

## CURRENT EXPERIMENTS IN PARTICLE PHYSICS

### Particle Data Group

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**Abstract** - This report contains summaries of current and recent experiments in Particle Physics. Included are experiments at BEPC (Beijing), BNL, CEBAF, CERN, CESR, DESY, FNAL, Frascati, ITEP (Moscow), JINR (Dubna), KEK, LAMPF, Novosibirsk, PNPI (St. Petersburg), PSI, Saclay, Serpukhov, SLAC, and TRIUMF, and also several proton decay and solar neutrino experiments. Excluded are experiments that finished taking data before 1991. Instructions are given for the World Wide Web (WWW) searching of the computer database (maintained under the SLAC-SPIRES system) that contains the summaries.

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## INTRODUCTION

This report contains full summaries of 180 approved current and recent experiments in elementary particle physics. The focus of the report is on selected experiments which directly contribute to our better understanding of elementary particles and their properties such as masses, widths or lifetimes, and branching fractions. This year's report is, in a way, a companion volume to the main Particle Data Group publication, *Review of Particle Physics*. Experiments at the following laboratories are included:

BEPC (Beijing) *	LAMPF (Los Alamos) *
BNL (Brookhaven) *	Novosibirsk (Inst. Nucl. Phys.)
CEBAF (now Jefferson Lab)	PNPI (St. Petersburg)
CERN (Geneva) *	PSI (Villigen) *
CESR (Cornell U.) *	SATURNE (Saclay) *
DESY (Hamburg) *	Serpukhov (Inst. High Energy Phys.)
FNAL (Batavia) *	SLAC (Stanford U.) *
Frascati (Lab. Nazionali)	TRIUMF (Vancouver)
ITEP (Moscow) *	Underground experiments
JINR (Dubna) *	Underice experiments
KEK (Tsukuba) *	Underwater experiments

For the institutions marked with an asterisk, the corresponding summaries section also contains a brief description of the particle physics plans at the laboratory till the end of the century.

We also list 263 other experiments at the above laboratories. Although, to the best of our knowledge, these experiments do not measure directly the properties of particles listed in the *Review of Particle Physics*, they still may be of considerable interest to the particle physics community. These additional experiments only have brief entries in the printed version of the report, but often have a full description in an online-accessible database from which the report is produced. The readers are encouraged to find more information about those experiments in the database (see below).

We exclude from this year's report the experiments for which the data collection was completed before 1991. We generally do not cover the experiments dealing primarily with nuclear levels or other nuclear-structure properties. As to the choice of institutions, we try to include those in which particle physics experiments top the list of priorities at the laboratory.

**Sources of information** — Our first information about an experiment usually comes from the proposal for the experiment. Subsequently, we follow the progress of the experiment as best we can in laboratory reports such as *Experiments at CERN*. Finally, a few months before an edition of this report is to appear, we send copies of the summaries of the experiments to the spokespersons for checking and updating. If a reply is received — as was the case for 90% of the experiments — there is a “√” next to the spokesperson's name. Since current experiments are often in flux, we rely heavily on these replies to be up to date: no √ by the spokesperson means the summary may be inaccurate or incomplete. (For a handful of experiments, we verified our information with a senior member of the experiment, not the spokesperson, but for simplicity put a √ by the spokesperson. For experiments with more than one spokesperson, all the spokespersons are checked even if only one of them replied.)

**Computer database** — This report is produced from a computer database maintained at SLAC under the SPIRES database management system. The database, named EXPERIMENTS, also contains information from earlier editions of this report, going back to about 1975, and including older experiments at Argonne, INS, IUCF, and Rutherford. See page 3 for a guide to using the EXPERIMENTS database via the World Wide Web (WWW).

**Summaries** — Each summary lists several dates related to the experiment: the date of the proposal, the approval date, and when the data-taking began and was completed. The title of the proposal and the most recent list of participants are given. The detector used in the experiment is identified either by a generic name (e.g., counter) or by a widely known acronym (e.g., SLD). The most important reactions and particles studied and the beam energy or momentum are listed where known. A brief comment describing the apparatus and the main goals of the experiment may follow. A summary ends with a list of any journal articles on results or instrumentation of the experiment. Related experiments, similar either in methods used or in subject of study, are also listed. Where known, an e-mail contact address and the WWW uniform resource locator (URL) are given.

**Abbreviations** — To keep the summaries brief, abbreviations are used to indicate journals, kinematic variables, accelerators, and detectors. The abbreviations are usually obvious but are also defined near the beginning of the report. The abbreviated forms are needed for searching the EXPERIMENTS database online.

**Acknowledgments** — P. Yamin (BNL), D. Buckle (CEBAF), M. Draper and B. Powell (CERN), and J. Parker (FNAL) kindly provided computer files with data on experiments from their respective institutions. Valuable additional information was obtained from P. Yamin (BNL), G. Fraser (CERN), P. Drell (CESR), P. Folkerts (DESY), R. Rubinstein (FNAL), M.V. Danilov (ITEP), H.K. Walter (PSI), and D.W. Leith (SLAC). We thank F.E. Armstrong (LBL) for her help with the final processing of the manuscript. We particularly thank the hundreds of spokespersons who took the time to reply to our inquiries.

**Comments and requests** — We invite comments pointing out omissions, obscurities, out-of-date information, and errors. We also encourage spokespersons to send us proposals and letters of intent for their future experiments. Comments and other material should be sent to:

EXPERIMENTS (c/o H. Galić)  
SLAC Library, MS 82  
P.O. Box 4349  
Stanford, CA 94309, USA  
e-mail: [expbase@slac.stanford.edu](mailto:expbase@slac.stanford.edu)

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## SEARCHING THE 'EXPERIMENTS' DATABASE VIA WORLD WIDE WEB

The summaries of current and many earlier experiments related to particle physics are contained in a computer database called EXPERIMENTS, maintained at SLAC under the SPIRES database management system. Note that even the experiments which only have a brief description in this report may still have a full description in the database. You can access the EXPERIMENTS database most easily via the World Wide Web (WWW). The first part of this section describes a simple database search based on the Web forms. This is followed by a few examples of a more advanced search technique. The concluding part lists some other computer-reachable sources of interest to experimental particle physicists.

**General information** — If your computer is linked to the Internet, you should be able to access the World Wide Web. The Web was brought to life in the early nineties by Timothy Berners-Lee and collaborators at CERN. Free WWW software is available for various platforms and various needs, from PC's to large computer systems, from simple line-mode browsers to sophisticated full-screen navigators. Names of some of the popular software packages that enable the Web access are Lynx, Netscape, and Mosaic, but the selection is by no means restricted to those three. Learn from your local computing center where and how to obtain the Web software most appropriate for your computer.

**EXPERIMENTS home page** — The EXPERIMENTS database and many other SPIRES-based SLAC Library databases are searchable via WWW. Find the home page for the EXPERIMENTS database at:

<http://www-spires.slac.stanford.edu/find/experiments>

When you open this document, you find a simple form which allows you to fill in one or several elements which best describe your search criteria. In the old days, when the database was only accessible through e-mail, you had to send a request written in the SPIRES search language to the SPIRES e-mail server. The Web form eliminates this step, and even a novice can immediately begin a searching session. Furthermore, a Web search presents much more than the old e-mail search method. The e-mail result was a text, while the WWW result is a hypertext. The marked hypertext leads to related links, and you can, for example, find a more thorough bibliographic description of journal articles corresponding to a given experiment (from the HEP database), and often read or print a postscript version of such articles. Similarly, if an experiment has a Web home page, you will be able to get there easily, and you may also find a direct link to the database entries of the experiments related to the selected one.

**Simple form searching** — Forms, in general, are simple to use and don't require much explanation. Explore them on your own, or use the following hints to get to the expected result even sooner. The EXPERIMENTS form allows you to find a result by a title-word search, by a search for a participant in an experiment, or by the experiment's official code number. You can also find all the experiments in which a certain institution is involved, or your search could be based on, for example, the particles studied in an experiment. You fill in the entries you know, leaving the others blank. The 'result' of a search is a database entry which fully describes an experiment, including the complete list of authors, a title, a description of the experiment's goals and methods, a list of resulting journal articles, etc.

To find all the experiments in which the author Johnson has participated, type the author's last name (surname) into the appropriate box. If an initial is added, separate it by a comma, e.g., johnson, g. Keep in mind that somebody you may know as Betty could officially be Elizabeth, Bob may be signing his papers as Robert, etc. If you are not sure what the right first name is, just do not use the initial. The last name can be truncated, e.g., leder# for Lederman. To deal with a combination of several authors, use the words **and**, **or**, and **and not**, e.g., johnson or smith will yield experiments by either physicist, johnson and smith will find experiments in which both have participated, whereas johnson and not smith will yield experiments by Johnson so long as Smith is not involved. If a special character appears in a name, such as the ü in the German spelling of Müller, try alternate spellings, such as muller or mueller. If you happen to know that author Johnson is from SLAC, for example, use both the participant and the affiliation boxes. If you are only interested in experiments which author Johnson did at Fermilab, type in the name (johnson), and also select Fermilab in the list of accelerators. To initiate a search, press the Perform Search button. Do not forget to use the Clear All Fields button between two searches.



If you are interested in the experiments that study the CP violation, for example, try the title-word search. Enter any or all expected words from the title in any order. A truncated search may be used, e.g., cp# in the title-word box yields titles containing the word CP standing free (as in CP violation), and also all the titles in which CP is hyphenated (as in CP-violating). If you type solar neutrino into the title-word box, you will find all the experiments with these two words (any order) in the titles. You can combine any number of other elements with your title-word search. For example, to find some of the recently approved CP violation experiments, type cp# in the title-word box, and select 'After' and '1990' in the two pull-down menus for the date-approved search element.

To find all the experiments in which people from a given institution participated, type the institution's name (exactly as it appears in this report's summaries) into the affiliation box. Similarly, type the experiments' official code number, as it appears in this report, into the exp-number box (e.g., type cern-na-048 to find more about the NA48 experiment at CERN). For many experiments you can also use a nickname instead of the complete code number. For example, if you type opal in the exp-number box, you will find the CERN-LEP-OPAL entry, while d0 or dzero yields the FNAL-740 description. (You can also find the OPAL and D0 entries by selecting the corresponding detectors in the list of detectors). To find both D0 and CDF entries, use dzero or cdf, and to find all four LEP experiments, type cern-lep-# into the exp-number box.

To use the studied-particle box, you must know the database-adopted spelling of various particles. We use k+, for example, and not kplus for  $K^+$ , and pi0, not pizero for  $\pi^0$ . An antiparticle name in the database is usually formed by adding the suffix bar to the corresponding particle name. Thus the antiproton in the studied-particle box should be written as pbar. An extensive list of the 'correct' particle names can be found on the EXPERIMENTS help page. (Note that the particle names in the studied-particle search are strictly standardized. In a title search, to the contrary, particle names are somewhat variable in their spelling and several forms should be tried).

If you are interested in finding all the experiments at a given accelerator, select the appropriate laboratory in the list of accelerators. Similarly, if you know a detector's name, try the list of detectors. The defaults are 'Any Accelerator' and 'Any Detector'. The date-approved search is useful if you know the approval year. You can also eliminate older experiments from your search result if you select the date-approved carefully. The default for the date-approved is 'Don't Know'.

**Advanced searching** — For the old hands and for those who want to have better control over searching, the form has a separate part named 'Make your own search'. This part only has one search window into which you type a complete SPIRES search command. To learn more about the SPIRES search language, check the 1994 and earlier editions of *Current Experiments*. Here we give a few examples of what could be typed into the SPIRES search window. We use lower case, but a search is case insensitive, and in an actual search you may use both lower and upper case characters.

Important note: whenever a term you wish to find contains characters, ')', '>', '<', or '(', the entire search value must be enclosed in double quotes (see examples below)

FIND, SHOW and BROWSE are some of the command verbs you can use in SPIRES searching. You can formulate a variety of search commands by using these three verbs. For example,

show indexes

(Shows the available search terms, e.g., AUTHOR, PAPER, EXP, etc. Use these terms in your search request to BROWSE and FIND, e.g., BROWSE AUTHOR..., or FIND PAPER..., FIND EXP..., etc.)

browse author trilling

(Displays values in the author-name index surrounding the stated value.)

browse exp

(No search value for EXP is given. SPIRES returns several random values of experiment code-numbers.)

browse exp desy

(Displays values in the code-number index alphabetically surrounding the specified value. Useful if you do not know the exact form or spelling of a search value.)

find author rubbia, c or

find author c rubbia

(Finds experiments in which the stated author has participated. The first-name initial is optional: find author rubbia will also work fine.)

find exp saturne-258

(Finds the record corresponding to the specified value.)

find paper "PR D37 (1988) 1131"

(Finds the experiment reported in the stated reference. Note that the reference has spaces but no commas between the elements. Double quotes are obligatory, see the box above.)

find reaction "e+ e- --> mu+ mu- x"

(The 'arrow' is composed of two minus signs and a 'greater-than' sign. Note the obligatory quotes.)

find ac kek-tristan

(Finds experiments using the stated accelerator.)

find de crystal-ball

(Finds experiments using the stated detector.)

find title cp phase difference

(Finds experiments with the words CP, PHASE, and DIFFERENCE in the title. The order of title words in a search command is unimportant.)

find af rutgers u

(Finds experiments in which people from the stated institution participated.)

find af rutger#

(Finds experiments with the stated affiliation. '#' represents any remaining characters.)

find particle d+

(Finds experiments studying the specified particle.)

The following search commands are also allowed:

find author prefix patters

(Finds authors whose last names begin with the string PATTERS, e.g., Patterson)

find af prefix northwest

find reaction prefix pi+ n

find exp sld

(For most of the large experimental collaborations you may type just the collaboration name instead of the full experimental number)

Compound searching is not only possible, but also desirable, because it keeps search results smaller:

find author prokoshkin and exp prefix cern

find af moscow, itep and not date before 1992

find particle j/psi or "psi(2s)"

Occasionally a search may fail. With some care you can reduce unsuccessful searching to a minimum:

- (i) Remember that any search value containing any of the special characters `)`, `>`, `<`, `(`, **must** be enclosed in double quotes. See the examples above for the PAPER, REACTION, and PARTICLE searches;
- (ii) Use the 'correct' form of a search value: a database-adopted particle name (e.g., K+, not Kplus), proper experiment code-name (e.g., FNAL-761, not FNAL-E761), etc. To find the correct forms, use the BROWSE command for the index you are searching.

**Other SLAC-SPIRES databases** — Several other SLAC Library databases of interest to experimental physicists are available via WWW. They are all listed on the SPIRES home page:

<http://www-spires.slac.stanford.edu/find/spires.html>

(1) HEP-PREPRINTS database is a joint project of SLAC and DESY libraries, and contains more than 320,000 bibliographic entries on particle physics papers (preprints, journal articles, reports, theses, conference papers, etc.); (2) BOOKS contains bibliographic summaries of more than 20,000 textbooks, conference proceedings, monographs, etc., covering high-energy physics and related topics; (3) CONFERENCES database lists past and future conferences, schools, and meetings of interest to the particle-physics community; (4) HEPNAMES contains more than 30,000 e-mail addresses of people working in high-energy and medium-energy physics. (By the way, you can retrieve the HEPNAMES data without leaving the EXPERIMENTS search form: to get the author Johnson's e-mail address, for example, just type the command query johnson into the 'Make your own search' window); (5) Database INSTITUTIONS lists about 5,000 addresses (and, often, phone and fax numbers) of institutions related to high-energy physics.

**Other computer accessible sources** — Clones of the EXPERIMENTS database are maintained for local users at the Yukawa Institute (Kyoto-SPIRES), Durham University (Durham-RAL BDMS), and IHEP (Protvino BDMS). The Durham version can also be found at <http://cpt1.dur.ac.uk/HEPDATA/EXP>

A Web document called Experiments Online is a guide to home pages of various high-energy physics collaborations. It is updated weekly. To add your experiment's home page to the document, write to [expbase@slac.stanford.edu](mailto:expbase@slac.stanford.edu). Find Experiments Online at:

<http://www-spires.slac.stanford.edu/find/explist.html>

We urge all active experimental collaborations to establish their home pages on the Web. Such pages keep the collaboration members better informed, and should also serve to represent the group to the world. At the very minimum, each home page should list the current members of the collaboration and identify the spokesperson, give the objectives of the experiment and describe the experimental apparatus, and list the journal articles, conference papers and preprints which have resulted from the collaboration's work.

Experimental physicists are invited to post their papers to the **hep-ex** e-print archive. To receive detailed instructions on submitting and retrieving papers, send a blank e-mail message with the subject **help** to: [hep-ex@xxx.lanl.gov](mailto:hep-ex@xxx.lanl.gov). E-mail listings of the experimental physics titles and abstracts submitted to the archive can be received daily by sending a blank e-mail with the subject **subscribe** <your-name> to [hep-ex](mailto:hep-ex). The listings and papers can also be accessed through the Web link <http://xxx.lanl.gov/>

You will find a well-documented list of other computer accessible sources of interest to particle physicists in the latest edition of the *Review of Particle Physics*, Physical Review D54 (1996) 1-720. The list is also posted at:

<http://www.slac.stanford.edu/library/pdg/hepinfo.html>

The *Review* itself is available over the Web. Check the Berkeley Particle Data Group WWW server at <http://pdg.lbl.gov/>

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## ABBREVIATIONS USED IN THE SUMMARIES

### JOURNALS

Following are abbreviations for journals listed in the summaries:

<b>APL</b>	Applied Physics Letters
<b>APP</b>	Acta Physica Polonica
<b>AOPT</b>	Applied Optics
<b>ASPP</b>	Astroparticle Physics
<b>ASTJ</b>	Astrophysical Journal
<b>CPC</b>	Computer Physics Communications
<b>DANS</b>	Doklady Akademii Nauk SSSR (in Russian)
<b>ECHAYA</b>	Fizika Elementarnykh Chastits i Atomnogo Yadra (translated as PPN)
<b>EPL</b>	Europhysics Letters
<b>FBS</b>	Few Body Systems
<b>HEPNP</b>	High Energy Physics and Nuclear Physics (in Chinese)
<b>HFI</b>	Hyperfine Interactions
<b>IEEE TNS</b>	Institute of Electrical and Electronics Engineers, Transactions on Nuclear Science
<b>IJMP</b>	International Journal of Modern Physics
<b>JDEP</b>	Journale de Physique
<b>JETPL</b>	Journal of Experimental and Theoretical Physics Letters (English translation of ZETFP)
<b>JOSA</b>	Journal of the Optical Society of America
<b>JPHY</b>	Journal of Physics
<b>JPSJ</b>	Journal of the Physical Society of Japan
<b>LNC</b>	Lettere al Nuovo Cimento
<b>MPL</b>	Modern Physics Letters
<b>NATU</b>	Nature
<b>NC</b>	Nuovo Cimento
<b>NIM</b>	Nuclear Instruments and Methods
<b>NP</b>	Nuclear Physics
<b>PAN</b>	Physics of Atomic Nuclei (English translation of YF)
<b>PHYU</b>	Physics - Uspekhi (English translation of USP)
<b>PL</b>	Physics Letters
<b>PPN</b>	Physics of Particles and Nuclei (English translation of ECHAYA)
<b>PR</b>	Physical Review
<b>PRL</b>	Physical Review Letters
<b>PRPL</b>	Physics Reports
<b>PS</b>	Physica Scripta
<b>PTE</b>	Pribory i Tekhnika Eksperimenta (in Russian)
<b>PTP</b>	Progress of Theoretical Physics
<b>PW</b>	Particle World
<b>RMP</b>	Reviews of Modern Physics
<b>RPP</b>	Reports on Progress in Physics
<b>RSI</b>	Review of Scientific Instruments
<b>SCI</b>	Science
<b>SJNP</b>	Soviet Journal of Nuclear Physics (English translation of YF)
<b>USP</b>	Uspekhi Fizicheskikh Nauk (translated as PHYU)
<b>YF</b>	Yadernaya Fizika (translated as SJNP before 1993, and as PAN thereafter)
<b>ZETFP</b>	Pisma v Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki (translated as JETPL)
<b>ZPHY</b>	Zeitschrift für Physik

## KINEMATIC VARIABLES

Following are abbreviations used with reactions to indicate the momenta or energies at which they are studied:

PLAB	beam momentum in the lab frame
TLAB	beam kinetic energy in the lab frame
ELAB	beam total energy in the lab frame
PLAB/N	beam momentum per nucleon in the lab frame
TLAB/N	beam kinetic energy per nucleon in the lab frame
ELAB/N	beam total energy per nucleon in the lab frame
ECM	total energy in the c.m. frame

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## ACCELERATORS

BEPC	Beijing $e^+e^-$ collider (3.6 GeV Ecm)
BNL	Brookhaven AGS proton synchrotron (31 GeV/c Plab)
BNL-RHIC	Brookhaven relativistic heavy ion collider (100 GeV/n per beam)
CEBAF	CEBAF linear accelerator with continuous $e^-$ beam (4.0 GeV Ecm)
CERN-LEAR	CERN Low-Energy Antiproton Ring
CERN-LEP	CERN Large Electron-Positron collider (90-180 GeV Ecm)
CERN-LHC	CERN Large Hadron Collider (14 TeV Ecm)
CERN-PBAR/P	CERN $\bar{p}p$ collider (900 GeV Ecm)
CERN-SPS	CERN Super Proton Synchrotron (450 GeV/c Plab)
CESR	Cornell Electron-positron Storage Ring (16 GeV Ecm)
DESY-DORIS-III	DESY DORIS electron-positron double ring, 1991 upgrade
DESY-HERA	DESY HERA electron (27 GeV) - proton (820 GeV) collider
FNAL-COLLIDER	FNAL $\bar{p}p$ collider (2000 GeV Ecm)
FNAL-TEV	FNAL fix target Tevatron (1000 GeV)
FRASCATI-DAPHNE	$e^+e^-$ storage ring and $\phi$ factory (1 GeV Ecm)
ITEP	ITEP Moscow proton synchrotron (7 GeV/c Plab)
JINR	JINR (Dubna) proton synchrotron (10 GeV/c Plab)
KEK	KEK proton synchrotron (12 GeV/c Plab)
KEK-B-FACTORY	KEK two-ring asymmetric B factory
KEK-TRISTAN	KEK electron-positron storage ring (60 GeV Ecm)
LAMPF	Los Alamos Meson/Proton Factory (1460 MeV/c Plab)
NOVO-VEPP-2M	Novosibirsk VEPP-2M electron-positron storage ring (1.4 GeV Ecm)
NOVO-VEPP-4M	Novosibirsk VEPP-4M electron-positron storage ring (7 GeV Ecm)
PNPI	Synchrocyclotron at St. Petersburg Inst. Nucl. Phys. (1 GeV Tlab)
PSI	Cyclotron at Paul Scherrer Institute (590 MeV Tlab)
SATURNE-II	Saclay Saturne-II $p$ , $d$ , and He synchrotron
SERPUKHOV	Serpukhov proton synchrotron (76 GeV/c Plab)
SERPUKHOV-UNK	Serpukhov multi-TeV proton machine
SLAC	Stanford electron linear accelerator (40 GeV/c Plab)
SLAC-PEP2	New SLAC Positron-Electron Project (asymmetric B factory)
SLAC-SLC	SLAC Linear $e^+e^-$ Collider (100 GeV Ecm)
TRIUMF	Canadian TRIangle University Meson Facility (520 MeV Tlab)

## DETECTORS

In searching the EXPERIMENTS database (SLAC/SPIRES) from which this report is taken, use the following abbreviations for general kinds of detectors:

CALO	calorimeter
CNTR	counter(s)
COMB	combination of various elements
DAS	double-arm spectrometer
DRIFT	drift chamber
EMUL	emulsion
IONIZATION	detector looking for ionization
MWPC	multiwire proportional chamber
PHOTON	photon spectrometer such as NaI or Ge detectors
PLASTIC	Lexan, etc., used like emulsion
PMT	various photomultiplier tubes
RICH	ring-imaging Čerenkov detector
SAS	single-arm spectrometer
SCINT	scintillator
SPEC	spectrometer system
STRC	streamer chamber
TRACK	tracking system
WIRE	wire chamber

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We use the following acronyms for specific detectors (both in this Report and in the SLAC/SPIRES database):

ALEPH	CERN-LEP detector
ALPHA	JINR magnetic spectrometer system
AMY	KEK-TRISTAN high-resolution lepton detector
ARGUS	DESY-DORIS-II detector
ATLAS	CERN-LHC proposed detector
BABAR	SLAC-PEP2 proposed detector
BELLE	KEK-B-FACTORY proposed detector
BES	BEPC detector
BRAHMS	BNL-RHIC proposed Broad Range Hadron Magnetic Spectrometer
CCM	FNAL-TEV Chicago Cyclotron Magnet spectrometer
CDF	Collider Detector at Fermilab
CHARM-II	CERN-SPS upgrade of CHARM neutrino detector
CLAS	CEBAF Large Acceptance Spectrometer
CLEO	CESR spectrometer system
CMD-2	Novosibirsk upgrade of CMD detector
CMS	CERN-LHC proposed detector
CRYSTAL-BALL	SLAC-PEP, DESY-DORIS, BNL Crystal Ball large-solid-angle neutral detector
CRYSTAL-BARREL	CERN-LEAR large-solid-angle detector
DELPHI	CERN-LEP detector
D0	FNAL-COLLIDER detector
EMC	CERN-SPS European Muon Collaboration detector
EXCHARM	Serpukhov detector, upgrade of BIS-2M
GAMS-4000	CERN-SPS 64×64 cell Pb-glass array
GAMS-4PI	Serpukhov gamma spectrometer
GGNT	Baksan Gallium-Germanium Neutrino Telescope
HELIOS	CERN-SPS detector
HLBC-DIANA	ITEP heavy liquid bubble chamber
HLBC-SKAT	Serpukhov heavy liquid bubble chamber
HYPERON-II	Serpukhov single arm magnetic spectrometer
H1	DESY-HERA detector
ICARUS	Gran Sasso bubble chamber detector
ISTRA-M	Serpukhov detector

## DETECTORS

<b>JETSET</b>	CERN-LEAR compact general purpose detector
<b>KEDR</b>	NOVO-VEPP-2M universal magnetic detector
<b>KLOE</b>	Frascati DAΦNE detector
<b>LAB-E</b>	FNAL-TEV target-calorimeter muon-spectrometer detector for neutrino physics
<b>LAMBDA METER</b>	ITEP detector
<b>LSND</b>	LAMPF Liquid Scintillator Neutrino Detector
<b>L3</b>	CERN-LEP detector
<b>MACRO</b>	Gran Sasso detector
<b>MEGA</b>	LAMPF array of electron and photon spectrometers
<b>MIS</b>	Serpukhov multiparticle spectrometer
<b>MIS-2</b>	Serpukhov upgrade of MIS
<b>MPS</b>	BNL MultiParticle Spectrometer
<b>MPS-II</b>	BNL upgrade of MPS
<b>MTS</b>	ITEP detector
<b>NEPTUN</b>	Serpukhov-UNK jet target detector
<b>NMS</b>	LAMPF Neutral Meson Spectrometer
<b>OMEGA</b>	CERN, CERN-SPS spectrometer system
<b>OMEGAPRIME</b>	CERN-SPS spectrometer system
<b>OPAL</b>	CERN-LEP detector
<b>PHENIX</b>	BNL-RHIC photon, electron, and hadron detector, under construction
<b>PHOBOS</b>	BNL-RHIC two-arm multiparticle spectrometer, under construction
<b>PINOT</b>	Saclay high resolution pi0 and eta detector
<b>QUARTZ</b>	Serpukhov crystal-diffraction spectrometer
<b>SINDRUM</b>	PSI large-solid-angle magnetic detector
<b>SINDRUM-II</b>	PSI upgraded large-angle solenoid detector
<b>SLD</b>	SLAC-SLC detector
<b>SND</b>	Novosibirsk Spherical Neutral Detector
<b>SPES-0</b>	Saclay modular lead-glass Čerenkov detector
<b>SPES-II</b>	CERN, CERN-LEAR high-resolution spectrometer
<b>SPES-III</b>	Saclay high-resolution spectrometer
<b>SPES-IV</b>	Saclay high-resolution spectrometer
<b>SPES4-PI</b>	Saclay high-resolution spectrometer
<b>SPHINX</b>	Serpukhov detector, also known as SFINKS
<b>STAR</b>	BNL-RHIC solenoidal detector, under construction
<b>TOKIWA</b>	KEK-PS spectrometer
<b>TOPAZ</b>	KEK-TRISTAN solenoidal spectrometer with TPC
<b>TPS</b>	FNAL Tagged Photon Spectrometer
<b>VENUS</b>	KEK-TRISTAN Versatile Economical and Novel Universal Spectrometer
<b>VES</b>	Serpukhov magnetic VERTex Spectrometer
<b>ZEUS</b>	DESY-HERA detector



## BEPC Experiments

### BEPC-BES

(Began data-taking 1991, In progress)

#### MEASUREMENT OF THE $\tau$ LEPTON MASS WITH THE BEIJING SPECTROMETER (BES)

##### BES COLLABORATION

BEIJING, IHEP - J Z Bai, S M Chen, S J Chen, Y Q Cheng, Z D Cheng, H C Cui, X Z Cui, H L Ding, Z Z Du, C Fang, M L Gao, S Q Gao, W X Gao, Y N Gao, J H Gu, S D Gu, W X Gu, Y N Guo, Y Y Guo, Y Han, J He, G Y Hu, H B Hu, T Hu, D Q Huang, Y Z Huang, C H Jiang, Z J Jiang, Y F Lai, P F Lang, F Li, J Li (Spokesperson), P Q Li, Q M Li, R B Li, W D Li, W Li, W G Li, Y S Li, S Z Lin, H M Liu, Q Liu, R G Liu, Y Liu, J G Lu, D H Ma, E C Ma, J M Ma, H S Mao, Z P Mao, X C Meng, H L Ni, L J Pan, N D Qi, Y K Que, G Rong, Y Y Shao, D L Shen, H Y Sheng, H Z Shi, X F Song, H S Sun, G L Tong, L Z Wang, M Wang, P L Wang, P Wang, T J Wang, Y Y Wang, X D Wu, D M Xi, X M Xia, P P Xie, X X Xie, R S Xu, Z Q Xu, S T Xue, J Yan, W G Yan, C Y Yang, C M Yang, H B Yao, M H Ye, S Z Ye, Z Q Yu, B Y Zhang, C C Zhang, D H Zhang, H Y Zhang, H L Zhang, J W Zhang, L S Zhang, S Q Zhang, Y Zhang, D X Zhao, M Zhao, P D Zhao, W R Zhao, J P Zheng, L S Zheng, Z P Zheng, G P Zhou, H S Zhou, L Zhou, L Zhou, X F Zhou, Y H Zhou, Q M Zhu, Y S Zhu, Y C Zhu

BOSTON U - J A Coller, A S Johnson, J Shank, J S Whitaker

CAL TECH - M Hatanaka, D Hitlin, L A Jones, M H Kelsey,

J H Panetta, F Porter, E N Prabhakar, X Shi

COLORADO STATE U - J Chen, Q P Jia, W Toki

(Spokesperson), R J Wilson

HAWAII U - A Breakstone, F Harris, S Olsen, D Paluselli

MIT, LNS - O Bardon, R Cowan, M Fero, J Quigley, E Torrence,

R K Yamamoto

SLAC - R A Becker-Szendy, W M Dunwoodie, H Marsiske,

E Soderstrom, J Synodinos, W J Wisniewski

TEXAS U, DALLAS - I Blum, J S Campbell, P Gratton,

J M Izen, X Lou, B Lowery, J Standiford

UC, IRVINE - A J Lankford, M Mandelkern, M Schernau,

B Schmid, J Schultz, A Smith, D P Stoker, G Zioulas

WASHINGTON U, SEATTLE - T Burnett, K Young

Accelerator BEPC Detector BES

##### Reactions

$e^+ e^- \rightarrow \tau^+ \tau^-$  3.6 GeV ( $E_{cm}$ )

Particles studied  $\tau$

Brief description Uses non-collinear 2-prong  $e\mu$  events with both  $e$  and  $\mu$  identified. Measures the threshold behavior of the cross-section by scanning a very narrow range of energies,  $3.544 < E_{cm} < 3.569$  GeV. The BES detector consists of a Muon Counter, TOF Counters, a Barrel Shower Counter and the main Drift Chamber. A major upgrade of the detector will be completed in the Fall 1996, and data-taking continued.

Journal papers NIM A308 (1991) 616, PRL 69 (1992) 3021, PL B355 (1995) 374 [erratum: PL B363 (1995) 267], PRL 74 (1995) 4599, PR D52 (1995) 3781, PR D53 (1996) 20, and PR D54 (1996) 1221.

E-mail contact lij@bepc2.ihep.ac.cn, toki@lamar.colostate.edu

WWW Home-page

<http://www-bes.slac.stanford.edu/beswww/bes.html>

## BEPC Future Plans

The upgrade of the BES spectrometer, which began in 1993, is nearing its completion, which promises new important physics results in the next few years at BEPC. The Lab is also actively involved in the design of the Beijing Tau Charm Factory (BTCF) which got positive reviews at home and abroad. BTCF was the main topic of a recent workshop in Beijing.

## Selected BNL Experiments

### BNL-787

(Proposed Sep 1983, Approved Oct 1983, Began data-taking Jun 1988, In progress)

#### A STUDY OF THE DECAY $K^+ \rightarrow \pi^+ \nu \bar{\nu}$

BROOKHAVEN - S Adler, M S Atiya, I H Chiang, M Diwan, J S Frank, E Garber, J S Haggerty, S H Kettell, T F Kycia, K K Li, L S Littenberg ( $\checkmark$  Spokesperson), C F Ng, A Sambamurti, A J Stevens, R C Strand, C Witzig, Y Zhao  
TOKYO U, INS - M Kazumori, T Komatsubara, M Kuriki, T Morimoto, N Muramatsu, H Okuno, K Omata, A Otomo, S Sugimoto, K Tauchi, K Ukai  
KEK - M Aoki, T Inagaki, S Kabe, M Kobayashi, Y Kuno, T Sato, T Shinkawa, Y Yoshimura  
OSAKA U - Y Kishi, T Nakano, T Sasaki  
PRINCETON U - D Akerib, M Ardebili, M Convery, M M Ito, D R Marlow, R McPherson, P D Meyers, W Sands, M A Selen, F C Shoemaker, A J S Smith ( $\checkmark$  Spokesperson), J R Stone  
TRIUMF - P Bergbusch, E W Blackmore, D A Bryman ( $\checkmark$  Spokesperson), M Burke, J V Cresswell, A Daviel, S Daviel, P Kitching, A Konaka, M LeNoble, J A Macdonald, J Mildeberger, T Numao, P Padley, J M Poutissou, R Poutissou, G Redlinger, J Roy, M Rozon, R Soluk, A S Turcot

Accelerator BNL Detector Spectrometer

##### Reactions

$K^+ \rightarrow \pi^+ \nu \bar{\nu}$	0 MeV/c ( $P_{lab}$ )
$K^+ \rightarrow \pi^+ \mu^+ \mu^-$	"
$K^+ \rightarrow \mu^+ \mu^+ \mu^- \nu$	"
$K^+ \rightarrow \mu^+ \nu \gamma$	"
$K^+ \rightarrow \pi^+ higgs$	"
$K^+ \rightarrow \pi^+ \gamma \gamma$	"
$K^+ \rightarrow \pi^+ X$	"
$K^+ \rightarrow \pi^+ \pi^0 \gamma$	"
$\pi^0 \rightarrow \nu \bar{\nu}$	205 MeV/c ( $P_{lab}$ )
$\pi^0 \rightarrow \gamma X$	"
$\pi^0 \rightarrow \gamma \nu \bar{\nu}$	"

Particles studied  $K^+$ , higgs, nuino,  $\pi^0$

Brief description A sensitivity down to a level of  $1 \times 10^{-10}$ , or

better, is expected for  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ . A measurement at this level determines  $|V_{td}|$ , given that  $m_t$  is known. An observation significantly above this level would indicate a fourth generation of quarks and leptons, the presence of nuinos, or other new phenomena. A simultaneous measurement of  $K^+ \rightarrow \pi^+ X$  to a sensitivity of about  $2 \times 10^{-11}$  is also expected. This probes the existence of axions, familons, hyperphotons, or other new particles. Other processes probe the existence of higgs, majorons, massive neutrinos, and other hypothetical particles. The first run was completed in June 91. Approved for 3000 additional hours with an upgraded beam and detector. The new beam (730 MeV/c  $K^+$ , stopped in spectrometer) was commissioned in 1992, the modified detector in 1994, and data was already collected with the new setup in 1995/96. Data taking is scheduled to resume in early 1997.

Journal papers NIM A279 (1989) 180, PRL 63 (1989) 2177, PRL 64 (1990) 21, PRL 65 (1990) 1188, NP (PROC SUPPL) 13 (1990) 568, PRL 66 (1991) 2189, NIM A321 (1992) 129, PRL 69 (1992) 733, PRL 70 (1993) 2521 [erratum: PRL 71 (1993) 305], PR D48 (1993) 1, PR D48 (1993) 1225, and PRL 76 (1996) 1421.

Related experiments N/A

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WWW Home-page <http://www.phy.bnl.gov/e787/e787.html>

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

### BNL-821

(Proposed Sep 1985, Sep 1986, Approved Nov 1986, In preparation)

#### A NEW PRECISION MEASUREMENT OF THE $g_{\mu} - 2$ VALUE AT THE LEVEL OF 0.35 PPM

##### MUON (G-2) COLLABORATION

BOSTON U - D H Brown, R M Carey, W Earle, E Efstathiadis, E S Hazen, B J Hughes, F Krienen, J P Miller, O Rind, B L Roberts (✓ Spokesperson), L R Sulak, W A Worstell  
 BROOKHAVEN - J T Benante, H N Brown, G Bunce, J R Cullen, G T Danby, C R Gardner, J M Geller, H Hseuh, J W Jackson, L- Jia, R Larsen, Y Y Lee, R E Meier, W Meng, W M Morse (✓ Spokesperson), C Pai, I Polk, R Prigl, S Rankowitz, J Sandberg, Y Semertzidis, R Shutt, L Snyderstrup, A Soukas, A Stillman, T Tallerico, P Thompson, F Toldo, K Woodle  
 CORNELL U - T Kinoshita, Y Orlov  
 FAIRFIELD U - D Winn  
 HEIDELBERG U, PHYS INST - J Gerhaeuser, A P Grossmann, K Jungmann, P von Walter, G zu Putlitz  
 HEIDELBERG, MAX PLANCK INST - U Haeberlen  
 ILLINOIS U, URBANA - P T Debevec, W Deninger, D W Hertzog, S A Sedykh, D C Urner  
 LBL & BROOKHAVEN - M A Green  
 MINNESOTA U - P B Cushman, S O Giron, J M Kindem, D E Maxam, D E Miller, C Timmermans, D Zimmerman  
 NOVOSIBIRSK, IYF - L M Barkov, D N Grigorev, B I Khazin, E A Kuraev, Y M Shatunov, E Solodov  
 TOKYO U - K Nagamine  
 SCIENCE U, TOKYO - Y Mizumachi  
 KEK - K Endo, H Hirabayashi, S Ichii, S Kurokawa, T Sato, A Yamamoto  
 WAKO, RIKEN - K Ishida  
 YALE U - S K Dhawan, F J M Farley, M Grosse-Perdekamp, V W Hughes (✓ Spokesperson), D M Kawall, S I Redin

Accelerator BNL Detector Other

Reactions Polarized beam

$\mu\text{on} \rightarrow e^{\pm} \nu \bar{\nu}$  3.09 GeV/c

Particles studied muon

Brief description Measures the anomalous gyromagnetic ratio of the muon and provides a direct test of the Standard Model. Uses a 7-m-radius superferric muon storage ring with a 1.45-tesla vertical field. Approved for 2100 hours. The first data collection expected in FY 1997.

E-mail contact roberts@bu.edu, morse1@bnl.gov, vernon.hughes@yale.edu

WWW Home-page <http://www.phy.bnl.gov/g2muon/home.html>

### BNL-840

(Proposed Jul 1987, Approved Oct 1987, Began data-taking Jul 1989, Completed data-taking Dec 1991)

#### SEARCH FOR THE COHERENT PRODUCTION OF LIGHT SCALAR AND PSEUDOSCALAR PARTICLES

ROCHESTER U - R Cameron, G Cantatore, A C Melissinos (✓ Spokesperson), J T Rogers, G Ruoso, Y K Semertzidis  
 BROOKHAVEN - H Halama, D Lazarus, A G Prodel  
 FERMILAB - F A Nezrick  
 CERN & TRIESTE U - P Micossi, C Rizzo, E Zavattini

Accelerator NONE Detector Other

Particles studied axion

Brief description The detector used two CBA superconducting dipoles. Searched for light scalar or pseudoscalar particles that couple to the electromagnetic field. Looked for optical rotation of a polarized laser beam traversing in vacuum the 3.5 T magnetic field. The sensitivity of  $10^{-10}$  rad corresponds to a limit on the coupling  $g_{a\gamma\gamma}$  of  $4 \times 10^{-7}$  GeV $^{-1}$ . Did not reach Delbruck scattering (real photons from virtual photons) below the  $e^+e^-$  threshold.

Journal papers PRL 64 (1990) 2988, JOSA B8 (1991) 520, PL A157 (1991) 125, PRL 69 (1992) 2333, ZPHY C56 (1992) 505, and PR D47 (1993) 3707.

Related experiments BNL-805

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### BNL-852

(Proposed Jan 1989, Approved Mar 1989, Began data-taking Jun 1993, In progress)

#### SEARCH FOR MESONS WITH UNUSUAL QUANTUM NUMBERS

BROOKHAVEN - S U Chung (✓ Spokesperson), R W Hackenburg, K Olchanski, D P Weygand, H J Willutzki  
 INDIANA U - B B Brabson, R R Crittenden, A R Dzierba, P C Figliozzi, J L Gunter, B Kern, R Lindenbusch, M McKerley, D R Rust, E B Scott, P T Smith, T Sulanke, S Teige  
 MASSACHUSETTS U, DARTMOUTH - Z Bar-Yam, J Cummings, J Dowd, P Eugenio, W Kern, E King  
 MOSCOW STATE U - E V Anoshina, L I Belzer, V A Bodyagin, A Demianov, A M Gribushin, O L Kodolova, V L Korotkiikh, M A Kostin, N Kruglov, A I Ostrovidov, A S Proskuryakov, L I Sarycheva, N B Sinev, I N Vardanyan, A A Yershov  
 NOTRE DAME U - T Adams, J M Bishop, N M Cason (✓ Spokesperson), E I Ivanov, J M LoSecco, J J Manak, A Sanjari, W D Shephard, D L Stienike, S A Taegar, D R Thompson  
 NORTHWESTERN U - D S Brown, T Pedlar, K K Seth, J Wise, D Zhao  
 SERPUKHOV - S Denisov, A Dushkin, V Kochetkov, V Lipaev, I Shein, A Soldatov  
 RENNELAER POLY - G Adams, J Kuhn, J Napolitano, M Nozar, J Smith, D B White, M Witkowski, A M Wright

Accelerator BNL Detector MPS

Reactions

$\pi^- p \rightarrow n \eta \pi^0$	18 GeV/c
$\pi^- p \rightarrow n \eta \eta$	"
$\pi^- p \rightarrow p \eta \pi^-$	"
$\pi^- p \rightarrow p \eta' \pi^-$	"
$\pi^- p \rightarrow p \eta \pi^- \pi^+ \pi^-$	"
$\pi^- p \rightarrow p \pi^- \pi^+ \pi^-$	"
$\pi^- p \rightarrow n \eta \pi^0 \pi^0$	"
$\pi^- p \rightarrow n \eta \pi^+ \pi^-$	"
$\pi^- p \rightarrow n \eta \eta'$	"
$\pi^- p \rightarrow n K^0 \bar{K}^0 \pi^0$	"
$\pi^- p \rightarrow n K^0 \bar{K}^0 \pi^0 \pi^0$	"
$\pi^- p \rightarrow n K^0 \bar{K}^0 \pi^+ \pi^-$	"

Particles studied exotic-meson, glueball, hybrid

Brief description Looks in particular for further evidence of an "M(1405)", observed to decay into  $\eta\pi^0$  in GAMS-spectrometer experiments at Serpukhov and CERN. Studies decay modes of mesons, with multiphotons and 0, 1, or 2 charged particles. The detector is built around MPS. An H<sub>2</sub> target is surrounded by a CsI veto. Other parts of the apparatus are a charged particle detector, a Čerenkov counter, and a 3000-element lead glass calorimeter. Approved for a total of 5000 hours. Taking data (July 96).

Journal papers NIM A332 (1993) 419, A342 (1994) 398, NIM A357 (1995) 95, and NIM A368 (1996) 617.

Related experiments SERPUKHOV-163, CERN-NA-012-2

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WWW Home-page

[http://lemond.phy.bnl.gov/~e852/home\\_e852.html](http://lemond.phy.bnl.gov/~e852/home_e852.html)

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

### BNL-865

(Proposed May 1990, Approved Jun 1990, Began data-taking 1995, In progress)

#### IMPROVED SEARCH FOR $K^+ \rightarrow \pi^+ \mu^+ e^-$

##### E865 COLLABORATION

BASEL U - G Backenstoss, W Menzel, H Weyer  
 BROOKHAVEN - D Lazarus, L Leipuner, H Ma, P Rehak  
 MOSCOW, INR - G S Atoyan, V V Isakov, O Karavichev,  
 A A Poblaguev, V Postoev, I N Semeniouk  
 NEW MEXICO U - B Bassalleck, S W Eilerts, J Lowe, D Wolfe  
 PSI, VILLIGEN - J Egger, W D Herold, H Kaspar, J Missimer  
 PITTSBURGH U - R Appel, N E Cheung, C A Felder,  
 H M Gach, D E Kraus, I G Ober, P A Pomianowski, A Sher,  
 J A Thompson  
 TBILISI STATE U - Y S Bagaturia, D Mazavia, G V Melitauri,  
 T M Sakhelashvili  
 YALE U - D R Bergman, H D Do, J A Lozano, W A Majid,  
 M E Zeller (✓ Spokesperson)  
 ZURICH U - S Pislak, P Robmann, P Truoel

Accelerator BNL Detector Spectrometer, Calorimeter

##### Reactions

$K^+ \rightarrow \pi^+ \mu^+ e^-$	6.0 GeV/c ( $P_{lab}$ )
$K^+ \rightarrow \pi^+ e^+ e^-$	"
$K^+ \rightarrow \pi^+ \mu^+ \mu^-$	"
$K^+ \rightarrow \pi^+ \pi^0 e^+ e^-$	"
$K^+ \rightarrow \pi^+ \pi^- e^+ \nu$	"
$\pi^0 \rightarrow e^+ e^-$	—

Particles studied  $K^+$ ,  $\pi^0$

Brief description Continuation of BNL-777 experiment, with a factor of approximately 70 improved sensitivity. The main purpose is to observe, or place a limit of a few times  $10^{-12}$ , on the branching ratio of the muon number violating decay  $K^+ \rightarrow \pi^+ \mu^+ e^-$ . Uses a magnetic spectrometer system with very high rate, and good particle identification. Aims at achieving significant improvements on measurements of rates and kinematic distributions of other rare decays (B.R.  $< 10^{-4}$ ). Taking data (July 96).

Related experiments BNL-777

E-mail contact michael.zeller@yale.edu

WWW Home-page

[http://130.132.48.201/www\\_info/e865/e865.html](http://130.132.48.201/www_info/e865/e865.html)

### BNL-871

(Proposed Sep 1990, Approved Nov 1990, Began data-taking Feb 1995, In progress)

#### A NEW SEARCH FOR VERY RARE $K_L$ DECAYS

UC, IRVINE - V Abadjev, M G Bachman, D F Connor,  
 P DeCecco, R M Djilibaev, N Kanematsu, R K Lee,  
 W R Molzon (✓ Spokesperson)  
 STANFORD U - C G Arroyo, K W Hartman, M J Hebert,  
 G M Irwin, D Ouimette, M C Pomot Maia, S G Wojcicki  
 (✓ Spokesperson)  
 TEXAS U - D Ambrose, S C Graessle, K Lang, A Milder,  
 J L Ritchie (✓ Spokesperson), V Vassikakopoulos  
 WILLIAM AND MARY COLL - M Eckhause, A D Hancock,  
 C Hoff, J R Kane (✓ Spokesperson), Y Kuang, R D Martin,  
 R E Welsh, E J Wolin  
 RICHMOND U - P D Rubin

Accelerator BNL Detector Spectrometer

##### Reactions

$K_L \rightarrow \mu^- e^+$	—
$K_L \rightarrow \mu^+ e^-$	—
$K_L \rightarrow \mu^+ \mu^-$	—
$K_L \rightarrow e^+ e^-$	—

Particles studied  $K_L$

Brief description A search for the decays  $K_L \rightarrow \mu e$  and

$K_L \rightarrow ee$  with a sensitivity of  $10^{-12}$ , and a measurement of the branching fraction for  $K_L \rightarrow \mu\mu$ . BNL-871 improves on the sensitivity of BNL-791 by more than a factor of ten. The detector consists of two dipoles, straw and wire drift chambers, scintillation and gas Čerenkov counters, a lead glass shower counter, and a muon rangefinder. A novel feature of the experiment is a shielded tungsten beam stop inside the spectrometer. Test data were taken in 1991/92, engineering runs were done in 1993/94, and the actual data taking began with a 5-month run in 1995. Approved for 7,000 hours. In progress (1996).

Related experiments BNL-791

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 ritchie@utaphy.ph.utexas.edu, kane@wmhcg.physics.wm.edu

WWW Home-page <http://www.ps.uci.edu/~e871/e871intro.html>

### BNL-881

(Proposed Jul 1991, Approved Aug 1991, In progress)

#### UTILIZING $\phi\phi$ SPECTROSCOPY TO SEARCH FOR EXOTIC GLUEBALLS, EXOTIC HYBRID, OR EXOTIC MULTIQUARK STATES

BROOKHAVEN & CITY COLL, NY - S J Lindenbaum

(Spokesperson)

BROOKHAVEN - R W Hackenburg, R S Longacre

CITY COLL, NY - C S Chan, E Efstathiadis, M A Kramer,

K Zhao, Y Zhu

CONNECTICUT U - M Gai

FERMILAB - K Vaziri

RENSSELAER POLY - G Adams, C Landberg, A M Perry,

B Wojtsekhowski

Accelerator BNL Detector MPS-II

##### Reactions

	8 GeV/c ( $P_{lab}$ )
$\pi^- p \rightarrow \phi \phi n$	8 GeV/c ( $P_{lab}$ )
$\pi^- p \rightarrow \phi K^+ K^- n$	"
$\pi^- p \rightarrow K^+ K^- K^+ K^- n$	"
$K^- p \rightarrow \phi \phi \Lambda$	"
$K^- p \rightarrow \phi \phi \Sigma$	"
$K^- p \rightarrow \phi K^+ K^- \Lambda$	"
$K^- p \rightarrow \phi K^+ K^- \Sigma$	"
$K^- p \rightarrow K^+ K^- K^+ K^- \Lambda$	"
$K^- p \rightarrow K^+ K^- K^+ K^- \Sigma$	"
$\bar{p} p \rightarrow \phi \phi \pi^0$	"
$\bar{p} p \rightarrow \phi K^+ K^- \pi^0$	"
$\bar{p} p \rightarrow K^+ K^- K^+ K^- \pi^0$	"

Particles studied glueball,  $f_2(2010)$ ,  $f_2(2300)$ ,  $f_2(2340)$

Brief description A search for exotic glueballs and exotic hybrids. Uses the MPS facility and the MESB beam at 8 GeV/c, tuned to contain  $\pi^-$ ,  $K^-$ , and  $\bar{p}$ . Lowering the momentum to 8 GeV/c increases the rate of exchanges required to make exotics. Currently pausing (May 96).

E-mail contact lindenbaum@bnldag.bnl.gov

WWW Home-page

[http://www.phy.bnl.gov/~e881/welcome\\_ag.html](http://www.phy.bnl.gov/~e881/welcome_ag.html)

### BNL-909

(Proposed Oct 1994, Approved Nov 1994, Began data-taking Apr 1995, Completed data-taking May 1995)

#### ETA PRODUCTION AT THRESHOLD IN THE REACTIONS $\pi^- p \rightarrow \eta n$ AND $K^- p \rightarrow \Lambda \eta$

ABILENE CHRISTIAN U - L D Isenhower, A A Rose, M Sadler  
 BOŠKOVIĆ INST, ZAGREB - A Marušić, I Šlaus  
 BROOKHAVEN - R Chrien, R Sutter  
 DUBNA - A A Efendiev



## SUMMARIES OF BROOKHAVEN EXPERIMENTS

GEORGE WASHINGTON U – C Bennhold, W J Briscoe  
( $\checkmark$  Spokesperson), T W Morrison, Z Papandreou, S A Philips,  
R Pratt, A Shafi  
HOUSTON U – R Sawafta  
RENSSELAER POLY – D B White  
ST PETERSBURG, INP – V V Abaev, V Bekrenev  
ST PETERSBURG, INP – N Kozlenko  
UCLA – M Clajus, S C McDonald, B M K Nefkens, W B Tippens  
( $\checkmark$  Spokesperson)

Accelerator BNL Detector Spectrometer

Reactions

$\pi^- p \rightarrow \eta n$  680–760 MeV/c ( $P_{1ab}$ )  
 $K^- p \rightarrow \eta \Lambda$  "

Particles studied  $N(1535 S_{11})$ ,  $\Lambda(1670 S_{01})$ .

Brief description Measures the total cross-section, as well as angular distribution for  $\eta$  production from threshold ( $P = 685$  MeV/c for pion,  $P = 723$  MeV/c for kaon) up to 760 MeV/c. The  $\eta$  particles are detected via the  $2\gamma$  decay mode using the improved  $\eta$  spectrometer. Data analysis in progress at GWU (July 96).

Related experiments BNL-890, BNL-913, BNL-914

E-mail contact briscoe@gwis2.circ.gwu.edu,  
btippens@uclapp.physics.ucla.edu

WWW Home-page

<http://ucla5.phy.bnl.gov/htdocs/e909/e909.html>

### BNL-913-914

(Proposed Mar 1995, Approved Sep 1995, In preparation)

#### BARYON AND NEUTRAL HYPERON SPECTROSCOPY WITH THE CRYSTAL BALL

CRYSTAL-BALL COLLABORATION

ABILENE CHRISTIAN U – B Draper, J Huddleston,  
L D Isenhower, Z Mulkey, M E Sadler ( $\checkmark$  Spokesperson)  
ARGONNE – H Spinka ( $\checkmark$  Spokesperson)  
ARIZONA STATE U – J R Comfort, K Craig  
BOŠKOVIĆ INST, ZAGREB – M Batinić, I Šlaus, I Supek,  
A Švarc  
BROOKHAVEN – T Kycia ( $\checkmark$  Spokesperson)  
COLORADO U – R J Peterson  
GEORGE WASHINGTON U – C Bennhold, W J Briscoe  
KARLSRUHE U – H M Staudenmaier  
KENT STATE U – D M Manley  
ST PETERSBURG, INP – V V Abaev, V S Bekrenev,  
N G Kozlenko, S P Kruglov ( $\checkmark$  Spokesperson), I V Lopatin,  
A B Starostin  
REGINA U – G J Lolos, Z Papandreou  
UCLA – M Clajus, A Marušić, S C McDonald, B M K Nefkens  
( $\checkmark$  Spokesperson), W B Tippens ( $\checkmark$  Spokesperson)  
VALPARAISO U, INDIANA – D Groznick, D D Koetke,  
R W Manweiler, S Stanislaus

Accelerator BNL Detector CRYSTAL-BALL

Reactions

$\pi^- p \rightarrow n \gamma$  400–1800 MeV/c  
 $\pi^- p \rightarrow \pi^0 n$  "  
 $\pi^- p \rightarrow \pi^0 \pi^0 n$  "  
 $\pi^- p \rightarrow \eta n$  685–1800 MeV/c  
 $\pi^- p \rightarrow \pi^0 \eta n$  1000–1800 MeV/c  
 $\pi^- p \rightarrow \omega n$  1100–1800 MeV/c  
 $K^- p \rightarrow \Lambda \gamma$  600–1800 MeV/c  
 $K^- p \rightarrow \Lambda \pi^0$  "  
 $K^- p \rightarrow \Lambda 2\pi^0$  "  
 $K^- p \rightarrow \Lambda \eta$  720–1800 MeV/c  
 $K^- p \rightarrow \Sigma^0 \gamma$  600–1800 MeV/c  
 $K^- p \rightarrow \Sigma^0 \pi^0$  "  
 $K^- p \rightarrow \Sigma^0 2\pi^0$  "  
 $K^- p \rightarrow \Sigma^0 \eta$  890–1800 MeV/c

Particles studied  $N^*(\text{unspec})^0$ ,  $\Delta(\text{unspec})^0$ ,  $\Lambda(\text{unspec})$ ,  
 $\Sigma(\text{unspec})^0$

Brief description Measures absolute differential cross-sections.

Uses the Crystal Ball multiphoton spectrometer with large acceptance and high energy resolution. Various reaction channels are identified by reconstructing the invariant mass of the produced  $\gamma$  rays. The experiment has two distinct parts. The goal of BNL-913 is a better determination of the masses, widths, and decay modes of the excited states of the nucleon. The spokespersons are M.E. Sadler, H. Spinka and W.B. Tippens. BNL-914 studies the  $\Lambda^*$  and  $\Sigma^*$  resonances via their neutral decays. The incident beam momentum is varied in steps of 25–50 MeV/c from 600 MeV/c in the C-line to the maximum momentum of 1.8 GeV/c in the D-line. The spokespersons are T. Kycia, S.P. Kruglov and B.M.K. Nefkens. Approved for 1000 hours. Scheduled to run in FY 1997.

E-mail contact

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kruglov@lnpi.spb.su, btippens@uclapp.physics.ucla.edu,  
bnfakens@uclapp.physics.ucla.edu

WWW Home-page

<http://ucla5.phy.bnl.gov/htdocs/e913-914/e913-914.html>

### BNL-RHIC-BRAHMS

(Proposed 1992, Approved Apr 1995, In preparation)

#### THE BRAHMS EXPERIMENT AT RHIC

BRAHMS COLLABORATION

Accelerator BNL-RHIC Detector BRAHMS

Brief description RHIC provides an opportunity for experiments investigating both baryon poor quark gluon plasma in the midrapidity region and baryon rich plasma in the fragmentation regions of rapidity. The most basic information available for understanding the phenomena that occur in heavy ion collisions comes from the momentum spectra and yields of the various emitted particles as a function of transverse momentum and rapidity. One of the goals of the experiment is to measure the spectra of well identified charged hadrons over a wide range of rapidity and transverse momenta as a function of the centrality of the collision. Uses the BRAHMS (Broad Range Hadron Magnetic Spectrometers) detector, consisting of a magnetic forward angle hadron spectrometer and a midrapidity spectrometer. PAC approved in Apr 95. For further details, please contact the Spokesperson, Dr. Flemming Videbaek [BNL], or get in touch with Dr. Dana Beavis [BNL].

E-mail contact videbaek@bnl.gov, beavis@bnl.gov

WWW Home-page

<http://rsgi01.rhic.bnl.gov/export1/brahms/WWW/brahms.html>

### BNL-RHIC-PHENIX

(Proposed 1989, In preparation)

#### PHOTON-ELECTRON NEW HEAVY ION EXPERIMENT

PHENIX COLLABORATION

Accelerator BNL-RHIC Detector PHENIX

Brief description Studies simultaneously various signatures of quark-gluon plasma in heavy ion collisions. Focuses specifically on the measurement of leptons, photons, and identified hadrons, and should be capable of exploiting the highest luminosities envisioned for RHIC. Studies also asymmetries of photons and leptonic decays of weak bosons in polarized proton reactions. The PHENIX detector system is based on an axial field magnet in which the central rapidity interval is covered by two detector arms, each subtending  $90^\circ$  in azimuth. The aperture is instrumented to detect electrons, photons, and hadrons. Two muon arms, covering polar angles subtending  $30^\circ$  (forward and backward), have a good acceptance for muon pairs and allow also electron-muon coincidence measurements. An event multiplicity array to cover over five rapidity units is used for

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

event characterization. Under construction (July 96). The collaboration consists of over 420 scientists, engineers, and graduate students from 45 participating institutions in 10 countries. For further details, please contact the Spokesperson, Prof. Shoji Nagamiya [Columbia U.].

E-mail contact nag@nevis.nevis.columbia.edu

WWW Home-page

[http://rsgi01.rhic.bnl.gov/~phenix/phenix\\_home.html](http://rsgi01.rhic.bnl.gov/~phenix/phenix_home.html)

### BNL-RHIC-PHOBOS

(Proposed Jan 1992, Approved Nov 1992, In preparation)

#### PROPOSAL TO STUDY VERY LOW $p_{\perp}$ PHENOMENA AT RHIC

##### PHOBOS COLLABORATION

Accelerator BNL-RHIC Detector PHOBOS

Brief description The experiment is based on the premise that phase transitions may be signaled by large fluctuations in the overall multiplicity or angular distribution of charged particles. An outer  $4\pi$  detector measures multiplicity and pseudorapidity. A small subset of particles around  $y = 0$  is then studied in detail by a two-arm multiparticle spectrometer with good momentum resolution and particle identification. The detector is based on silicon technology and allows unbiased triggering at very high rates. In preparation (July 96). For further details, please contact the Spokesperson, Prof. Wit Busza [MIT].

E-mail contact busza@mit.edu

WWW Home-page

<http://www.rhic.bnl.gov/phobos/common/WWW/phobos.html>

### BNL-RHIC-PP2PP

(Proposed Jan 1994, Approved Mar 1994, In preparation)

#### TOTAL AND DIFFERENTIAL CROSS-SECTIONS, AND POLARIZATION EFFECTS IN $pp$ ELASTIC SCATTERING AT RHIC

##### PP2PP COLLABORATION

Accelerator BNL-RHIC Detector ?

Brief description Studies systematically the  $pp$  elastic scattering from  $\sqrt{s} = 60$  GeV to  $\sqrt{s} = 500$  GeV, in two kinematical regions. In the Coulomb Nuclear Interference (CNI) region, for  $|t|$  between 0.0005 and 0.12  $(\text{GeV}/c)^2$ , measures (1) the  $s$  dependence of the total and elastic cross-sections,  $\sigma_{tot}$  and  $\sigma_{el}$ , (2) the ratio of the real to the imaginary part of the forward elastic scattering amplitude, and (3) the nuclear slope parameter of the  $pp$  elastic scattering,  $b$ . In the intermediate  $|t|$  region,  $|t| \leq 1.5$   $(\text{GeV}/c)^2$ , studies the evolution of the dip structure with  $s$ , and the  $s$  and  $|t|$  dependence of  $b$ . The possibility of having polarized proton beams at RHIC would allow measurements of (i) the difference in the total cross-sections as a function of initial transverse spin states, (ii) the analyzing power,  $A_N$ , especially in the dip region where a pronounced structure was found at fixed-target experiments, and (iii) the transverse spin correlation parameter,  $A_{NN}$ . Under construction (July 96). For further details, please contact the Spokesperson, Dr. Wlodek Guryń [BNL].

E-mail contact guryń@bnl.gov

### BNL-RHIC-STAR

(Proposed 1990, Approved Aug 1991, In preparation)

#### SOLENOIDAL TRACKER AT RHIC (STAR)

##### STAR COLLABORATION

Accelerator BNL-RHIC Detector STAR

Brief description STAR is designed to search for signatures of quark-gluon plasma formation and to investigate the behavior

of strongly interacting matter at high energy density. The emphasis is on the measurement and correlation of global observables on an event-by-event basis and the use of hard scattering of partons to probe the properties of high density nuclear matter. The event-by-event measurement of global observables is possible because of the very high charged particle densities ( $dN/dy$  about 1000) expected at mid-rapidity in nucleus-nucleus collisions at RHIC. To fulfill the physics objectives, the experiment will provide tracking, momentum analysis, and particle identification of most of the charged particles at mid-rapidity. The baseline STAR detector includes a time projection chamber (TPC) in a solenoidal magnetic field of 0.5 T, covering approximately 4 units of the central rapidity. The cylindrical TPC is four meters in diameter. Ionization charge produced along particle trajectories is drifted to the two end plates, where induced signals and arrival times are read out on 150,000 cathode pads. Particle identification will be possible via  $dE/dx$  in the  $1/\beta^2$  region. Upgrades being developed for STAR include an array of TOF counters to extend the PID capabilities to higher momenta, an electromagnetic calorimeter to provide for the measurement of neutral energy, and a silicon vertex detector which uses position sensitive silicon devices with a drift-time measurement technique. A further upgrade using TPC's in the forward direction will extend the particle tracking coverage to a pseudorapidity of approximately  $\pm 4$ . PAC approved August 91. In preparation (July 96). For further details, please contact the Spokesperson, Prof. John W. Harris [Yale U.]. Project Director is Dr. Jay N. Marx [LBL], and Deputy Spokesperson Dr. Timothy J. Hallman [BNL].

Journal papers NP A566 (1994) 277c.

E-mail contact jwharris@lbl.gov, jmarx@lbl.gov, tjhallman@lbl.gov

WWW Home-page

<http://rsgi01.rhic.bnl.gov/star/starlib/doc/www/star.html>

## Other BNL Experiments

Listed here are some other BNL experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the annual Brookhaven report 'AGS Experiments' (BNL-34518), or visit the Web sites: <http://www.rhichome.bnl.gov/AGS/> (for the AGS experiments), or <http://www.rhic.bnl.gov/> (for the RHIC experiments)

### BNL-774 (Completed data-taking 1991)

#### SEARCH FOR $\Sigma$ HYPERNUCLEAR LEVELS IN $^4\text{He}$

Spokesperson: E.V. Hungerford [Houston U.]

E-mail contact hunger@uh.edu

### BNL-781 (Completed data-taking 1992)

#### SPIN DEPENDENCE OF THE $\Lambda$ - NUCLEUS INTERACTION DETERMINED BY OBSERVATION OF HYPERNUCLEAR $\gamma$ RAYS

Spokespersons: M. May [Brookhaven], M. Deutsch [MIT]

E-mail contact may2@bnl.gov, deutsch@mitlns.mit.edu

### BNL-810 (Completed data-taking 1992)

#### A SEARCH FOR QUARK MATTER (QGP) AND OTHER NEW PHENOMENA UTILIZING HEAVY ION COLLISIONS AT THE AGS

Spokespersons: E.D. Platner [Brookhaven], S.J. Lindenbaum [Brookhaven and City Coll., N.Y.]

E-mail contact platner@bnldag.bnl.gov, lindenbaum@bnldag.bnl.gov

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

**BNL-813** (Completed data-taking Jun 1995)

### SEARCH FOR A STRANGENESS -2 DIBARYON

Spokespersons: G.B. Franklin [Carnegie Mellon U.], P.D. Barnes [Los Alamos]

E-mail contact franklin@ernest.phys.cmu.edu,  
pdbarnes@lanl.gov

**BNL-814** (Completed data-taking 1992)

### STUDY OF EXTREME PERIPHERAL COLLISIONS AND OF THE TRANSITION FROM PERIPHERAL TO CENTRAL COLLISIONS IN REACTIONS INDUCED BY RELATIVISTIC HEAVY IONS

Spokesperson: Peter Braun-Munzinger [SUNY, Stony Brook]

E-mail contact pbm@skipper.physics.sunysb.edu

**BNL-817** (Taking data)

### POLARIZATION TRANSFER IN HYPERON PRODUCTION

Spokespersons: Billy E. Bonner, Jay B. Roberts [Rice U.]

E-mail contact bonner@physics.rice.edu

**BNL-836** (Completed data-taking Jul 1994)

### SEARCH FOR A STRANGENESS -2 DIBARYON USING A $^3\text{He}$ TARGET

Spokespersons: G.B. Franklin [Carnegie Mellon U.], P.D. Barnes [Los Alamos]

E-mail contact franklin@ernest.phys.cmu.edu,  
pdbarnes@lanl.gov

**BNL-844** (In preparation)

### MEASUREMENT OF ANGULAR DISTRIBUTIONS FOR FRAGMENTS IN THE TARGET RAPIDITY REGION

Spokesperson: James B. Cumming [Brookhaven]

E-mail contact cumming@bnl.gov

**BNL-849** (Completed data-taking 1992)

### SEARCH FOR MUONIUM TO ANTIMUONIUM CONVERSION

Spokespersons: Dale Richard Harshman, A.P. Mills, Jr. [A T and T Bell Labs, Murray Hill]

**BNL-850** (Taking data)

### EVA, A SOLENOIDAL DETECTOR FOR LARGE ANGLE EXCLUSIVE REACTIONS: PHASE I — DETERMINING COLOR TRANSPARENCY TO 22 GeV/c

Spokespersons: A.S. Carroll [Brookhaven], S. Heppelmann [Penn State U.]

E-mail contact carroll1@bnl.gov, heppel@phys.psu.edu,  
heppelmann@bnldag.bnl.gov

WWW Home-page

<http://www.phys.psu.edu/LEPS/EVA/eva.html>

**BNL-854** (Completed data-taking Jun 1991)

### ANTIPROTON-NUCLEUS INTERACTIONS AT 5-10 GeV/c

Spokesperson: B.E. Bonner [Rice U.]

E-mail contact bonner@physics.rice.edu

**BNL-859** (Completed data-taking 1992)

### STUDIES OF HIGH DENSITY BARYON MATTER FROM EXTENDED MEASUREMENTS OF PARTICLE MOMENTUM DISTRIBUTIONS AND FROM HIGH PRECISION TWO-PARTICLE CORRELATIONS

Spokespersons: Louis P. Remsberg [Brookhaven], William A. Zajc [Columbia U.], Robert J. Ledoux [MIT]

E-mail contact remsberg@nc6.chm.bnl.gov,  
zajc@nevis.nevis.columbia.edu

**BNL-863** (Completed data-taking Sep 1993)

### PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN COLLISIONS OF HEAVY IONS IN NUCLEAR TARGETS AT AGS ENERGIES

By EMU01 Collaboration

Spokespersons: Ingvar Otterlund [Lund U.], R. Jeffrey Wilkes [Washington U., Seattle]

E-mail contact ingvar.otterlund@kosufy.lu.se,  
kaj.soderstrom@kosufy.lu.se, wilkes@phys.washington.edu

WWW Home-page <http://marge.phys.washington.edu/emu01/>

**BNL-864** (In preparation)

### PRODUCTION OF RARE COMPOSITE OBJECTS IN RELATIVISTIC HEAVY ION COLLISIONS

Spokespersons: Richard D. Majka, Jack Sandweiss [Yale U.]

E-mail contact jack.sandweiss@yale.edu

WWW Home-page

<http://rhic2.physics.wayne.edu/le864/e864.html>

**BNL-866** (Completed data-taking Jan 1996)

### STUDIES OF PARTICLE PRODUCTION AT HIGH BARYON DENSITY USING THE Au BEAM

By E-802 Collaboration

Spokespersons: Chellis Chasman [Brookhaven], Steve G. Steadman [MIT], Hideki Hamagaki [Tokyo U., INS]

E-mail contact chasman@hi0.hirg.bnl.gov, sgs@mitlns.mit.edu,  
hamagaki@insuty.ins.u-tokyo.ac.jp

WWW Home-page

<http://marie.mit.edu/server/e866/E866Main.html>

**BNL-868** (Completed data-taking Dec 1995)

### INTERACTIONS OF 14.1 GeV/NUCLEON NUCLEI FROM $^{16}\text{O}$ TO $^{197}\text{Au}$ IN LIGHT AND HEAVY TARGETS BY KLMM Collaboration

Spokesperson: C.J. Waddington [Minnesota U.]

E-mail contact waddington@uhn.spa.umn.edu

**BNL-869**

### MEASUREMENT OF FRAGMENT YIELDS FOR 14 GeV/NUCLEON Au + X COLLISIONS

By UHIC Collaboration

Spokesperson: C.Jake Waddington [Minnesota U.]

E-mail contact waddington@uhn.spa.umn.edu

WWW Home-page <http://www.srl.caltech.edu/uhic/>

**BNL-874** (Completed data-taking Jun 1993)

### KAON-NUCLEUS QUASIELASTIC AND ELASTIC SCATTERING

Spokespersons: Robert E. Chrien [Brookhaven], Roy Jerome Peterson [Colorado U.], E.V. Hungerford [Houston U.]

E-mail contact chrien@bnl.gov, peterson@spectr.colorado.edu,  
hunger@uh.edu

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

**BNL-875** (Completed data-taking Aug 1993)

**STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY-ION COLLISIONS IN NUCLEAR EMULSIONS**

Spokesperson: P.L. Jain [SUNY, Buffalo]  
*E-mail contact* phyjain@ubvms.cc.buffalo.edu

**BNL-877** (Completed data-taking Dec 1995)

**STUDY OF RELATIVISTIC NUCLEAR COLLISIONS WITH HEAVY BEAMS USING THE E814 CALORIMETRY AND MODIFIED FORWARD SPECTROMETER**

Spokesperson: Peter Braun-Munzinger [SUNY, Stony Brook]  
*E-mail contact* pbm@skipper.physics.sunysb.edu  
*WWW Home-page* <http://skipper.physics.sunysb.edu/~e877/Home.html>

**BNL-878** (Completed data-taking Oct 1993)

**INVESTIGATION OF ANTINUCLEUS PRODUCTION AND SEARCH FOR NEW PARTICLES IN NUCLEUS-NUCLEUS COLLISIONS AT THE AGS**

Spokesperson: H.J. Crawford [UC, Berkeley, Space Sci.]  
*E-mail contact* hjcrawford@lbl.gov, crawford@bnldag.bnl.gov  
*WWW Home-page* [http://aquila.lbl.gov/bnl878/home\\_e878.html](http://aquila.lbl.gov/bnl878/home_e878.html)

**BNL-882** (Completed data-taking Oct 1994)

**SEARCH FOR PARTICLES WITH  $|Z| > 3$  AND NEGATIVE CHARGE OR LARGE  $A/Z$  PRODUCED IN CENTRAL NUCLEUS-NUCLEUS COLLISIONS**

Spokesperson: P. Buford Price [UC, Berkeley]  
*E-mail contact* pbprice@lbl.gov, yudong@physics.berkeley.edu

**BNL-885** (In preparation)

**EXPERIMENT TO DETECT  $\Lambda\Lambda$  HYPERNUCLEI**

Spokespersons: M. May [Brookhaven], G.B. Franklin [Carnegie Mellon U.], Charles A. Davis [Manitoba U. and TRIUMF]  
*E-mail contact* may2@bnl.gov, franklin@ernest.phys.cmu.edu, cymru@triumf.ca

**BNL-886** (Completed data-taking Oct 1993)

**SEARCH FOR NEW PARTICLES IN NUCLEUS-NUCLEUS COLLISIONS**

Spokespersons: Kenichi Imai [Kyoto U.], Philip H. Pile [Brookhaven], G. Diebold [Yale U.]  
*E-mail contact* imai@kekvx.kek.jp, pile@bnl.gov

**BNL-887** (Completed data-taking 1995)

**DO NARROW  $\Sigma$  HYPERNUCLEAR STATES EXIST?**

Spokespersons: Reyad Sawafta [Brookhaven], Kenneth H. Hicks [Ohio U.]  
*E-mail contact* sawafta@bnldag.bnl.gov, hicks@ouvaxa.cats.ohiou.edu

**BNL-888** (Completed data-taking Jul 1992)

**SEARCH FOR THE  $H$  DIBARYON**

Spokespersons: R.D. Cousins [UCLA], Alan J. Schwartz [Princeton U.]  
*E-mail contact* cousins@bnldag.bnl.gov, schwartz@puphep.princeton.edu

**BNL-890** (Completed data-taking Jun 1995)

**TEST OF CHARGE SYMMETRY IN  $\eta$  PRODUCTION ON DEUTERIUM**

Spokespersons: Robert E. Chrien [Brookhaven], J.C. Peng [Los Alamos], Bernard M.K. Nefkens [UCLA]  
*E-mail contact* chrien@bnl.gov, peng@lanl.gov, bnefkens@uclapp.physics.ucla.edu

*WWW Home-page* <http://ucla5.phy.bnl.gov/htdocs/e890/e890.html>

**BNL-891** (In preparation)

**A SEARCH FOR QUARK MATTER (QGP) AND OTHER NEW PHENOMENA UTILIZING Au Au COLLISIONS AT THE AGS**

Spokesperson: E.D. Platner [Brookhaven]  
*E-mail contact* platner@bnldag.bnl.gov  
*WWW Home-page* [http://www.phy.bnl.gov/usr1/people/e891/doc/www/welcome\\_e891.html](http://www.phy.bnl.gov/usr1/people/e891/doc/www/welcome_e891.html)

**BNL-892** (In preparation)

**ELECTRON CAPTURE FROM PAIR PRODUCTION**

Spokesperson: Harvey Gould [LBL, Berkeley]  
*E-mail contact* hagould@lbl.gov  
*WWW Home-page* <http://www.ags.bnl.gov/~e892/>

**BNL-895** (Taking data)

**EXCLUSIVE STUDY OF NUCLEAR COLLISIONS AT THE AGS**

Spokesperson: Gulshan Rai [LBL, Berkeley]  
*E-mail contact* grai@lbl.gov  
*WWW Home-page* <http://cnr2.kent.edu/~e895/>

**BNL-896** (In preparation)

**SEARCH FOR A SHORT-LIVED  $H_0$  DIBARYON AND SHORT-LIVED STRANGE MATTER, AND STUDY OF HYPERON PRODUCTION IN 11.6 A GeV/c Au Au COLLISIONS**

Spokespersons: Henry J. Crawford [UC, Berkeley, Space Sci.], Tim J. Hallman [UCLA]  
*E-mail contact* tjhallman@lbl.gov, hjcrawford@lbl.gov, crawford@bnldag.bnl.gov  
*WWW Home-page* [http://aquila.lbl.gov/bnl896/home\\_e896.html](http://aquila.lbl.gov/bnl896/home_e896.html)

**BNL-900** (Completed data-taking Apr 1996)

**ENERGY DISSIPATION AND MULTIFRAGMENTATION IN  $p+A$  REACTIONS BETWEEN 2 AND 24 GeV/c**

Spokespersons: Kris Kwiatkowski, Victor E. Viola [Indiana U.]  
*E-mail contact* kwiat@iucf.indiana.edu, vicv@iucf.indiana.edu

**BNL-905** (Taking data)

**SEARCH FOR A  $\Sigma$  HYPERNUCLEAR BOUND STATE IN  $^4\text{He}(K^-, \pi^\pm)$  REACTIONS**

Spokesperson: Tomofumi Nagae [Tokyo U., INS]  
*E-mail contact* tomofumi.nagae@kek.jp

## SUMMARIES OF BROOKHAVEN EXPERIMENTS

**BNL-906** (In preparation)

### EXPERIMENT TO DETECT DOUBLE- $\Lambda$ HYPERNUCLEI BY OBSERVING CHARACTERISTIC $\pi^-$ MESONIC DECAY

Spokespersons: Robert Chrien [Brookhaven], Tomokazu Fukuda [Tokyo U., INS]

E-mail contact chrien@bnl.gov, fukuda@insiel.ins.u-tokyo.ac.jp

**BNL-907** (Taking data)

### INVESTIGATION OF LIGHT HYPERNUCLEI USING ( $K^-$ [stop], $\pi^0$ ) REACTION

Spokespersons: Ed V. Hungerford [Houston U.], Jen-Chieh Peng [Los Alamos]

E-mail contact hunger@uh.edu, peng@lanl.gov

**BNL-910** (Taking data)

### FACILITY TO STUDY PROTON-NUCLEUS AND HEAVY ION COLLISIONS USING A LARGE ACCEPTANCE DETECTOR WITH PARTICLE IDENTIFICATION CAPABILITIES

Spokesperson: Brian A. Cole [Columbia U.]

E-mail contact cole@nevis.columbia.edu

WWW Home-page

<http://nevis1.nevis.columbia.edu/heavyion/e910/>

**BNL-917** (In preparation)

### HIGH DENSITY BARYON MATTER USING RARE PROBES

Spokespersons: Alice Mignerey [Maryland U.], R.K. Seto [UC, Riverside]

E-mail contact richard.seto@ucr.edu

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## BNL Future Plans

The physics program at the Lab is centered around the AGS and RHIC facilities. For the next few years, the AGS proton program will continue to emphasize the search for rare and forbidden  $K$  decays, the measurement of  $g - 2$  for the muon, and studies of exotic mesons in the Multi-Particle Spectrometer. The heavy ion program will emphasize the search for the (strangeness - 2)  $H$  dibaryon and searches for strange baryonic fragments with anomalous charge/mass ratios (strangelets). An AGS-2000 Workshop took place in the spring of 1996. Its focus was on the competitive, leading-edge physics which can make use of the  $10^{14}$  protons per pulse which will be available at the AGS. Among the experiments under consideration were a study of  $K^0 \rightarrow \pi^0 \nu \bar{\nu}$ ,  $\mu \rightarrow e$  conversion, polarization in  $K_{\mu 3}$ , and searches for low-mass gluino-gluino bound states. It is anticipated that the core of the AGS program beyond the year 2000 will develop from these and other Workshop efforts. The RHIC construction project is well underway. The current schedule calls for the first circulating and accelerating beams by the beginning of 1999, and the first physics runs later that year.

## SUMMARIES OF CEBAF EXPERIMENTS

### Selected CEBAF Experiments

#### CEBAF-89-024

(Proposed 1987, Approved 1989, In preparation)

#### RADIATIVE DECAYS OF LOW-LYING HYPERONS

##### CLAS COLLABORATION

RICE U - S Ahmad, B E Bonner, G S Mutchler (✓ Spokesperson), S Taylor

WILLIAM AND MARY COLL - M Eckhause, A D Hancock, J R Kane, Y N Kuang, R E Welsh

Accelerator CEBAF Detector CLAS

##### Reactions

$\gamma p \rightarrow K^+ Y^*$  (unspec) 1.40 - 3.02 GeV ( $E_{lab}$ )

Particles studied  $\Lambda(1405 S_{01})$ ,  $\Lambda(1520 D_{03})$ ,  $\Sigma(1385 P_{13})^0$

Brief description Measures the electromagnetic branching ratios of low-lying excited hyperons,  $\Lambda(1405)$ ,  $\Lambda(1520)$  and  $\Sigma^0(1385)$ . Uses the CLAS detector, a superconducting toroidal spectrometer with drift chambers and TOF scintillators. Determines the four-momentum of the excited hyperon from the energy of the tagged photon and  $K^+$  momentum. The four-momentum of  $\Lambda$  (from the  $Y^* \rightarrow \Lambda \gamma$  decay) can be reconstructed from the proton and  $\pi^-$  momentum. A good mass resolution with CLAS allows the suppression of the background due to  $\pi^0$  decays. Uses a tagged photon beam and an LH2 target. Approved for 60 days of running in Hall B. Expected to run in Summer and Fall 1997.

Related experiments CEBAF-89-004, BNL-811

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#### CEBAF-89-038

(Proposed Oct 1989, Approved May 1990, In preparation)

#### MEASUREMENT OF $p(e, e' \pi^+)n$ , $p(e, e' p)\pi^0$ , AND $n(e, e' \pi^-)p$ IN THE SECOND AND THIRD RESONANCE REGIONS

##### N\* COLLABORATION

CEBAF - W Brooks, V D Burkert (✓ Spokesperson), D Joyce, B A Mecking, M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran

CHRISTOPHER NEWPORT U - D Doughty, D Heddle, Z J Li

DUKE U - H R Weller

FLORIDA STATE U - L C Dennis, P Dragovitsch, K W Kemper

FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi

INFN, GENOA - M Anghinolfi, P Corvisiero, G Gervino, L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone, M Taiuti, A Zucchiatti

GEORGE MASON U - B J Lieb

JAMES MADISON U - K Giovanetti

KENT STATE U - D Keane, D M Manley

PITTSBURGH U - S A Dytman

RENSELAER POLY - G S Adams, N C Mukhopadhyay, P Stoler

VIRGINIA U - D B Day, J S McCarthy, R C Minehart

(✓ Spokesperson), D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber

VIRGINIA STATE U - C E Stronach

VIRGINIA TECH - R A Arndt, D A Jenkins, L D Roper

WILLIAM AND MARY COLL - C E Carlson, H O Funsten,

T Y Tung

CONNECTICUT U - M Gai (✓ Spokesperson)

Accelerator CEBAF Detector CLAS

##### Reactions

$e^- p \rightarrow e^- p \pi^0$  2.0, 4.0 GeV ( $T_{lab}$ )

$e^- p \rightarrow e^- n \pi^+$  "

$e^- p \rightarrow e^- p p \pi^-$  "

Particles studied  $N(1535 S_{11})$ ,  $N(1520 D_{13})$ ,  $N(1680 F_{15})$ ,  $N(1440 P_{11})$

Brief description The experiment will measure transition form-factors to nucleon excited states in the mass region from 1350 to 1800 MeV/ $c^2$ . Scheduled to run in Hall B in 1997.

Related experiments CEBAF-89-037, CEBAF-89-040, CEBAF-89-042, CEBAF-89-043, CEBAF-91-002, CEBAF-93-036

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#### CEBAF-89-039

(Proposed Oct 1989, Approved 1989, In preparation)

#### AMPLITUDES FOR THE $N(1535 S_{11})$ AND $N(1710 P_{11})$ RESONANCES FROM THE $ep \rightarrow ep\eta$ SCATTERING

##### CLAS COLLABORATION

CEBAF - V D Burkert, D Cords, D Joyce, B A Mecking,

M Mestayer, B B Niczyporuk, E Smith, A Yegneswaran

CHRISTOPHER NEWPORT U - D Doughty, L Elouadrhiri,

D Heddle

DUKE U - R Chasteler, D R Tilley, H Weller

FLORIDA STATE U - L C Dennis, P Dragovitsch, K W Kemper

GEORGE MASON U - B J Lieb

FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-

Sandri, V Muccifora, E Polli, A R Reolon, P Rossi

GENOA U & INFN, GENOA - M Anghinolfi, P Corvisiero,

G Gervino, L Mazzaschi, V I Mokeev, G Ricco, M Ripani,

M Sanzone, M Taiuti, A Zucchiatti

JAMES MADISON U - K Giovanetti (✓ Spokesperson)

KENT STATE U - D M Manley

PITTSBURGH U - S A Dytman (✓ Spokesperson), J Mueller,

D Tedeschi, R Thompson

RENSELAER POLY - G S Adams, N C Mukhopadhyay,

J Napolitano, J Price, P Stoler

VIRGINIA U - D B Day, R Marshall, J S McCarthy,

R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock,

S T Thornton, H J Weber

VIRGINIA STATE U - C E Stronach

VIRGINIA TECH - R A Arndt, D A Jenkins, L D Roper

WILLIAM AND MARY COLL - C E Carlson, H O Funsten,

T Y Tung

YALE U - M Gai

Accelerator CEBAF Detector CLAS

##### Reactions

$e^- p \rightarrow e^- p \eta$  2, 4 GeV ( $T_{lab}$ )

Particles studied  $N(1535 S_{11})$ ,  $N(1710 P_{11})$ ,  $N^*$  (unspec)

Brief description Covers the total center-of-mass energies,  $W$ , from 1.35 to 1.9 GeV for the second resonance region, and from 1.49 to 1.9 GeV for the  $\eta$  channel. Uses a simple hydrogen gas target. Scheduled to run in Hall B.

E-mail contact giovankl@vax1.jmu.edu, dytman@vms.cis.pitt.edu

WWW Home-page <http://www.cebaf.gov/clas/CLAS.html>

#### CEBAF-89-043

(Proposed Oct 1989, Approved 1989, In preparation)

#### MEASUREMENTS OF THE ELECTROPRODUCTION OF THE $\Lambda$ , $\Lambda(1520)$ , AND $f_0(975)$ VIA THE $K^+ K^- p$ AND THE $K^+ \pi^- p$ FINAL STATES

ABILENE CHRISTIAN U - D Isenhower, M Sadler

MIT, BATES LINEAR ACCELERATOR - L Ghedira

CEBAF - V D Burkert, D Joyce, B A Mecking, M Mestayer,

B B Niczyporuk, E Smith, R R Whitney, A Yegneswaran

CARNEGIE MELLON U - R A Schumacher

CHRISTOPHER NEWPORT U - D Doughty

FLORIDA STATE U - L C Dennis (Spokesperson), K W Kemper

GEORGE MASON U - B J Lieb

GEORGE WASHINGTON U - A Mokhtari

JAMES MADISON U - K Giovanetti

## SUMMARIES OF CEBAF EXPERIMENTS

KANSAS STATE U - T R Donoghue  
 KENT STATE U - D Keane, D M Manley  
 MIT - W Y Kim  
 PITTSBURGH U - S A Dytman  
 RENNELAER POLY - G S Adams, N C Mukhopadhyay, P Stoler  
 VIRGINIA U - D B Day, R Marshall, J S McCarthy,  
 R C Minehart, O A Rondon-Aramayo, R Sealock, S T Thornton,  
 H J Weber  
 VIRGINIA STATE U - C E Stronach  
 VIRGINIA TECH - R A Arndt, D A Jenkins, L D Roper  
 WILLIAM AND MARY COLL - C E Carlson, H O Funsten  
 (Spokesperson), C F Perdrisat  
 YALE U - M Gai

Accelerator CEBAF Detector CLAS

Reactions

$$e^- p \rightarrow e^- X \quad 4 \text{ GeV } (T_{\text{lab}})$$

Particles studied  $f_0(980)$ ,  $\Lambda(1520 D_{03})$

Brief description Studies exclusive electroproduction and charged hadronic decay of the  $f_0(980)$  resonance and low-mass  $\Lambda$ 's. Scheduled to run in Hall B.

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### CEBAF-91-002

(Proposed Sep 1991, Approved Nov 1991, Jan 1995, In preparation)

#### THE STUDY OF EXCITED BARYONS AT HIGH MOMENTUM TRANSFER WITH THE CLAS SPECTROMETER

N\* COLLABORATION

CEBAF - V D Burkert (✓ Spokesperson), B A Mecking,  
 M Mestayer, B B Niczyporuk, E Smith, B Wojtsekhowski,  
 A Yegneswaran  
 CHRISTOPHER NEWPORT U - D Doughty, D Heddle, Z J Li  
 CONNECTICUT U - M Gai  
 DUKE U - R Chasteler, D R Tilley, H R Weller  
 FLORIDA STATE U - L C Dennis, P Dragovitsch  
 FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-  
 Sandri, V Muccifora, E Polli, A R Reolon, P Rossi  
 INFN, GENOA - M Anghinolfi, P Corvisiero, G Gervino,  
 L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone,  
 M Taiuti (✓ Spokesperson), A Zucchiatti  
 GEORGE MASON U - B J Lieb  
 HAMPTON U - K Beard  
 JAMES MADISON U - K Giovanetti  
 KENT STATE U - D M Manley  
 PITTSBURGH U - S A Dytman  
 RENNELAER POLY - G S Adams, N C Mukhopadhyay,  
 J Napolitano, P Stoler (✓ Spokesperson)  
 VIRGINIA U - D Crabb, D B Day, R Marshall, J S McCarthy,  
 R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock,  
 L C Smith, S T Thornton, H Weber  
 WILLIAM AND MARY COLL - C E Carlson, A Coleman,  
 H O Funsten, T Y Tung

Accelerator CEBAF Detector CLAS

Reactions

$$e^- p \rightarrow e^- p \pi^0 \quad 6.0 \text{ GeV } (T_{\text{lab}})$$

$$e^- p \rightarrow e^- p \eta \quad "$$

$$e^- p \rightarrow e^- n \pi^+ \quad "$$

Particles studied  $\Delta(1232 P_{33})$ ,  $N(1440 P_{11})$ ,  $N(1535 S_{11})$ ,  
 $N(1680 F_{15})$

Brief description Studies the transition form-factors of prominent resonances,  $\Delta(1232 P_{33})$ ,  $N(1440 P_{11})$ ,  $N(1535 S_{11})$ , and  $N(1680 F_{15})$  at high momentum transfers, in the transition region where constituent-quark models are expected to become less relevant and gluons and current-quarks are believed to play a more active role. Scheduled to run in Hall B in 1996/97.

Related experiments CEBAF-94-014

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### CEBAF-91-008

(Proposed Sep 1991, Approved Jan 1992, In preparation)

#### PHOTOPRODUCTION OF $\eta$ AND $\eta'$ MESONS

CLAS COLLABORATION

ARIZONA STATE U - B G Ritchie (✓ Spokesperson)  
 CATHOLIC U - H Crannell, J T O'Brien, D I Sober  
 CEBAF - B A Mecking  
 FLORIDA STATE U - L C Dennis  
 GEORGETOWN U - J Lambert  
 GEORGE WASHINGTON U - B L Berman, W J Briscoe,  
 K Dhuga, W R Dodge  
 BOŠKOVIĆ INST, ZAGREB - I Šlaus  
 SOUTH CAROLINA U - C Djalali, B M Freedom, A Tam,  
 S Whisnant  
 UCLA - B M K Nefkens

Accelerator CEBAF Detector CLAS

Reactions

$$\gamma p \rightarrow \eta p \quad 0.65\text{--}2.25 \text{ GeV } (E_{\text{lab}})$$

$$\gamma p \rightarrow \eta' p \quad "$$

Particles studied  $\eta$ ,  $\eta'$

Brief description Measures the differential cross-section for the photoproduction of  $\eta$  and  $\eta'$  mesons using the Hall-B bremsstrahlung photon tagger and the CLAS spectrometer. The target is a liquid hydrogen cell. Identification of the  $\eta$  and  $\eta'$  is made by detection of the recoil proton in the CLAS. Studies the properties of  $\eta$ ,  $\eta'$ ,  $N(1535 S_{11})$ , and  $N(1710 P_{11})$ . Scheduled to run in Hall B.

Related experiments CEBAF-89-039, CEBAF-89-045, CEBAF-93-008, CEBAF-93-017

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### CEBAF-91-011

(Proposed Oct 1991, Approved Dec 1993, In preparation)

#### HIGH PRECISION SEPARATION OF POLARIZED STRUCTURE FUNCTIONS IN ELECTROPRODUCTION OF THE $\Delta$ AND ROPER RESONANCES

CAL STATE, LA - M B Epstein  
 CEBAF - J P Chen, J J LeRose, J H Mitchell, S Nanda, A Saha  
 INFN, ROME - E Cisbani, R de Leo, F Ghio, M Jodice,  
 G M Urciuoli  
 INFN, LECCE - R Perrino  
 MARYLAND U - J J Kelly, P Markowitz  
 MIT - W Bertozzi, D Dale, S Gilad, A Sarty  
 NIKHEF, AMSTERDAM - H P Blok  
 OLD DOMINION U - P E Ulmer, L B Weinstein  
 RUTGERS U - R Gilman, C Glashauser, G Kumbartzki,  
 R Ransome, P M Rutt  
 SACLAY - J Y Mougey  
 NEW HAMPSHIRE U - J Calarco  
 ROME U, TORVERGATA - S Frullani (✓ Spokesperson),  
 F Garibaldi  
 VIRGINIA U - D H Barkhuff, R Lourie (✓ Spokesperson),  
 B Milbrath, S Van Verst  
 WILLIAM AND MARY COLL - J M Finn, M Jones, C F Perdrisat

Accelerator CEBAF Detector Spectrometer

Reactions Polarized beam

$$e^- p \rightarrow e^- p \pi^0 \quad 3.2 \text{ GeV}/c$$

Particles studied  $\Delta(1232 P_{33})$

Brief description Studies the six structure functions in the  $N\text{-}\Delta$  transition as a function of  $\theta_{\text{cm}}$ . The measurement is performed at  $Q^2 = 1.0 \text{ (GeV}/c)^2$ , at 6 c.m. angles, which allows a stand-alone multipole analysis of the amplitudes. Uses high-resolution spectrometers and a focal plane polarimeter. The target is liquid hydrogen. Scheduled to run in Hall A.

Related experiments CEBAF-89-037, -89-042, -93-036

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## SUMMARIES OF CEBAF EXPERIMENTS

### CEBAF-91-023

(Proposed Oct 1991, Approved May 1992, Jan 1995, In preparation)

#### MEASUREMENT OF POLARIZED STRUCTURE FUNCTIONS IN INELASTIC ELECTRON-PROTON SCATTERING USING THE CEBAF LARGE ACCEPTANCE SPECTROMETER

##### N\* COLLABORATION

CEBAF - W Brooks, V D Burkert (✓ Spokesperson),  
A Freyberger, B A Mecking, M Mestayer, B B Niczyporuk,  
E Smith, A Yegneswaran  
CHRISTOPHER NEWPORT U - D Doughty, L Elouadrhiri,  
D Heddle  
DUKE U - M Spraecker, H R Weller  
FLORIDA STATE U - L C Dennis, P Dragovitsch, K W Kemper  
FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-  
Sandri, V Muccifora, E Polli, A R Reolon, P Rossi  
INFN, GENOA - M Anghinolfi, P Corvisiero, G Gervino,  
L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone,  
M Taiuti, A Zucchiatti  
HAMPTON U - K B Beard  
JAMES MADISON U - K Giovanetti  
KENT STATE U - D Keane, D M Manley  
OLD DOMINION U - S Kuhn  
PITTSBURGH U - S A Dytman  
RENSSELAER POLY - G S Adams, N C Mukhopadhyay, P Stoler  
VIRGINIA U - D G Crabb (✓ Spokesperson), D B Day,  
J S McCarthy, R C Minehart (✓ Spokesperson), O A Rondon-  
Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber  
VIRGINIA STATE U - C E Stronach  
VIRGINIA TECH - R A Arndt, D A Jenkins, L D Roper  
WILLIAM AND MARY COLL - A Coleman, H O Funsten,  
T Y Tung  
YALE U - M Gai

Accelerator CEBAF Detector CLAS

Reactions Polarized beam and target

$$e^- p \rightarrow e^- X \quad 1.2 - 4.0, 6.0 \text{ GeV } (T_{\text{lab}})$$

Particles studied  $N(1440 P_{11})$

Brief description Measures the inclusive polarized structure functions,  $A_1$  and  $A_2$ , in the range  $0.2 \leq Q^2 \leq 2.5$  (GeV/c)<sup>2</sup> and  $1.1 < W < 2.5$  GeV. Uses polarized NH<sub>3</sub> target. Scheduled to run in Hall B in 1998.

Related experiments CEBAF-93-009

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### CEBAF-91-024

(Proposed Oct 1991, Approved Dec 1991, In preparation)

#### SEARCH FOR MISSING RESONANCES IN THE ELECTROPRODUCTION OF $\omega$ MESONS

##### N\* COLLABORATION

CEBAF - W Brooks, V D Burkert (Spokesperson), D Joyce,  
B A Mecking (Spokesperson), M Mestayer, B B Niczyporuk,  
E Smith, A Yegneswaran  
CHRISTOPHER NEWPORT U - D Doughty, D Heddle, Z J Li  
FLORIDA STATE U - L C Dennis  
FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-  
Sandri, V Muccifora, E Polli, A R Reolon, P Rossi  
INFN, GENOA - M Anghinolfi, P Corvisiero, G Gervino,  
L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone,  
M Taiuti, A Zucchiatti  
GEORGE MASON U - B J Lieb  
HAMPTON U - K B Beard  
JAMES MADISON U - K Giovanetti  
KENT STATE U - D M Manley (Spokesperson)  
PITTSBURGH U - S A Dytman  
RENSSELAER POLY - G S Adams, N C Mukhopadhyay, P Stoler

VIRGINIA U - D G Crabb, D B Day, R Marshall, J S McCarthy,  
R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock,  
L C Smith, S T Thornton, H J Weber  
VIRGINIA STATE U - C E Stronach  
WILLIAM AND MARY COLL - C E Carlson, H O Funsten  
(Spokesperson), T Y Tung  
YALE U - M Gai

Accelerator CEBAF Detector CLAS

Reactions

$$e^- p \rightarrow e^- p \pi^+ \pi^- X \quad 1.6, 2.4, 4.0 \text{ GeV } (T_{\text{lab}})$$

Brief description The experiment is aimed at searching for 'missing' 3-quark baryon states in the mass range from 1.7 to 2.2 GeV/c<sup>2</sup> in the  $p\omega$  decay channel. Scheduled to run in Hall B in 1996/97.

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### CEBAF-93-006

(Proposed Apr 1993, Approved Jun 1993, In preparation)

#### TWO PION DECAY OF ELECTROPRODUCED LIGHT QUARK BARYON RESONANCES

##### N\* COLLABORATION

CEBAF - W Brooks, V D Burkert (✓ Spokesperson),  
B A Mecking, B B Niczyporuk, E Smith, A Yegneswaran  
CHRISTOPHER NEWPORT U - D Doughty, D Heddle  
DUKE U - R Chasteler, H R Weller  
FLORIDA STATE U - L C Dennis, P Dragovitsch  
FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-  
Sandri, V Muccifora, E Polli, A R Reolon, P Rossi  
INFN, GENOA - M Anghinolfi, P Corvisiero, V Mokeev, G Ricco,  
M Ripani (✓ Spokesperson), M Sanzone, M Taiuti, A Zucchiatti  
GEORGE MASON U - B J Lieb  
HAMPTON U - K B Beard  
JAMES MADISON U - K Giovanetti  
KENT STATE U - D M Manley  
NORTH CAROLINA STATE U - D R Tilley  
PITTSBURGH U - S A Dytman  
RENSSELAER POLY - G S Adams, N C Mukhopadhyay,  
J Napolitano, P Stoler  
VIRGINIA U - D G Crabb, D B Day, R Marshall, J S McCarthy,  
R C Minehart, D Počanić, O A Rondon-Aramayo, R Sealock,  
L C Smith, S T Thornton, H J Weber  
WILLIAM AND MARY COLL - C E Carlson, A Coleman,  
H O Funsten, T Y Tung  
YALE U - M Gai

Accelerator CEBAF Detector CLAS

Reactions

$$e^- p \rightarrow e^- \text{ nucleon pion pion } X \quad 1.6, 2.4, 4.0 \text{ GeV } (T_{\text{lab}})$$

$$e^- n \rightarrow e^- \text{ nucleon pion pion } X$$

Brief description Studies some aspects of baryon spectra in the nonstrange sector, e.g., the form-factors of some poorly known states. It also looks for highly excited nucleon states around 1.6 GeV (mostly [56, 0+] and [70, 1-] multiplets) and the 'missing' states around 2 GeV (mostly [56, 2+] and [70, 2+] multiplets) predicted by quark models. Such states would strongly decay through  $\Delta\pi$ , and  $pN$  channels, both giving a final state with two pions. Approved for 800 hours with hydrogen target and 400 hours with deuterium target. Expected to run in Hall B in 1996/97.

Related experiments CEBAF-91-024, CEBAF-91-002, CEBAF-93-033

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WWW Home-page <http://aiacehp.ge.infn.it/twopion.html>



## SUMMARIES OF CEBAF EXPERIMENTS

### CEBAF-93-030

(Proposed Apr 1993, Approved Jun 1993, In preparation)

#### MEASUREMENT OF THE STRUCTURE FUNCTIONS FOR KAON ELECTROPRODUCTION

##### CLAS COLLABORATION

CEBAF - M Mestayer (✓ Spokesperson), E Smith  
 CARNEGIE MELLON U - R Magahiz, R A Schumacher  
 CHRISTOPHER NEWPORT U - D Doughty  
 FLORIDA STATE U - S Capstick  
 GEORGE WASHINGTON U - C Bennhold  
 OHIO U - T Adami, R W Finlay, S Grimes, K H Hicks  
 (✓ Spokesperson), A Kumar, D S Onley, J Rapaport,  
 L E Wright

PITTSBURGH U - S A Dytman  
 RICHMOND U - P D Rubin  
 SOUTH CAROLINA U - A Tam  
 WILLIAM AND MARY COLL - H O Funsten

Accelerator CEBAF Detector CLAS

##### Reactions

$e^- p \rightarrow e^- K^+ \Lambda$  2.4, 3.2, 4.0 GeV ( $T_{lab}$ )  
 $e^- p \rightarrow e^- K^+ \Sigma^0$  "

Particles studied  $N^*$  (unspec)

Brief description Measures  $L$ ,  $T$ ,  $LT$ , and  $TT$  structure

functions for  $Q^2$  between 1 and 2 ( $\text{GeV}/c^2$ ) and  $W$  between 1.8 and 2.2 GeV. Measures isospin dependence by comparing  $\Lambda$  and  $\Sigma$  productions. Studies production ratio of hyperons up to the  $\Lambda(1520)$ . Measures polarization of  $\Lambda$ . Searches for  $N^*$  resonances which decay to hyperon- $K^+$  final states. Scheduled to run in Hall B.

Journal papers NIM A323 (1992) 191, and IEEE TNS 39 (1992) 690.

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 hicks@ouvaxa.cats.ohiou.edu, hicks1@ohiou.edu

### CEBAF-93-033

(Proposed Apr 1993, Approved Jun 1993, In preparation)

#### A SEARCH FOR MISSING BARYONS FORMED IN $\gamma p \rightarrow p\pi^+\pi^-$ USING THE CLAS DETECTOR

##### CLAS COLLABORATION

RENSELAER POLY - G S Adams, J Napolitano  
 (✓ Spokesperson), P Stoler, M Witkowski, B B Wojtsekhowski  
 CARNEGIE MELLON U - R Schumacher  
 RICE U - G Mutchler  
 KENT STATE U - D M Manley

Accelerator CEBAF Detector CLAS

##### Reactions

$\gamma p \rightarrow p \pi^+ \pi^-$  0.5-2.3 GeV ( $E_{lab}$ )

Particles studied  $N^*$  (unspec)

Brief description Uses tagged photons and liquid hydrogen target. Scheduled to run in Hall B in 1996/97.

Related experiments CEBAF-89-004, CEBAF-89-024

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WWW Home-page <http://www.ceba.gov/clas/CLAS.html>

### CEBAF-93-036

(Proposed Apr 1993, Approved Jun 1993, In preparation)

#### MEASUREMENT OF SINGLE PION ELECTROPRODUCTION FROM THE PROTON WITH POLARIZED BEAM AND POLARIZED TARGET USING CLAS

##### $N^*$ COLLABORATION

CEBAF - W Brooks, V D Burkert, D Joyce, B A Mecking,  
 B B Niczyporuk, E S Smith, A Yegneswaran

CHRISTOPHER NEWPORT U - D Doughty, D Heddle, Z J Li  
 DUKE U - R Chasteler (✓ Spokesperson), H R Weller  
 (✓ Spokesperson)

FLORIDA STATE U - L C Dennis, P Dragovitsch  
 FRASCATI - N Bianchi, G P Capitani, E De Sanctis, P Levi-Sandri, V Muccifora, E Polli, A R Reolon, P Rossi  
 INFN, GENOA - M Anghinolfi, P Corvisiero, G Gervino,  
 L Mazzaschi, V Mokeev, G Ricco, M Ripani, M Sanzone,  
 M Taiuti, A Zucchiatti  
 GEORGE MASON U - B J Lieb  
 HAMPTON U - K B Beard  
 JAMES MADISON U - K Giovanetti  
 KENT STATE U - D M Manley  
 PITTSBURGH U - S A Dytman  
 RENSELAER POLY - G S Adams, N C Mukhopadhyay, P Stoler  
 VIRGINIA U - D G Crabb, D B Day, J S McCarthy,  
 R C Minehart (✓ Spokesperson), D Počanić, O A Rondon-Aramayo, R Sealock, L C Smith, S T Thornton, H J Weber  
 VIRGINIA STATE U - C E Stronach  
 WILLIAM AND MARY COLL - C E Carlson, H O Funsten  
 YALE U - M Gai

Accelerator CEBAF Detector CLAS

Reactions Polarized beam and target

$e^- p \rightarrow e^- \pi^+ n$  1.2-4.0 GeV ( $T_{lab}$ )  
 $e^- p \rightarrow e^- p \pi^0$  "

Particles studied  $N(1440 P_{11})$ ,  $N(1520 D_{13})$ ,  $\Delta(1232 P_{33})$

Brief description Measures polarization asymmetries for exclusive single-pion channels. Provides information on the Roper resonance. Scheduled to run in Hall B in 1998/99.

Related experiments CEBAF-89-037, CEBAF-89-038, CEBAF-89-040, CEBAF-89-042, CEBAF-89-043, CEBAF-91-002

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 weller@tunl.tunl.duke.edu, minehart@virginia.edu

### CEBAF-94-008

(Proposed Apr 1994, Approved Jun 1994, In preparation)

#### PHOTOPRODUCTION OF $\eta$ and $\eta'$ MESONS FROM DEUTERIUM

##### CLAS COLLABORATION

ARIZONA STATE U - B Ritchie (✓ Spokesperson)  
 CEBAF - B A Mecking  
 GEORGETOWN U - J Lambert  
 RICHMOND U - G P Gilfoyle, R W Major, M F Vineyard  
 SOUTH CAROLINA U - C Djalali, B Preedom, S Whisnant

Accelerator CEBAF Detector CLAS

##### Reactions

$\gamma \text{ deut} \rightarrow \eta \text{ deut}$  0.63-1.52 GeV ( $E_{lab}$ )  
 $\gamma \text{ deut} \rightarrow \eta' \text{ deut}$  "

Particles studied  $\eta$ ,  $\eta'$ ,  $N(1535 S_{11})$ ,  $N(1710 P_{11})$

Brief description Measures the differential cross-section for the coherent and incoherent photoproduction of  $\eta$  and  $\eta'$  mesons on the deuteron for photon energies from 0.63 to 1.52 GeV. Uses a liquid deuterium target cell and a tagged photon beam. Provides information on the properties of  $\eta$ ,  $\eta'$  and gives insight into the structure of related nucleon resonances. Studies the behavior of the mesons in the lightly bound two-nucleon systems. Scheduled to run in Hall B, for 23 days (simultaneously with CEBAF-89-045, and CEBAF-93-017).

Related experiments CEBAF-89-039, CEBAF-89-045, CEBAF-93-008, CEBAF-93-017, CEBAF-91-008

E-mail contact barry.ritchie@asu.edu

### CEBAF-94-016

(Proposed Apr 1994, Approved Jan 1995, In preparation)

#### MEASUREMENT OF RARE RADIATIVE DECAYS OF THE $\phi$ MESON

## SUMMARIES OF CEBAF EXPERIMENTS

CATHOLIC U - H Crannell, J O'Brien, D I Sober  
 CEBAF - V D Burkert, B Niczyporuk, E S Smith  
 INDIANA U - B Brabson, R Crittenden, A Dzierba  
 (✓ Spokesperson), J Gunter, R Lindenbusch, D Rust, P Smith,  
 S Teige  
 MOSCOW, ITEP - M V Kossov  
 NOTRE DAME U - J J Kolata, J Losecco, A H Sanjari,  
 W D Shephard  
 RICE U - S Ahmad, B E Bonner, G Mutchler  
 RICHMOND U - G P Gilfoyle, P Rubin, M F Vineyard  
 RENSSELAER POLY - G S Adams, J J Napolitano (✓ Co-  
 spokesperson), M T Witkowski  
 VIRGINIA U - E Frlež, D Počanić  
 WILLIAM AND MARY COLL - D Armstrong

Accelerator CEBAF Detector Calorimeter

### Reactions

$\gamma p \rightarrow \eta p$  4 GeV ( $E_{\text{lab}}$ )

Particles studied  $\phi, \rho, \omega$

Brief description Uses the 4 GeV tagged photon beam and a lead glass detector to study decays of the  $\phi$  into all-photon final states. Expects to achieve the branching ratio sensitivity of about  $10^{-5}$ , which should be enough to observe the (yet unobserved) decays  $\phi \rightarrow f_0(980)\gamma$ ,  $\phi \rightarrow a_0(980)\gamma$ , and  $\phi \rightarrow \eta'\gamma$ , and to improve the measurement of other branching ratios of  $\phi, \rho$  and  $\omega$ . Scheduled to run in Hall B, for 30 days.

Related experiments BNL-852

E-mail contact dzierba@indiana.edu, jimnap@rpi.edu

WWW Home-page

<http://www.cebaf.gov/physics/radphi/radphi.html>

### CEBAF-94-109

(Proposed Dec 1994, Approved Jan 1995, In preparation)

#### PHOTOPRODUCTION OF THE $\rho$ MESON FROM THE PROTON WITH LINEARLY POLARIZED PHOTONS

ARIZONA STATE U - R Alarcon, J Comfort  
 CATHOLIC U - H Crannell, S Matthews, J O'Brien, D I Sober  
 CEBAF - R R Whitney (✓ Spokesperson)  
 GEORGE WASHINGTON U - B L Berman, W J Briscoe,  
P L Cole (✓ Spokesperson), J P Connelly (✓ Spokesperson),  
 K S Dhuga, L Murphy, S Rugari  
 KENT STATE U - D M Manley  
 OLD DOMINION U - C Hyde-Wright, W Roberts  
 RENSSELAER POLY - J J Napolitano  
 SACLAY - G Audit, M Guidal, F Kunne-Perrot, J M Laget,  
 C Marchand, B Saghai  
 FLORIDA STATE U, SCRI - S C Capstick  
 VIRGINIA TECH - J Pienec, D A Jenkins

Accelerator CEBAF Detector CLAS

Reactions Polarized beam

$\gamma p \rightarrow \rho^0 p$  1.0-1.5 GeV ( $E_{\text{lab}}$ )

$\gamma p \rightarrow \rho^+ n$  "

$\gamma p \rightarrow \rho^0 p$  1.4-2.1 GeV ( $E_{\text{lab}}$ )

$\gamma p \rightarrow \rho^+ n$  "

Particles studied  $N^*$ (unspec),  $\Delta$ (unspec)

Brief description Studies the baryon resonance region between 1.66 and 2.22 GeV center-of-mass energy in the  $\rho N$  channel. Uses a linearly polarized tagged photon beam produced by coherent bremsstrahlung from a diamond crystal. Measures the beam asymmetry and extracts the spin density matrix elements from the angular distribution of the two-pion decay of the  $\rho$  meson as a function of  $s$  and  $t$ . This facilitates the search for baryon resonance contributions and provides information on diffractive,  $t$ - and  $u$ -channel processes. Scheduled to run in Hall B, for 11 days at 4 GeV, and 9 days at 6 GeV.

Related experiments CEBAF-93-033

E-mail contact cole@micro1.cebaf.gov

## Other CEBAF Experiments

Listed here are some other Jefferson Lab's (formerly CEBAF) experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. The regularly published Program Advisory Committee (PAC) reports often list all the approved experiments at the Lab. For the copies of these reports contact [users@cebaf.gov](mailto:users@cebaf.gov), or check the Lab's main Web page (<http://www.cebaf.gov>).

### CEBAF-89-004 (In preparation)

#### ELECTROMAGNETIC PRODUCTION OF HYPERONS

By CLAS Collaboration

Spokesperson: Reinhard A. Schumacher [Carnegie Mellon U.]

E-mail contact reinhard@ernest.phys.cmu.edu

### CEBAF-89-008 (In preparation)

#### INCLUSIVE SCATTERING FOR NUCLEI AT $x > 1$ AND HIGH $Q^2$

Spokespersons: Bradley W. Filippone [Cal Tech], Donal B. Day [Virginia U.]

E-mail contact brad@erin.caltech.edu, dbd@virginia.edu

### CEBAF-89-009 (In preparation)

#### INVESTIGATION OF THE SPIN DEPENDENCE OF THE $\Lambda N$ EFFECTIVE INTERACTION IN THE $P$ SHELL

Spokespersons: Robert E. Chrien [Brookhaven], Ed Hungerford [Houston U.]

E-mail contact chrien@bnl.gov, hunger@uh.edu

### CEBAF-89-012 (Taking data)

#### TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON AT FORWARD ANGLES AND PHOTON ENERGIES BETWEEN 1.5 AND 4.0 GeV

Spokesperson: Roy J. Holt [Argonne]

E-mail contact holt@anlphy.phy.anl.gov

### CEBAF-89-015 (In preparation)

#### STUDY OF COINCIDENCE REACTIONS IN THE DIP AND $\Delta$ -RESONANCE REGIONS

Spokesperson: Hossain Baghaei [Virginia U.]

E-mail contact hossain@virginia.edu

### CEBAF-89-017 (In preparation)

#### ELECTROEXCITATION OF THE $\Delta(1232)$ IN NUCLEI

Spokesperson: Richard Sealock [Virginia U.]

E-mail contact sealock@virginia.edu

### CEBAF-89-033 (In preparation)

#### MEASUREMENT OF RECOIL POLARIZATION IN THE $^{16}\text{O}(\bar{e}, e'\bar{p})$ REACTION WITH 4 GeV ELECTRONS

Spokespersons: Sirish Nanda, J. Wallace Van Orden [CEBAF], Chia Cheh (George) Chang [Maryland U.], Charles Glashauser [Rutgers U.]

E-mail contact nanda@cebaf.gov, vanorden@cebaf.gov, chang@enp.umd.edu, glashauser@ruthep.rutgers.edu

## SUMMARIES OF CEBAF EXPERIMENTS

**CEBAF-89-037** (In preparation)

**ELECTROPRODUCTION OF THE  $\Delta(1232 P_{33})$  RESONANCE**

By N\* Collaboration

Spokespersons: Volker D. Burkert [CEBAF], Ralph C. Minehart [Virginia U.]

E-mail contact burkert@cebaf.gov, minehart@virginia.edu

**CEBAF-89-042** (In preparation)

**MEASUREMENT OF THE ELECTRON ASYMMETRY IN THE  $p(e, e'p)\pi^0$  AND  $p(e, e'\pi^+)n$  IN THE MASS REGION OF THE  $\Delta(1232 P_{33})$  FOR  $Q^2 \leq 2$  (GeV/c)<sup>2</sup>**

By N\* Collaboration

Spokespersons: Volker D. Burkert [CEBAF], Ralph C. Minehart [Virginia U.]

E-mail contact burkert@cebaf.gov, minehart@virginia.edu

**CEBAF-89-045** (In preparation)

**STUDY OF KAON PHOTOPRODUCTION ON DEUTERIUM**

Spokesperson: Bernhard A. Mecking [CEBAF]

E-mail contact mecking@cebaf.gov

**CEBAF-91-003** (In preparation)

**A STUDY OF LONGITUDINAL CHARGED PION ELECTROPRODUCTION IN <sup>2</sup>D, <sup>3</sup>He, AND <sup>4</sup>He**

Spokesperson: Harold E. Jackson [Argonne]

E-mail contact hal@anl.gov

**CEBAF-91-004** (In preparation)

**MEASUREMENT OF STRANGE QUARK EFFECTS USING PARITY VIOLATING ELASTIC SCATTERING FROM <sup>4</sup>He AT  $Q^2 = 0.6$  (GeV/c)<sup>2</sup>**

Spokesperson: Betsy Beise [Maryland U.]

E-mail contact beise@enp.umd.edu

**CEBAF-91-007** (In preparation)

**MEASUREMENT OF THE NUCLEAR DEPENDENCE AND MOMENTUM TRANSFER DEPENDENCE OF QUASIELASTIC ( $e, e'p$ ) SCATTERING AT LARGE MOMENTUM TRANSFER**

Spokesperson: Richard G. Milner [MIT]

E-mail contact milner@mitlns.mit.edu

**CEBAF-91-010** (In preparation)

**PARITY VIOLATION IN ELASTIC SCATTERING FROM THE PROTON AND <sup>4</sup>He**

Spokespersons: Paul A. Souder [Syracuse U.], J.M. Finn [William and Mary Coll.]

E-mail contact souder@suhep.phy.syr.edu, finn@cebaf.gov

WWW Home-page <http://www.cebaf.gov/halla/parity.html>

**CEBAF-91-014** (In preparation)

**QUASIFREE STRANGENESS PRODUCTION IN NUCLEI**

Spokesperson: Charles E. Hyde-Wright [Old Dominion U.]

E-mail contact hyde@cebaf.gov

**CEBAF-91-015** (In preparation)

**HELICITY STRUCTURE OF PION PHOTOPRODUCTION**

By CLAS Collaboration

Spokesperson: Daniel I. Sober [Catholic U.]

E-mail contact sober@cua.edu

**CEBAF-91-016** (In preparation)

**ELECTROPRODUCTION OF KAONS AND LIGHT HYPERNUCLEI**

Spokesperson: Benjamin Zeidman [Argonne]

E-mail contact zeidman@anlphy.phy.anl.gov

**CEBAF-91-017** (In preparation)

**MEASUREMENT OF  $G^0$ , THE FLAVOR SINGLET CHARGE FORM-FACTOR OF PROTON**

Spokesperson: Douglas H. Beck [Illinois U., Urbana]

E-mail contact beck@uinpla.npl.uiuc.edu

**CEBAF-91-026** (In preparation)

**MEASUREMENT OF THE ELECTRIC AND MAGNETIC STRUCTURE FUNCTIONS OF DEUTERON AT LARGE MOMENTUM TRANSFERS**

Spokesperson: Gerassimos (Makis) G. Petratos [Kent State U.]

E-mail contact petratos@ksuvxd.kent.edu

**CEBAF-93-008** (In preparation)

**INCLUSIVE  $\eta$  PHOTOPRODUCTION IN NUCLEI**

Spokesperson: Michael F. Vineyard [Richmond U.]

E-mail contact vineyard@urvax.urich.edu

**CEBAF-93-009** (In preparation)

**THE POLARIZED STRUCTURE FUNCTION  $G_{1n}$  AND THE  $Q^2$  DEPENDENCE OF THE GERASIMOV-DRELLHEARN SUM RULE FOR THE NEUTRON**

By N\* Collaboration

Spokesperson: Sebastian E. Kuhn [Old Dominion U.]

E-mail contact kuhn@cebaf.gov

**CEBAF-93-012** (In preparation)

**ELECTROPRODUCTION OF LIGHT QUARK MESONS**

By CLAS Collaboration

Spokesperson: Mikhail V. Kossov [Moscow, ITEP]

E-mail contact kossov@cebaf.gov

**CEBAF-93-017** (In preparation)

**STUDY OF  $\gamma d \rightarrow pn$  AND  $\gamma d \rightarrow p\Delta^0$  REACTIONS FOR SMALL MOMENTUM TRANSFERS**

Spokespersons: Enzo De Sanctis, Patrizia Rossi [Frascati]

E-mail contact rossi@lnf.infn.it, desanctis@lnf.infn.it

**CEBAF-93-021** (In preparation)

**THE CHARGED PION FORM-FACTOR**

Spokesperson: David J. Mack [CEBAF]

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## SUMMARIES OF CEBAF EXPERIMENTS

**CEBAF-93-022** (In preparation)

**MEASUREMENT OF THE POLARIZATION OF THE  $\phi$  IN ELECTROPRODUCTION**

Spokespersons: Elton Smith [CEBAF], Philip D. Rubin [Richmond U.], Herbert O. Funsten [William and Mary Coll.]

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**CEBAF-93-024** (In preparation)

**MEASUREMENT OF THE MAGNETIC FORM-FACTOR OF THE NEUTRON AT LARGE MOMENTUM TRANSFERS**

Spokespersons: Javier Gomez [CEBAF], Gerassimos (Makis) G. Petratos [Kent State U.]

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**CEBAF-93-026** (In preparation)

**THE CHARGE FORM-FACTOR OF THE NEUTRON**

Spokesperson: Donal B. Day [Virginia U.]

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**CEBAF-93-027** (In preparation)

**ELECTRIC FORM-FACTOR OF PROTON BY RECOIL POLARIZATION**

Spokespersons: Vina Punjabi [Norfolk State U.], Charles F. Perdrisat [William and Mary Coll.]

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**CEBAF-93-031** (In preparation)

**PHOTOPRODUCTION OF VECTOR MESONS AT HIGH  $t$**

Spokespersons: Marco Anghinolfi [INFN, Genoa], Jean Marc Laget, Claude Marchand [Saclay]

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**CEBAF-93-038** (In preparation)

**THE ELECTRIC AND MAGNETIC FORM-FACTORS OF THE NEUTRON FROM THE  $d(\epsilon, e'\bar{n})p$  REACTION**

Spokesperson: Richard Madey [Hampton U.]

E-mail contact madey@cebaf.gov

**CEBAF-94-002** (In preparation)

**PHOTOPRODUCTION OF VECTOR MESONS OFF NUCLEI**

Spokespersons: Pierre Bertin [Clermont-Ferrand U.], Mikhail Vladimirovich Kossov [Moscow, ITEP], Barry Freedom [South Carolina U.]

E-mail contact kossov@cebaf.gov

**CEBAF-94-005** (In preparation)

**DETERMINATION OF THE  $N\Delta$  AXIAL VECTOR TRANSITION FORM-FACTOR  $G_{N\Delta}^A$  FROM THE  $ep \rightarrow e'\Delta^{++}\pi^-$  REACTION**

Spokespersons: Latifa Elouadrhiri, David Heddle [Christopher Newport U.]

E-mail contact latifa@cebaf.gov

**CEBAF-94-010** (In preparation)

**MEASUREMENT OF THE NEUTRON ( $^3\text{He}$ ) SPIN STRUCTURE FUNCTION AT LOW  $Q^2$ : A CONNECTION BETWEEN THE BJORKEN AND DRELLHEARN-GERASIMOV SUM RULES**

Spokespersons: Gordon D. Cates [Princeton U.], Zein-Eddine Meziani [Temple U.]

E-mail contact meziani@vm.temple.edu

**CEBAF-94-012** (In preparation)

**MEASUREMENT OF PHOTOPROTON POLARIZATION IN THE  $H(\gamma, \bar{p})\pi^0$  REACTION**

Spokespersons: Roy J. Holt [Illinois U., Urbana], Ronald Gilman [Rutgers U.]

E-mail contact gilman@ruthep.rutgers.edu

**CEBAF-94-014** (In preparation)

**The  $\Delta(1232)$  FORM-FACTOR AT HIGH MOMENTUM TRANSFER**

Spokesperson: James J. Napolitano [Rensselaer Poly]

E-mail contact jimnap@rpi.edu

**CEBAF-94-015** (In preparation)

**STUDY OF THE AXIAL ANOMALY USING THE  $\gamma\pi^+ \rightarrow \pi^+\pi^0$  REACTION NEAR THRESHOLD**

Spokespersons: Amrit S. Yegneswaran [CEBAF], Rory A. Miskimen [Massachusetts U., Amherst], Kebin Wang [Virginia U.]

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**CEBAF-94-017** (In preparation)

**THE NEUTRON MAGNETIC FORM-FACTOR FROM PRECISION MEASUREMENTS OF THE RATIO OF QUASIELASTIC ELECTRON-NEUTRON TO ELECTRON-PROTON SCATTERING IN DEUTERIUM**

Spokespersons: William K. Brooks [CEBAF], Michael F. Vineyard [Richmond U.]

E-mail contact brooksw@cebaf.gov

**CEBAF-94-103** (In preparation)

**THE PHOTOPRODUCTION OF PIONS**

Spokespersons: William J. Briscoe [George Washington U.], John Ficenec, David A. Jenkins [Virginia Tech]

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**CEBAF-94-104** (In preparation)

**THE FUNDAMENTAL  $\gamma n \rightarrow \pi^- p$  PROCESS IN  $^2\text{H}$ ,  $^4\text{He}$ , and  $^{12}\text{C}$  IN THE 1.2-6.0 GeV REGION**

Spokespersons: Haiyan Gao, Roy J. Holt [Illinois U., Urbana]

E-mail contact gao@uinpla.npl.uiuc.edu

**CEBAF-95-003** (In preparation)

**MEASUREMENT OF  $K^0$  ELECTROPRODUCTION**

Spokesperson: Richard Magahiz [Carnegie Mellon U.]

E-mail contact magahiz@ernest.phys.cmu.edu

## Selected CERN Experiments

## CERN-IS-300

(Proposed Sep 1991, Approved Sep 1991, In preparation)

## A SEARCH FOR AXIONS AND MASSIVE NEUTRINOS

## IS300-ISOLDE COLLABORATION

AARHUS U - P Hornshoj, H L Nielsen, J W Petersen, K Riisager, G Weyer (✓ Spokesperson)

CERN - A De Rujula, H L Ravn

CHALMERS UNIV TECH - B Jonson, G Nyman

Accelerator CERN-PS Detector SpectrometerParticles studied axion,  $\nu$ 

Brief description A search for axions and a heavy neutrino relying on a strong, high purity source of radioactive  $^{125}\text{I}$ . A possible 17 keV neutrino emission in the electron capture decay of  $^{125}\text{I}$  could be observed by studying the internal bremsstrahlung spectrum. A possible observation of axions in the 35.5 keV M1 transition of the  $^{125}\text{Te}$  daughter is based on an analogue of the Mössbauer effect, i.e. the axion resonance absorption in the  $^{125}\text{Te}$  resonance absorber. Awaiting for a staggered beam from the PS Booster, expected to be available in Spring 97.

E-mail contact helge.ravn@cern.ch

## CERN-LEP-ALEPH

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

## THE ALEPH DETECTOR (APPARATUS FOR LEP PHYSICS)

## ALEPH COLLABORATION

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F Sanchez, F Teubert

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E Kneringer, J Knobloch, I Lehraus, E B Martin, P Mato,

A Minten, R Miquel, L M Mir, L Moneta, T Oest, P Palazzi,

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S Monteil, J C Montret, D Pallin, P Perret, F Podlyski,

J Proriot, J M Rossignol

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DEMOCRITOS NUCLEAR RESEARCH CENTER - A Kyriakis,

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P Bourdon, J C Brient, A Rouge, M Rumpf, R Tanaka,

A Valassi, M Verderi, H Videau

EDINBURGH U - D J Candlin, M I Parsons

FLORENCE U &amp; INFN, FLORENCE - E Focardi, G Parrini

FLORIDA STATE U - M Corden, C Georgopoulos, D E Jaffe

FRASCATI - A Antonelli, G Bencivenni, G Bologna, F Bossi,

P Campana, G Capon, D Casper, V Chiarella, G Felici,

P Laurelli, G Mannocchi, F Murtas, G P Murtas, L Passalacqua, M Pepe-Altarelli

GLASGOW U - L Curtis, S J Dorris, A W Halley, I G Knowles,

J G Lynch, V O'Shea, C Raine, P Reeves, J M Scarr, K Smith,

A S Thompson, F Thomson, S Thorn, R M Turnbull

HEIDELBERG U - U Becker, C Geweniger, G Graefe, P Hanke,

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J Sommer, H Stenzel, K Tittel, S Werner, M Wunsch

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J K Sedgbeer, A M Stacey, M D Williams

INNSBRUCK U - G Dissertori, P Girtler, D Kuhn, G Rudolph

LANCASTER U - C K Bowdery, T J Brodbeck, P Colrain,

G Crawford, A J Finch, F Foster, G Hughes, T Sloan,

E P Whelan, M I Williams

MAINZ U, INST PHYS - A Galla, A M Greene, K Kleinknecht,

G Quast, B Renk, E Rohne, H G Sander, P van Gemmeren,

R Wanke, C Zeitnitz

MARSEILLE, CPPM - J J Aubert, A M Bencheikh, C Benchouk,

A Bonissant, G Bujosa, D Calvet, J Carr, C Diaconu, F Etienne,

N Konstantinidis, D Nicod, P Payre, D Rousseau, A Sadouki,

M Talby, M Thulasidas, K Trabelsi

MUNICH, MAX PLANCK INST - I Abt, R Assmann, C Bauer,

W Blum, H Dietl, F Dydak, G Ganis, C Gotzhein, K Jakobs,

H Kroha, G Lutjens, G Lutz, W Manner, H G Moser, R Richter,

A Rosado-Schlösser, S Schael, R Settles, H Seywerd, R St Denis,

W Wiedenmann, G Wolf

ORSAY, LAL - J Boucrot, O Callot, A Cordier, M Davier,

L Duflot, J F Grivaz, P Heusse, M Jacquet, D W Kim,

F Le Diberder, J Lefrancois, A M Lutz, I Nikolic, H J Park,

I C Park, M H Schune, S Simion, J J Veillet, I Videau

PISA U &amp; INFN, PISA &amp; PISA, SCUOLA NORMALE

SUPERIORE - P Azzurri, G Bagliesi, G Batignani, S Bettarini,

C Bozzi, G Calderini, M Carpinelli, M A Ciocci, V Ciulli,

R Dell'Orso, R Fantechi, I Ferrante, L Foa, F Forti, A Giassi,

M A Giorgi, A Gregorio, F Ligabue, A Lusiani, P S Marrocchesi,

A Messineo, G Rizzo, G Sanguinetti, A Sciaba, P Spagnolo,

J Steinberger, R Tenchini, G Tonelli, C Vannini, P G Verdini,

J Walsh

ROYAL HOLLOWAY - BEDFORD COLL - A P Betteridge,

G A Blair, L M Bryant, F Cerutti, J T Chambers, Y Gao,

M G Green, D L Johnson, T Medcalf, P Perrodo, J A Strong,

J H von Wimmersperg-Toller

RUTHERFORD - D R Botterill, R W Clift, T R Edgecock,

S Haywood, P Maley, P R Norton, J C Thompson

DAPNIA, SACLAY - B Bloch-Devaux, P Colas, S Emery,

W Kozanecki, E Lancon, M C Lemaire, E Locci, B Marx,

P Perez, J Rander, J F Renardy, A Roussarie, J P Schuller,

J Schwindling, A Trabelsi, B Vallage

UC, SANTA CRUZ - R P Johnson, H Y Kim, A M Litke,

M A McNeil, G Taylor

SHEFFIELD U - A Beddall, C N Booth, R Boswell, C A J Brew,

S Cartwright, F Combley, A Koksai, M Letho, W M Newton,

C Rankin, J Reeve, L F Thompson

SIEGEN U - A Bohrer, S Brandt, V Buscher, G Cowan,

E Feigl, C Grupen, G Lutters, J Minguet-Rodriguez, F Rivera,

P Saraiva, L Smolik, F Stephan

TRIESTE U, IST FIS &amp; INFN, TRIESTE - M Aleppo,

N Apollonio, L Bosisio, R Della Marina, G Giannini, B Gobbo,

G Musolino, F Ragusa

WASHINGTON U, SEATTLE - J Rothberg, S Wasserbaech

WISCONSIN U - S R Armstrong, L Bellantoni, P Elmer, Z Feng,

D P S Ferguson, Y S Gao, S Gonzales, J Grahl, T C Greening,

J L Harton, O J Hayes, H Hu, P A McNamara, III, J M Nacht-

man, W Orejudos, Y B Pan, Y Saadi, M Schmitt, I J Scott,

V Sharma, J D Turk, A M Walsh, S L Wu, X Wu, J M Ya-

martino, M Zheng, G Zobernig

Accelerator CERN-LEP Detector ALEPHReactions $e^+ e^- < 200 \text{ GeV (Ecm)}$ Particles studied  $W^+$ ,  $W^-$ ,  $Z^0$ , hvy-flavor, hvy-lepton, higgs,

s-particle

Brief description A  $4\pi$  detector designed to give as much

detailed information as possible about complex events in high-

energy  $e^+e^-$  collisions. A superconducting coil 5 m in diameter

and 6 m long produces a uniform 1.5 tesla field in the beam

direction. Inside the coil, in order of increasing radius, there

## SUMMARIES OF CERN EXPERIMENTS

is a microstrip solid state device, an Inner Tracking Chamber (ITC) using drift wires, a Time Projection Chamber (TPC), 3.6 m diameter, 4.4 m long, and an electromagnetic calorimeter, of 2 mm lead sheets with proportional wire sampling. Outside of the coil, a 1.2 m thick Fe return path is used as a hadron calorimeter, and a double layer of drift tubes aids in the muon identification. Strong points of the detector are a precision of momentum measurements for charged particles, due to a high magnetic field and a TPC, a good identification of electrons and muons even when they are immersed in jets, and a spatial resolution obtained in  $e\gamma$  calorimetry. A minivertex detector provides a capability for identifying secondary vertices, and a silicon-tungsten calorimeter installed in 1992 allows a significant reduction of the luminosity error. Taking data (July 96).

*Journal papers* NIM 217 (1983) 305, NIM 217 (1983) 317, NIM A225 (1984) 481, NIM A226 (1984) 82, IEEE TNS 32 (1985) 605, NIM A228 (1985) 327, NIM A234 (1985) 47, NIM A235 (1985) 296, NIM A239 (1985) 192, NIM A244 (1986) 516, NIM A247 (1986) 438, NIM A251 (1986) 449, NIM A252 (1986) 392, NIM A252 (1986) 399, NIM A252 (1986) 403, IEEE TNS 34 (1987) 133, CPC 45 (1987) 229, CPC 45 (1987) 283, CPC 45 (1987) 433, NIM A257 (1987) 587, IEEE TNS 35 (1988) 316, NIM A263 (1988) 43, NIM A263 (1988) 58, NIM A268 (1988) 144, NIM A271 (1988) 449, CPC 57 (1989) 401, IEEE TNS 36 (1989) 1459, IEEE TNS 36 (1989) 1464, IEEE TNS 36 (1989) 1514, NIM A277 (1989) 358, NIM A279 (1989) 212, NIM A283 (1989) 573, PL B231 (1989) 519, IJMP C1 (1990) 147, IEEE TNS 37 (1990) 1210, NIM A286 (1990) 61, NIM A289 (1990) 176, NIM A294 (1990) 121 [erratum: NIM A303 (1991) 393], NIM A297 (1990) 153, NIM A297 (1990) 390, HEPNP 14 (1990) 966, PL B234 (1990) 209, PL B234 (1990) 399, PL B235 (1990) 399, PL B236 (1990) 86, PL B236 (1990) 233, PL B236 (1990) 501, PL B236 (1990) 511, PL B237 (1990) 291, PL B241 (1990) 141, PL B241 (1990) 623, PL B241 (1990) 635, PL B244 (1990) 541, PL B244 (1990) 551, PL B245 (1990) 289, PL B246 (1990) 306, PL B250 (1990) 172, ZPHY C48 (1990) 365, NIM A306 (1991) 446, NP (PROC SUPPL) 23B (1991) 291, PL B255 (1991) 623, PL B257 (1991) 479, PL B257 (1991) 492, PL B258 (1991) 236, PL B259 (1991) 377, PL B262 (1991) 139, PL B263 (1991) 112, PL B263 (1991) 325, PL B264 (1991) 476, PL B265 (1991) 430, PL B265 (1991) 475, PL B266 (1991) 218, PL B273 (1991) 181, NIM A315 (1992) 121, NIM A320 (1992) 177, NIM A323 (1992) 213, PL B276 (1992) 247, PL B278 (1992) 209, PL B279 (1992) 411, PL B284 (1992) 151, PL B284 (1992) 163, PL B284 (1992) 177, PL B285 (1992) 309, PL B292 (1992) 210, PL B294 (1992) 145, PL B295 (1992) 174, PL B295 (1992) 396, PL B297 (1992) 432, PL B297 (1992) 449, PL B297 (1992) 459, PRPL 216 (1992) 253, ZPHY C53 (1992) 1, ZPHY C53 (1992) 21, ZPHY C53 (1992) 375, ZPHY C54 (1992) 75, ZPHY C54 (1992) 211, ZPHY C55 (1992) 209, PL B298 (1993) 479, PL B303 (1993) 198, PL B307 (1993) 187, PL B307 (1993) 194, PL B307 (1993) 209, PL B308 (1993) 425, PL B311 (1993) 425 [erratum: PL B316 (1993) 631], PL B313 (1993) 299, PL B313 (1993) 312, PL B313 (1993) 498, PL B313 (1993) 509, PL B313 (1993) 520, PL B313 (1993) 535, PL B313 (1993) 549, PL B314 (1993) 459, ZPHY C57 (1993) 17, ZPHY C59 (1993) 215, ZPHY C59 (1993) 369, ZPHY C60 (1993) 71, IEEE TNS 41 (1994) 236, NIM A346 (1994) 461, PL B321 (1994) 168, PL B322 (1994) 275, PL B322 (1994) 441, PL B332 (1994) 209, PL B332 (1994) 219, PL B334 (1994) 244, PL B335 (1994) 99, ZPHY C62 (1994) 1, ZPHY C62 (1994) 179, ZPHY C62 (1994) 539, ZPHY C64 (1994) 361, NIM A360 (1995) 481, NP (PROC SUPPL) 39BC (1995) 322, PL B343 (1995) 444, PL B345 (1995) 103, PL B346 (1995) 371, PL B346 (1995) 379, PL B346 (1995) 389, PL B349 (1995) 238, PL B349 (1995) 585, PL B352 (1995) 479, PL B355 (1995) 381, PL B355 (1995) 595, PL B356 (1995) 409, PL B357 (1995) 487 [erratum: PL B364 (1995) 247], PL B357 (1995) 685, PL B357 (1995) 699, PL B359 (1995) 236, PL B361 (1995) 221, ZPHY C66 (1995) 3, ZPHY C66 (1995) 355, ZPHY C69 (1995) 15, PL B365 (1996) 437, PL B369 (1996) 151, PL B373 (1996) 246, PL B374 (1996) 319, ZPHY C69 (1996) 183, ZPHY C69 (1996) 365, ZPHY C69 (1996) 379, ZPHY C69 (1996) 393, and ZPHY C69 (1996) 585.

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### CERN-LEP-DELPHI

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

#### THE DELPHI DETECTOR (DETECTOR WITH LEPTON PHOTON AND HADRON IDENTIFICATION)

##### DELPHI COLLABORATION

ANTWERP U & BRUSSELS U, IIHE & MONS U - D Bertrand, C Bricman, F Cao, M Chen, A Deghorain, S De Brabandere, C De Clercq, P Herquet, S Hoorelbeke, K Huet, V Lefebure, J Lemonne, A Tomaradze, C Vander Velde, W K Van Doninck, F Verbeure, J H Wickens  
 IOWA STATE U - H B Crawley, D Edsall, A Firestone, L Gorn, T S Hill, J W Lamsa, D W Lane, C K Legan, R Mc Kay, W T Meyer, E I Rosenberg  
 ATHENS U - S Katsanevas, C Kourkoumelis, R Nicolaidou, L K Resvanis  
 BERGEN U - G Eigen, A G Frodesen, R Keranen, A Klovning, B Stugu  
 BOLOGNA U & INFN, BOLOGNA - A C Benvenuti, F R Cavallo, F L Navarria, A Perrotta, T Rovelli, G Valenti  
 RIO DE JANEIRO, CBPF & RIO DE JANEIRO, PONT UNIV CATORICA & RIO DE JANEIRO STATE U - M Begalli, M Gandelman, L M Mundim, M E Pol, R C Shellard, D Souza-Santos  
 COMENIUS U - P Chochula, R Janik, P Kubinec, B Sitar  
 COLLEGE DE FRANCE - P Beilliere, J M Brunet, C Defoix, J Dolbeau, P Frenkiel, G Tristram  
 CERN - U Amaldi, P Antilogus, A Augustinus, P Baillon, Y Belokopytov, C Bourdarios, R C A Brown, A Buys, T Camporesi, F Carena, A Cattai, V Chabaud, P Charpentier, V Chorowicz, P Collins, M Davenport, A De Angelis, H Dijkstra, M Donszelmann, M Feindt, H Foeth, F Formenti, C Gaspar, P Gavillet, F Hahn, H Herr, H J Hilke, C Joram, H Klein, M Koratzinos, J C Marin, M Mc Cubbin, M Paganoni, L Pape, D Reid, E Rosso, F Stichelbaut, D Treille (✓ Spokesperson), W Trischuk, A Tsirou, O Ullaland, E Vallazza, P Weilhammer, A M Wetherell, A Zalewska  
 STRASBOURG, CRN - D Bloch, F Djama, M Dracos, J P Engel, P A Fischer, D Gele, J P Gerber, P Juillot, V Nikolaenko, P Pages, R Strub, T Todorov, S Todorova, M Winter  
 DEMOCRITOS NUCLEAR RESEARCH CENTER - K Karafasoulis, E Karvelas, P Kokkinias, D Loukas, A Markou, K Papageorgiou, E Zevgolatakos  
 PRAGUE, INST PHYS - S Nemecek, M Novak, J Rames, J Ridky, V Vrba  
 GENOA U & INFN, GENOA - M Bozzo, M Canepa, C Caso, R Contri, G Crosetti, F Fontanelli, V Gracco, O Kouznetsov, M R Monge, P Morettini, F Parodi, A Petrolini, G Piana, I Roncagliolo, M Sannino, S Squarcia  
 GRENOBLE U - M L Andrieux, R Barate, F Ledroit, F Naraghi, L Roos, O Sahr, G Sajot  
 HELSINKI U - M Battaglia, R A Brenner, S Czellar, K Kurvinen, R Lauhakangas, R Orava, K Osterberg, H Saarikko  
 DUBNA - G D Alekseev, D Y Bardin, M S Bilenyk, G A Chelkov, B A Khomenko, N N Khovanski, Z Krumstein, V Malyshev, A G Olshevski, V Pozdniakov, N Pukhaeva, A Sadovsky, Y Sedykh, A N Sisakian, L G Tkatchev, I A Tyapkin, L S Vertogradov, A S Vodopyanov, N I Zimin  
 KARLSRUHE U - W D Apel, W De Boer, R Ehret, D C Fries, M Kaiser, C Kreuter, G Machlum, S Meyer, H Mueller, W Oberschulte-Beckmann, O Podobrin, M Schimmelpennig, H Schneider, U Schwickerath, A Seitz, C Weiser, M Wielers  
 CRACOW - P Bruckman, Z Hajduk, P Jalocho, K Korcyl, W Krupinski, W Kucewicz, T Lesiak, B Muryn, H Palka, G Polok, K Rybicki, M Witek  
 ORSAY, LAL - P Bambade, B Bouquet, J L Contreras, G Cosme, B Dalmagne, F Fulda-Quenzer, G Grosdidier, B Jean-Marie, V Lepeltier, P Paganini, S Plaszczynski, P Rebecchi, F Richard, P Roudeau, A Stocchi, A Trombini  
 LANCASTER U - P N Ratoff, P Seager  
 LISBON, LIP - P Abreu, F Barao, M Espirito Santo, R Henriques, A Maio, A Onofre, L Peralta, M Pimenta, T Spassov, B Tome  
 LIVERPOOL U - P P Allport, P S L Booth, T J V Bowcock, L Carroll, J H Cowell, A Galloni, M Gibbs, C Green, M Houlden, J N Jackson, B King, S Marti i Garcia, R Mc Nulty, J Richardson, S Tzamarias

## SUMMARIES OF CERN EXPERIMENTS

- PARIS, CURIE UNIV VI - M Baubillier, P Billoir, W Da Silva, C De La Vaissiere, S Fichet, F Kapusta, R Pain, J P Tavernet  
LUND U - S Almehed, O Barring, E Falk, V Hedberg, C Jarlskog, G Jarlskog, L Jonsson, P Jonsson, I Kronkvist, B Loerstad, U Mjoernmark, O Smirnova, G Transtromer  
LYON, IPN - J E Augustin, D Bertini, L Chaussard, J D Durand, I Laktineh, L Mirabito, G Smadja, P Vincent, F Zach  
MADRID U - J A Barrio, J Sanchez  
MARSEILLE, CPPM - P Delpierre, A Tilquin  
MILAN U & INFN, MILAN - A Andreazza, M Bonesini, W Bonivento, M Caccia, M Calvi, Y Gouz, S Gumenyuk, C Matteuzzi, C Meroni, P Negri, A Pullia, S Ragazzi, N G Redaelli, T Tabarelli, A Tonazzo, C Troncon, G Vegni  
BOHR INST - E Dahl-Jensen, M Dam, G Damgaard, N J Kjaer, R Moeller, B S Nielsen  
CHARLES U - R Leitner  
NIKHEF, AMSTERDAM - E Agasi, E Boudinov, W Hao, D Holthuisen, P Kluit, B Koene, M Merk, M Nieuwenhuizen, W Ruckstuhl, I Siccama, J Timmermans, D Z Toet, G W Van Apeldoorn, P Van Dam, J Van Eldik  
DEMOCRITOS NUCLEAR RESEARCH CENTER - M Dris, D Fassouliotis, T A Filippas, E Fokitis, E N Gazis, E C Katsoufis, T D Papadopoulou, H Rahmani  
OSLO U - L Bugge, T Buran, A L Read, T B Skaali, S Stapnes  
OVIEDO U - J Cuevas Maestro  
OXFORD U - N Demaria, F J Harris, T L Hensing, P J Holt, J Libby, J G Loken, L Lyons, G Myatt, A Normand, C Parkes, D Radojicic, P B Renton, A M Segar, K Stevenson, J Thomas, N Vassilopoulos, G R Wilkinson, W S C Williams, K Yip  
PADUA U & INFN, PADUA - K D Brand, P Checchia, A De Min, U Gasparini, A Lipniacka, I Lippi, M Margoni, M Mazzucato, M Michelotto, A Nomerotski, M Pegoraro, P Ronchese, F Simonetto, I Stavitski, L Ventura, M Verlato, G Zumerle  
RUTHERFORD - T Abye, M J Bates, D Crennell, P D Dauncey, B Franek, G Gopal, J Guy, W J Murray, H T Phillips, R Sekulin, G R Smith, M Tyndel, W Venus (✓ Deputy Spokesperson)  
ROME U, TORVERGATA & INFN, ROME - V Canale, L Di Ciaccio, G Matthiae, P Privitera, L Serbelloni  
DAPNIA, SACLAY - J Baudot, M Besancon, T Bolognese, G Borisov, C De Saint-Jean, P Gris, P Jarry, J P Laugier, P Lutz, A Ouraou, F Pierre, I Ripp, V Ruhlmann-Kleider, Y Sacquin, P Siegrist, R Silvestre, S Simonetti, M L Turluer, D Vilanova, M Zito  
ROME, ISS & INFN, ROME - A Baroncelli, C Bosio, P Branchini, E Graziani, C Mariotti, A Passeri, E Spiriti, C Stanescu, L Tortora  
SANTANDER U - A J Camacho Rozas, J Garcia, J M Lopez, J Marco, R Marco, C Martinez-Rivero, F Matorras, A Ruiz  
SERPUKHOV - I Ajinenko, M Chapkin, P Chliapnikov, A Fenyuk, V Kostioukhine, V Lapin, V Obraztsov, A Ostantkov, M Petrovych, N Smirnov, O Tchikilev, V Uvarov, E Vlasov, A Zaitsev  
STEFAN INST, LJUBLJANA & LJUBLJANA U - V Cindro, B Erzen, B Golob, D Zavrtanik, D Zontar  
STOCKHOLM U - B Asman, K Cankocak, G Ekspong, P Gunnarsson, S O Holmgren, K Hultqvist, R Jacobsson, E K Johansson, M Karlsson, T G M Malmgren, T Moa, P Niss, C Walck, G C Zucchelli  
TURIN U & INFN, TURIN - F Bianchi, M Bigi, R Chierici, D Gamba, E Migliore, G Rinaudo, A Romero, G Sciolla  
TRIESTE U, IST FIS & INFN, TRIESTE & UDINE U - G Barbiellini, F Cossutti, G Della Ricca, B De Lotto, L Lancieri, C Petridou, P Poropat, F Scuri, L Vitale, F Waldner  
RIO DE JANEIRO U - S Amato, M Barbi, M Berggren, L De Paula, B Marechal  
UPPSALA U - O Botner, T Ekelof, M Gunther, A Hallgren, J Medbo, K Woschnagg  
VALENCIA U - R Alemany, S Cabrera, M V Castillo Gimenez, E Cortina, A Ferrer, J Fuster, C Garcia, J J Hernandez, E Higon, C Lacasta, F Martinez-Vidal, S Navas, J Salt  
VIENNA, OAW - W Adam, W Bartl, R Fruhwirth, J Hrubec, M Krammer, G Leder, D Liko, J MacNaughton, F Mandl, W A Mitaroff, N Neumeister, H Pernegger, M Pernicka, M Regler, J Strauss  
WARSAW, INR - K Doroba, R Gokieli, M Gorski, K Grzelak, K Nawrocki, R Sosnowski, M Szczekowski, M Szeptycka, P Zalewski
- WUPPERTAL U - K H Becks, M Blume, T Brenke, T Burgsmueller, P Buschmann, J Dahm, J Drees, K A Drees, M Elsing, A Grefrath, S Hahn, K Hamacher, O Klapp, P Langefeld, G Lenzen, R Lindner, K Moenig, W Neumann, M Reale, M A E Schyns, P Sponholz, B Ueberschaer, H Wahlen, M Weierstall, D Wicke
- Accelerator CERN-LEP Detector DELPHI
- Reactions  
 $e^+ e^-$  < 200 GeV ( $E_{cm}$ )
- Particles studied  $W^+$ ,  $W^-$ ,  $Z^0$ , hvy-lepton, higgs, hvy-flavor
- Brief description A general purpose LEP detector for physics on and above the  $Z^0$ , offering 3-dimensional information on curvature and energy deposition with fine spatial granularity, as well as identification of leptons and hadrons over most of the solid angle. A superconducting coil provides a 1.2 T solenoidal field of high uniformity. Tracking relies on a microvertex detector, an inner detector, a Time Projection Chamber (TPC), an outer detector, and forward drift chambers. A 3-layer silicon microvertex detector allows a precision measurement of the interaction vertex and decay vertices of short-lived particles such as bottom and charm hadrons and  $\tau$  leptons. Electromagnetic showers are measured in the barrel with high granularity by the High Density Projection Chamber (HPC) and in the endcaps by  $1^\circ \times 1^\circ$  projective towers composed of lead glass as an active material and phototriode readout. Hadron identification is provided mainly by liquid and gas ring imaging Cerenkov counters (RICH). A segmented magnet yoke serves for hadron calorimetry and as a filter for muons which are identified in two drift chamber layers. In addition, scintillator systems are implemented in the barrel and forward regions. A small angle Shashlik-type calorimeter (STIC) is used for the luminosity determination. Taking data (July 96).
- Journal papers NIM 225 (1984) 477, NIM A225 (1984) 606, NIM A235 (1985) 310, NIM A241 (1985) 429, NIM A243 (1986) 77, NIM A243 (1986) 91, NIM A248 (1986) 317, NIM A252 (1986) 188, NIM A252 (1986) 413, NIM A252 (1986) 418, NIM A252 (1986) 435, NIM A252 (1986) 524, NIM A252 (1986) 573, NIM A254 (1987) 111, NIM A256 (1987) 65, NIM A256 (1987) 267, NIM A257 (1987) 499, NIM A260 (1987) 124, IEEE TNS 34 (1987) 227, NIM A263 (1988) 215, NIM A265 (1988) 218, NIM A269 (1988) 652, NIM A270 (1988) 393, NIM A273 (1988) 553, NIM A273 (1988) 565, NIM A273 (1988) 841, NIM A273 (1988) 847, IEEE TNS 36 (1989) 390, NIM A275 (1989) 49, NIM A277 (1989) 154, NIM A277 (1989) 160, NIM A277 (1989) 338, NIM A277 (1989) 347, NIM A279 (1989) 473, NIM A279 (1989) 518, NIM A283 (1989) 502, NIM A283 (1989) 567, NIM A283 (1989) 792, PL B231 (1989) 539, NIM A289 (1990) 400, NIM A290 (1990) 320, NIM A290 (1990) 327, NIM A292 (1990) 75, NIM A292 (1990) 319, NIM A292 (1990) 551, NIM A294 (1990) 424, PL B240 (1990) 271, PL B241 (1990) 425, PL B241 (1990) 435, PL B241 (1990) 449, PL B242 (1990) 536, PL B245 (1990) 276, PL B247 (1990) 137, PL B247 (1990) 148, PL B247 (1990) 157, PL B247 (1990) 167, PL B252 (1990) 140, PL B252 (1990) 149, NP B342 (1990) 1, IEEE TNS 38 (1991) 861, NIM A303 (1991) 233, NIM A305 (1991) 344, NIM A310 (1991) 596, PL B255 (1991) 466, PL B260 (1991) 240, PL B267 (1991) 422, PL B268 (1991) 296, NP B367 (1991) 511, ZPHY C50 (1991) 185, ZPHY C51 (1991) 25, ZPHY C52 (1991) 271, IEEE TNS 39 (1992) 166, NIM A315 (1992) 143, NIM A315 (1992) 393, NIM A323 (1992) 209, NIM A323 (1992) 351, NIM A323 (1992) 363, PL B274 (1992) 230, PL B274 (1992) 498, PL B275 (1992) 222, PL B275 (1992) 231, PL B276 (1992) 247, PL B276 (1992) 254, PL B276 (1992) 536, PL B277 (1992) 371, PL B281 (1992) 383, PL B286 (1992) 201, PL B289 (1992) 199, PL B295 (1992) 383, PL B298 (1992) 236, PL B298 (1992) 247, NP B373 (1992) 3, NP B386 (1992) 471, ZPHY C53 (1992) 41, ZPHY C53 (1992) 555, ZPHY C53 (1992) 567, ZPHY C54 (1992) 55, ZPHY C55 (1992) 555, ZPHY C56 (1992) 47, ZPHY C56 (1992) 63, NIM A328 (1993) 447, NIM A338 (1993) 284, PL B301 (1993) 145, PL B302 (1993) 356, PL B307 (1993) 187, PL B307 (1993) 221, PL B311 (1993) 379, PL B311 (1993) 408, PL B312 (1993) 253, PL B316 (1993) 620, PL B318 (1993) 249, NP B403 (1993) 3, ZPHY C57 (1993) 181, ZPHY C59 (1993) 21, ZPHY C59 (1993) 357, ZPHY C59 (1993) 533 [erratum: ZPHY C65 (1995) 709], PL B322 (1994) 459, PL B323 (1994) 242, PL B324 (1994) 500, PL B327 (1994) 386, PL B332 (1994) 488, PL B334 (1994) 435, PL B338 (1994) 409, PL B341 (1994) 109, NP B417 (1994) 3

## SUMMARIES OF CERN EXPERIMENTS

[erratum: NP B426 (1994) 244], NP B418 (1994) 403, NP B421 (1994) 3, ZPHY C61 (1994) 407, ZPHY C62 (1994) 357, ZPHY C63 (1994) 3, ZPHY C63 (1994) 17, ZPHY C64 (1994) 183, NIM A362 (1995) 361, PL B342 (1995) 402, PL B345 (1995) 598, PL B347 (1995) 447, PL B355 (1995) 415, PL B357 (1995) 255, PL B357 (1995) 715, PL B359 (1995) 411, PL B361 (1995) 207, NP B444 (1995) 3, ZPHY C65 (1995) 555, ZPHY C65 (1995) 569, ZPHY C65 (1995) 587, ZPHY C65 (1995) 603, ZPHY C66 (1995) 323, ZPHY C66 (1995) 341, ZPHY C67 (1995) 1, ZPHY C67 (1995) 69, ZPHY C67 (1995) 183, ZPHY C67 (1995) 543, ZPHY C68 (1995) 13, ZPHY C68 (1995) 353, ZPHY C68 (1995) 363, ZPHY C68 (1995) 375, ZPHY C68 (1995) 541, ZPHY C69 (1995) 1, NIM A368 (1996) 314, PL B365 (1996) 448, PL B372 (1996) 172, ZPHY C69 (1996) 223, ZPHY C69 (1996) 561, ZPHY C69 (1996) 575, ZPHY C70 (1996) 179, and ZPHY C70 (1996) 371.

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### CERN-LEP-L3

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

#### L3 EXPERIMENT

#### L3 COLLABORATION

AACHEN, TECH HOCHSCH, I PHYS INST & AACHEN, TECH HOCHSCH, III PHYS INST - R Bock, A Bohm, H Fesefeldt, K Hangarter, B Hartmann, W Krenz, K Lubelsmeyer, S Muller, A Nippe, D Pandoulas, C Paus, Y J Pei, S Rohner, S Roth, M Sassowsky, C Schafer, S Schmidt-Kaerst, D Schmitz, P Schmitz, J Schwenke, G Schwering, T Siedenburger, A Straessner, M Tonutti, M von der Mey, W Wallraff, A Weber, S Wynhoff, Y Zeng  
 NIKHEF, AMSTERDAM - G J Bobbink, A P Colijn, P Duinker, F C Erne, F L Linde, G G G Massaro, D van Dierendonck  
 MICHIGAN U - T Azemoon, A Button, L W Jones, R Moore, K Riles, B P Roe  
 ANNECY - G Carlino, X Chereau, G Coignet, A Degre, D Duchesneau, Y Karyotakis, D Perret-Gallix, S Rosier-Lees, M Vivargent  
 JOHNS HOPKINS U - C Y Chien, A Gougas, G Hu, D Kim, A Pevsner  
 BASEL U - L Tauscher, M Wadhwa  
 LOUISIANA STATE U - R R McNeil  
 BEIJING, IHEP - G Chen, G M Chen, H S Chen, B N Jin, Z A Liu, Y S Lu, X W Tang, K L Tung, C G Yang, X Y Yao, Z Zhang, G Y Zhu  
 HUMBOLDT U, BERLIN - M W Gruenewald, T Hebbeker, S Petrak  
 BOLOGNA U & INFN, BOLOGNA - F Anselmo, D Antreasyan, M Basile, G Cara Romeo, F Cindolo, D Hatzifotiadou  
 TATA INST - T Aziz, S Banerjee, S Dutta, S N Ganguli, A Gurtu, M Maity, G Majumder, S Mangla, K Mazumdar, R Raghavan, S Sarkar, K Sudhakar, S C Tonwar  
 BOSTON U - S Ahlen, J Goldstein, A Marin, J Xu, B Zhou  
 NORTHEASTERN U - G Alverson, S S Gau, T Paul, S Reucroft, L Taylor  
 BUCHAREST U - T Angelescu, F Cotorobai, N Gheordanescu, A Mihul  
 BUDAPEST, CRIP - A Csilling, D Kiss, E Nagy, J Toth, G Vesztergombi  
 HARVARD U - K Strauch  
 MIT - U Becker, P Berges, E Brambilla, J D Burger, X D Cai, M Capell, I Clare, R Clare, T S Dai, P de Jong, F J Epling, P H Fisher, G Forconi, T Kramer, C Lapoint, A Lebedev, D Luckey, S Nahn, H Postema, J Rodin, B Smith, M Steuer, F Sticozzi, S M Ting, S C C Ting (✓ Spokesperson), J C Wang, Y F Wang  
 FLORENCE U & INFN, FLORENCE - O Adriani, F Becattini, A M Cartacci, G Castellini, C Civinini, R D'Alessandro, A Favara, G Landi, M Lenti, A Macchiolo, M Meschini, B Monteleoni, G Passaleva, M Pieri, E Pistolesi, P Spillantini  
 CERN - J Allaby, R Barillere, B Bertucci, M Biasini, J J Blaising, A Herve, V Innocente, J Kirkby, M Lebeau, P Lecoq, J M Le Goff, D McNally, J A Mnich, J A Rubio, J Salicio, U Uwer, F Wittgenstein, A Zichichi

WORLD LAB, GENEVA - U K Chaturvedi, M T Dova, M Kaur, R A Khan, G Sultanov, J D Swain, S X Wu  
 GENEVA U - G Ambrosi, M Bourquin, W J Burger, C Cecchi, P Extermann, J H Field, L Fredj, H Hoorani, M N Kienzle-Focacci, F Muheim, N Produit, D Sciarrino, G F Susinno  
 HEPFEL, CUST - H F Chen, Z F Gong, C Li, W G Ma, L Z Sun, X L Wang, Z M Wang, Z Z Xu, B Z Yang, J B Ye, Z P Zhang  
 HELSINKI U - P Laurikainen, R Ostonen, M E Sarakinos  
 LAUSANNE U - G Alemanni, A Bay, S Goldfarb, A Kasser, Y Mi, P Rosselet  
 LECCE U - F Cesaroni  
 LOS ALAMOS - J S Kapustinsky, W W Kinnison, J Shukla  
 LYON, IPN - M Chemarin, H El Mamouni, J P Ernenwein, J Fay, P Lebrun, J P Martin  
 MADRID, CIEMAT - M Aguilar-Benitez, J Alcaraz, J Berdugo, J Casaus, M Cerrada, M Chamizo, N Colino, B de la Cruz, D Fernandez, I Josa-Mutuberria, P Ladrón de Guevara, C Mana, F J Rodriguez, L Romero, E Sanchez  
 MILAN U & INFN, MILAN - M Acciarri, A Baschirotto, R Castello, C Furetta, S Pensotti, P G Rancoita, M Rattaggi  
 MOSCOW, ITEP - A Arefiev, Y Galaktionov, A Klimentov, I Korolko, V Koutsenko, A Kunin, A Malinin, V Plyaskin, V Pojidaev, V Shoutko, E Shumilov, I Vetlitsky, I Vorobiev  
 NAPLES U, IFS & INFN, NAPLES - A Aloisio, M G Alvigi, N Cavallo, G Chiefari, R de Asmundis, A Doria, E Drago, L Lista, S Mele, L Merola, M Napolitano, P Paolucci, S Patricelli, D Piccolo, C Sciacca  
 CYPRUS U - A Hasan, P Razis, A Vorvolakos  
 NIKHEF, NIJMEGEN & NIJMEGEN U - A Buytenhuijs, H De Boeck, W Kittel, A C Konig, H Kuijten, W J Metzger, D J Schotanus, R T Van de Walle, W C van Hoek, A J W van Mil  
 OAK RIDGE - H O Cohn, Y Efremenko, Y Kamyshev, K Read  
 CAL TECH - G Gratta, A Kirkby, D Kirkby, W Lu, R Mount, H Newman, S Shevchenko, A Shvorob, R Y Zhu  
 PERUGIA U & INFN, PERUGIA - B Alpat, P Bartalini, R Battiston, G M Bilei, M Caria, S Easo, E Fiandrini, M Pauluzzi, A Santocchia, L Servoli  
 CARNEGIE MELLON U - S C Blyth, I C Brock, A Engler, T Ferguson, F Filthaut, R W Kraemer, H K Park, J C Pinto, H Vogel, J M You  
 PRINCETON U - P Denes, V K Gupta, P A Piroué, D P Stickland, H Stone, C Tully  
 ROME U & INFN, ROME - P Bagnaia, L Barone, B Borgia, F Cavallari, S Costantini, F DeNotaristefani, M Diemoz, C Dionisi, R Faccini, S Falciani, F Ferroni, S Gentile, S Giagu, E Leonardi, E Longo, C Luci, L Ludovici, L Luminari, L Malgeri, F Marzano, G Mirabelli, S Morganti, G Organtini, S Paoletti, G Pascale, M Rescigno, E Valente  
 ST PETERSBURG, INP - V P Andreev, O Fedin, P Levtchenko, D Prokofiev, V Schegelsky, A A Vorobyov, A Zalite, Y Zalite  
 SALERNO U - L Cifarelli  
 UC, SAN DIEGO - J G Branson, A Dominguez, G Raven  
 SANTIAGO DE COMPOSTELA U - I Duran  
 SOFIYA, AUTOMATION SCI INSTRUM LAB - N Shivarov, B Stoyanov  
 KOREA INST SCI, TAEJON - M T Choi, J K Kim, S C Kim, Y G Kim, J S Lee, K Y Lee, S Ro, D Son  
 ALABAMA U - L Baksay, J Busenitz, D DiBitonto, H Tuchscherer  
 UTRECHT U - A Buijs, T van Rhee, W van Rossum  
 PURDUE U - K Banicz, L J Gutay, B C Riemers  
 PSI, VILLIGEN - K Deiters, M Fabre, W Lustermann  
 DESY-IFH, ZEUTHEN - P Kapinos, R Leiste, E Lieb, W Lohmann, H Nowak, S Riemann, B Schoeneich, A Sopczak, F Tonisch, H Vogt, R Volkert  
 ZURICH, ETH - H Anderhub, F Behner, B L Betev, A Biland, D Bourilkov, V Brigljevic, M Campanelli, F Di Lodovico, M Dittmar, M Felcini, K Freudenreich, H Hofer, K Lassila-Perini, P Lecomte, P Le Coultre, P Marchesini, F Nessi-Tedaldi, F Pauss, M Pohl, G Rahal-Callot, D Ren, A Robohm, H Rykaczewski, N Scholz, H Suter, J Ulbricht, G Viertel, P Zemp  
 HAMBURG U - H Schopper  
 TAIWAN, HEP GROUP - A Chan, Y H Chang, A Chen, S R Hou, W T Lin, J C Sens, S C Yeh

*Accelerator* CERN-LEP *Detector* L3

*Reactions*

$e^+ e^-$

< 200 GeV ( $E_{cm}$ )



## SUMMARIES OF CERN EXPERIMENTS

*Particles studied*  $Z^0$ ,  $W^\pm$ ,  $\gamma$ , quark, gluon, leptons, hvy-lepton, higgs, s-particle

*Brief description* The detector consists of a high-volume low-field solenoid magnet, a small central tracking chamber with very high spatial resolution, a high-resolution electromagnetic calorimeter encapsulating the central detector, a hadron calorimeter acting also as a muon filter, and high-precision muon tracking chambers. The detector is designed to measure energy and position of leptons with the highest obtainable precision allowing a mass resolution  $\Delta m/m$  smaller than 2% in dilepton final states. Hadronic energy flux is detected by a fine-grained calorimeter, which also serves as a muon filter and a tracking device. The outer boundary of the detector is given by the iron return-yoke of a conventional magnet. The field is 0.5 T over a length of 12 m. The muon momentum measurement is performed by three sets of drift chambers in the central detector region. A forward-backward muon detection system extends the polar angle coverage to 22 degrees in the forward region. Radially inwards is a combined hadron calorimeter and muon absorber. The electromagnetic energy flow is determined by approximately 11000 crystals of BGO. Full electromagnetic shower containment over nearly  $4\pi$  solid angle coverage is achieved. Surrounding the 10 cm diameter beam pipe, a high-precision Silicon Microstrip Detector (SMD) and a small drift chamber operating in the time expansion mode (TEC) act as charged particle vertex detectors. Taking data (July 96).

*Journal papers* NIM 214 (1983) 525, NIM A225 (1984) 493, NIM A228 (1985) 294, NIM A235 (1985) 464, NIM A251 (1986) 258, NIM A252 (1986) 304, CPC 45 (1987) 391, NIM A253 (1986) 15, NIM A254 (1987) 535, NIM A256 (1987) 261, NIM A257 (1987) 125, NIM A257 (1987) 528, HEPNP 12 (1987) 587, NIM A258 (1987) 58, NIM A263 (1988) 14, NIM A263 (1988) 343, NIM A265 (1988) 50, NIM A265 (1988) 252, NIM A270 (1988) 397, NIM A272 (1988) 713, NIM A273 (1988) 471, NIM A273 (1988) 814, NIM A274 (1989) 113, NIM A275 (1989) 71, NIM A275 (1989) 81, NIM A277 (1989) 187, NIM A278 (1989) 699, NIM A279 (1989) 671, NIM A280 (1989) 25, NIM A283 (1989) 799, NIM A285 (1989) 403, PL B231 (1989) 509, PL B233 (1989) 530, MPL A5 (1990) 1381, NIM A288 (1990) 364, NIM A289 (1990) 35, NIM A289 (1990) 103, NIM A289 (1990) 335, NIM A290 (1990) 115, PL B236 (1990) 109, PL B237 (1990) 136, PL B238 (1990) 122, PL B241 (1990) 416, PL B247 (1990) 177, PL B247 (1990) 473, PL B248 (1990) 203, PL B248 (1990) 227, PL B248 (1990) 464, PL B249 (1990) 341, PL B250 (1990) 183, PL B250 (1990) 199, PL B250 (1990) 205, PL B251 (1990) 311, PL B251 (1990) 321, PL B252 (1990) 511, PL B252 (1990) 518, PL B252 (1990) 525, PL B252 (1990) 703, PL B252 (1990) 713, NIM A302 (1991) 53, NIM A306 (1990) 150, NIM A309 (1991) 318, PL B257 (1991) 450, PL B257 (1991) 469, PL B259 (1991) 199, PL B261 (1991) 169, PL B261 (1991) 177, PL B262 (1991) 155, PL B263 (1991) 551, PL B265 (1991) 451, PL B270 (1991) 111, PL B271 (1991) 453, PL B271 (1991) 461, ZPHY C51 (1991) 179, PL B275 (1992) 209, PL B276 (1992) 247, PL B283 (1992) 454, PL B284 (1992) 471, PL B286 (1992) 403, PL B288 (1992) 395, PL B288 (1992) 404, PL B288 (1992) 412, PL B292 (1992) 454, PL B292 (1992) 463, PL B292 (1992) 472, PL B294 (1992) 457, PL B294 (1992) 466, PL B295 (1992) 337, PL B295 (1992) 371, PL B297 (1992) 469, ZPHY C55 (1992) 39, PL B301 (1993) 136, PL B303 (1993) 391, PL B306 (1993) 187, PL B307 (1993) 187, PL B307 (1993) 237, PL B309 (1993) 451, PL B313 (1993) 326, PL B315 (1993) 494, PL B316 (1993) 427, PL B317 (1993) 467, PL B317 (1993) 474, PL B317 (1993) 637, PL B318 (1993) 575, PRPL 236 (1993) 1, ZPHY C57 (1993) 355, NIM A340 (1994) 396, NIM A343 (1994) 456, NIM A344 (1994) 133, NIM A344 (1994) 212, NIM A344 (1994) 521, NIM A348 (1994) 431, NIM A348 (1994) 436, NIM A351 (1994) 300, IEEE TNS 41 (1994) 772, PL B321 (1994) 283, PL B328 (1994) 223, PL B332 (1994) 201, PL B335 (1994) 542, PL B341 (1994) 245, ZPHY C62 (1994) 551, PL B345 (1995) 74, PL B345 (1995) 93, PL B345 (1995) 589, PL B345 (1995) 609, PL B346 (1995) 190, PL B350 (1995) 109, PL B351 (1995) 375, PL B352 (1995) 487, PL B353 (1995) 136, PL B353 (1995) 145, PL B363 (1995) 118, PL B363 (1995) 127, PL B363 (1995) 137, PL B370 (1996) 195, PL B370 (1996) 211, PL B371 (1996) 126, PL B371 (1996) 137, and PL B374 (1996) 331.

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### CERN-LEP-OPAL

(Proposed 1982, Approved Nov 1982, Began data-taking Aug 1989, In progress)

#### THE OPAL DETECTOR (AN OMNI PURPOSE APPARATUS FOR LEP)

##### OPAL COLLABORATION

AACHEN, TECH HOCHSCH, III PHYS INST - J Bechtluft, S Bethke, O Biebel, D Lanske, P Pfeifenschneider, U Ruppel  
 ALBERTA U - D Gingrich, J Hewlett, J McDonald, S Mullin, J Pinfeld, H Przysiezniak, N Rodning, P Routenburg, J Schaapman, W Springer  
 BIRMINGHAM U - A N Bell, I J Bloodworth, J Bloomer, D G Charlton, S J Hillier, R J Homer, M Jimack, P Jovanovic, T J Mc Mahon, S W O'Neale, M Pearce, D Rees, D Rigby, S D Talbot, P M Watkins, A T Watson, J A Wilson  
 BOLOGNA U & INFN, BOLOGNA - S Arcelli, P Capiluppi, M Cuffiani, G M Dallavalle, F Fabbri, M Ferrari, M Fierro, G Giacomelli, R Giacomelli, C Grandi, J Letts, S Marcellini, A Michelini, A Montanari, F Odorici, B Poli, A M Rossi, C Sbarra, G P Siroli  
 BONN U - R Bartoldus, K Desch, A Eyring, H M Fischer, C Geich-Gimbel, S Gross, C Hartmann, T P Kockott, P Maettig, C Markus, S Menke, U C Mueller, B Nellen, A Posthaus, F Scharf, P Schuetz, M Schumacher, A Stahl, B Stockhausen, E von Toerne, N Wermes  
 BUDAPEST, CRIP - C Hadju, D Horvath, G Pasztor  
 CAMBRIDGE U - N Altekamp, J R Batley, J R Carter, V Gibson, M J Goodrick, C M Hawkes, J C Hill, D E Hutchcroft, C R Jones, R Shaw, C P Ward, D R Ward, S Wotton  
 CARLETON U - R K Carnegie, C Charlesworth, P E Estabrooks, R J Hemingway, M Jones, D Karlen, D Koetke, P Krieger, S Towers, P Weber  
 CERN - E Barberio, T Behnke, S Bentvelsen, V Blobel, H J Burckhardt, C Burgard, L Del Pozo, A Fuertjes, W Glessing, M Gruwe, M Guillot, R Hammarstrom, M Hansroul, M Hauschild, R Hawkins, R D Heuer (✓ Spokesperson), M Hildreth, J Hill, M Jimenez, R W L Jones, T R Junk, B King, S Kluth, R Kowalewski, R Lorenzi, M Mannelli, R A McPherson, F Meijers, H A Neal, R Nisius, D Plane, A Renoux, E Ros, O Runolfsson, P Scharff-Hansen, B Schmitt, M Schroeder, M Schulz, A M Smith, F Strumia, M Tecchio, M Thomson, M Turner-Watson, P Wells, K Zankel, M Znoj  
 CHICAGO U - K J Anderson, R L Armstrong, H Evans, D Glensinski, P Hart, F S Merritt, M J Oreglia, J E Pilcher, E Pod, H Sanders, A Turcot  
 DEBRECEN, INST NUCL RES - J Palinkas  
 DUKE U - S Lautenschlager, A Lee  
 FREIBURG U - P Berlich, M Bobinski, R Buergen, G Herten, T Hulse, D Joos, M Kobel, R Kolpin, M Kolrep, J Ludwig, W Mohr, J Patt, H Roeser, K Runge, K Sachs, H Schultz-Coulon, S Soeldner-Rembold, M Thiergen, M Verzocchi, H C Weber, B Wilkens  
 TECHNION - S Dado, J Goldberg, D Lazic, N Lupu, Y Rozen, S Tarem  
 DESY & HAMBURG U - J Meyer, S Petzold, C H Shepherd-Themistocleous, A Sittler, J Steuerer, A Wagner, G Wilson  
 HEIDELBERG U, IHEP - P Bock, H M Bosch, P Fath, P Igo-Kemenes, U Jost, T Kress, S Schmitt, V Soergel, M Steiert, P Utzat, J von Krogh, P von Walter  
 INDIANA U - S Anderson, B Bouwens, S Braibant, S De Jong, E do Couto e Silva, F Fiedler, G Hanson, H O Ogren, D R Rust, M Starks, R van Kooten  
 KOBE U - K Kawagoe, H Takeda  
 UNIVERSITY COLL, LONDON - B E Anderson, D J Attree, A Charalambous, P E L Clarke, J E Conboy, R Cranfield, M Cresswell, D A Hayes, J W Lauber, C Lewis, E A McKigney, D J Miller, T Rooke, P Sherwood, A Skillman, J J Ward  
 BRUNEL U - K Ametewee, P Hobson, D C Imrie, W Matthews, R Rylko  
 QUEEN MARY - WESTFIELD COLL - G A Beck, A A Carter, M D Evans, W R Gibson, M Hapke, P Kyberd, S L Lloyd, A J Martin, A I McNab, J Morris, T W Pritchard, S A Robins  
 MANCHESTER U - J Allison, R J Barlow, C Beeston, S G Clowes, O Cooke, I P Duerdoth, J Edwards, R E Hughes-Jones, G D Lafferty, F K Loebinger, B Nijhar, N J Oldershaw, J Pater, P D Phillips, K Stephens, E Vokurka, T R Wyatt

## SUMMARIES OF CERN EXPERIMENTS

MARYLAND U - A Ball, R Bard, C Y Chang, C Dallapiccola, D Fong, M Foucher, S Gascon-Shotkin, A Jawahery, R G Kellogg, R Lahmann, G Long, G Martinez, A Skuja, G A Snow

MONTREAL U - G Azuelos, G Beaudoin, M Beaulieu, M Doucet, J Gascon, H Jeremie, A Joly, E Lefebvre, J-P Martin, R Tafirout, P Taras, P Vikas, V Zacek

MUNICH U - M Boutemeur, G Duckeck, A D Schaile, O Schaile

OREGON U - W-P Lai, D Strom

CRPP, OTTAWA - M S Dixit, P Gagnon, C K Hargrove, M J Losty, H Mes, F G Oakham, N K Watson

UC, RIVERSIDE - D Chrisman, S L Chu, J W Gary, P Giacomelli, W Gorn, J G Layter, P Schenk, B C Shen

RUTHERFORD - K W Bell, R M Brown, N I Geddes, T Gerialis, F R Jacob, P W Jeffreys, B W Kennedy, G N Patrick, W G Scott, M Sproston, P Szymanski

DAPNIA, SACLAY - A Gaidot, F-X Gentit, H Lafoux, A Malik, G Vasseur

TEL AVIV U - G Alexander, G Bella, I Cohen, E Sarkisyan, E Tsur

TOKYO U - S Asai, K Ishii, J Kanzaki, T Kawamoto, T Kobayashi, S Komamiya, T Mashimo, T Mori, M Morii, I Nakamura, T Omori, S Orito, S Tanaka, T Tsukamoto, S Yamashita

BRITISH COLUMBIA U - D A Axen, R Howard, J Kirk, J McKenna

VICTORIA U - D Deatrich, A Honma, R K Keeler, I Lawson, P Poffenberger, S Robertson, M J Roney, M Rosvick, T J Smith, R Sobie, M Vincter, J White

WEIZMANN INST - E Duchovni, R Folman, E Gross, D Lellouch, L Levinson, G Mikenberg, R Mir, K Nagai, M Shoa, G Wolf, G Yekutieli

Accelerator CERN-LEP Detector OPAL

Reactions

$$e^+ e^- < 200 \text{ GeV } (E_{\text{cm}})$$

Particles studied  $Z^0$ ,  $W^+$ ,  $W^-$ ,  $\gamma$ ,  $\tau$ , hvy-flavor, gluon, higgs, s-particle

Brief description OPAL is a general purpose detector designed to study a wide range of unexplored physics at LEP. Among the central physics issues are the study of the  $Z^0$  and  $W^\pm$  bosons (e.g., the determination of their exact masses and widths, and couplings to leptons and quarks), the physics of heavy flavors (such as the spectroscopy of  $b$  quarks and the determination of the mixing and lifetimes of  $B$  states), and various QCD topics. A general search for new particles, in particular the Higgs bosons, is being made. The main components of the apparatus, in order of increasing distance from the interaction point, are a silicon microvertex detector, central detectors consisting of a vertex and a jet chamber, and a barrel of Z chambers, a warm conductor solenoid providing a uniform magnetic field of 0.4 T, a TOF scintillator barrel detector complimented by a scintillating tile endcap detector, a  $4\pi$  lead glass electromagnetic calorimeter, a hadron calorimeter instrumented by streamer tubes and thin gap wire chambers, an external muon identifier, and a forward detector which includes a new small-angle silicon-tungsten calorimeter. Taking data (July 96).

Journal papers NIM A236 (1985) 284, IEEE TNS 32 (1985) 736, NIM A242 (1986) 247, NIM A244 (1986) 416, NIM A250 (1986) 503, NIM A252 (1986) 331, NIM A252 (1986) 511, IEEE TNS 34 (1987) 240, CPC 47 (1987) 55, NIM A260 (1987) 132, NIM A260 (1987) 329, NIM A265 (1988) 11, NIM A265 (1988) 445, IEEE TNS 36 (1989) 380, NIM A278 (1989) 725, NIM A279 (1989) 236, NIM A279 (1989) 523, NIM A283 (1989) 492, NIM A283 (1989) 515, NIM A283 (1989) 650, PL B231 (1989) 530, IEEE TNS 37 (1990) 1584, NIM A286 (1990) 99, NIM A286 (1990) 107, NIM A286 (1990) 117, NIM A290 (1990) 76, NIM A293 (1990) 145, NIM A294 (1990) 431, PL B235 (1990) 379, PL B235 (1990) 389, PL B236 (1990) 224, PL B236 (1990) 364, PL B240 (1990) 250, PL B240 (1990) 261, PL B240 (1990) 497, PL B241 (1990) 133, PL B242 (1990) 299, PL B244 (1990) 135, PL B246 (1990) 285, PL B247 (1990) 448, PL B247 (1990) 458, PL B247 (1990) 617, PL B248 (1990) 211, PL B251 (1990) 211, PL B252 (1990) 159, PL B252 (1990) 290, ZPHY C47 (1990) 505, NIM A302 (1991) 434, NIM A305 (1991) 275, NIM A310 (1991) 527, PL B253 (1991) 511, PL B254 (1991) 293, PL B257 (1991) 531, PL B261 (1991) 334, PL B262 (1991) 341, PL B262 (1991) 351, PL B263 (1991) 123, PL B263 (1991) 311, PL B264 (1991)

219, PL B264 (1991) 467, PL B265 (1991) 462, PL B266 (1991) 201, PL B266 (1991) 485, PL B267 (1991) 143, PL B268 (1991) 122, PL B273 (1991) 338, PL B273 (1991) 355, ZPHY C49 (1991) 1, ZPHY C49 (1991) 49, ZPHY C49 (1991) 375, ZPHY C50 (1991) 373, ZPHY C52 (1991) 175, ZPHY C52 (1991) 543, NIM A313 (1992) 103, NIM A314 (1992) 74, NIM A317 (1992) 47, NIM A320 (1992) 183, NIM A323 (1992) 169, PL B274 (1992) 513, PL B276 (1992) 247, PL B276 (1992) 379, PL B276 (1992) 547, PL B278 (1992) 485, PL B281 (1992) 394, PL B281 (1992) 405, PL B287 (1992) 389, PL B287 (1992) 401, PL B288 (1992) 373, PL B291 (1992) 503, PL B294 (1992) 436, PL B295 (1992) 347, PL B295 (1992) 357, ZPHY C53 (1992) 539, ZPHY C54 (1992) 193, ZPHY C55 (1992) 1, ZPHY C55 (1992) 191, ZPHY C56 (1992) 521, NIM A324 (1993) 34, NIM A325 (1993) 129, NIM A325 (1993) 271, NIM A325 (1993) 494, NIM A333 (1993) 330, PL B298 (1993) 456, PL B302 (1993) 523, PL B305 (1993) 407, PL B305 (1993) 415, PL B307 (1993) 187, PL B307 (1993) 247, PL B311 (1993) 391, PL B312 (1993) 501, PL B313 (1993) 333, PL B316 (1993) 435, ZPHY C58 (1993) 207, ZPHY C58 (1993) 219, ZPHY C58 (1993) 387, ZPHY C58 (1993) 405, ZPHY C58 (1993) 523, ZPHY C59 (1993) 1, ZPHY C59 (1993) 183, ZPHY C60 (1993) 19, ZPHY C60 (1993) 199, ZPHY C60 (1993) 217, ZPHY C60 (1993) 397, ZPHY C60 (1993) 579, ZPHY C60 (1993) 593, ZPHY C60 (1993) 601, NIM A348 (1994) 409, NIM A348 (1994) 421, NIM A348 (1994) 424, PL B320 (1994) 417, PL B327 (1994) 397, PL B327 (1994) 411, PL B328 (1994) 207, PL B336 (1994) 585, PL B337 (1994) 196, PL B337 (1994) 207, PL B337 (1994) 393, PL B338 (1994) 497, PL B339 (1994) 278, NC 107A (1994) 2007, NC 107A (1994) 2055, ZPHY C61 (1994) 19, ZPHY C61 (1994) 199, ZPHY C61 (1994) 209, ZPHY C61 (1994) 357, ZPHY C63 (1994) 181, ZPHY C63 (1994) 197, ZPHY C63 (1994) 363, ZPHY C64 (1994) 1, PL B350 (1995) 273, PL B352 (1995) 176, PL B353 (1995) 402, PL B353 (1995) 595, PL B358 (1995) 162, PL B364 (1995) 93, ZPHY C65 (1995) 1, ZPHY C65 (1995) 17, ZPHY C65 (1995) 31, ZPHY C65 (1995) 47, ZPHY C65 (1995) 183, ZPHY C65 (1995) 367, ZPHY C66 (1995) 19, ZPHY C66 (1995) 31, ZPHY C66 (1995) 543, ZPHY C66 (1995) 555, ZPHY C67 (1995) 15, ZPHY C67 (1995) 27, ZPHY C67 (1995) 45, ZPHY C67 (1995) 57, ZPHY C67 (1995) 203, ZPHY C67 (1995) 365, ZPHY C67 (1995) 379, ZPHY C67 (1995) 389, ZPHY C67 (1995) 555, ZPHY C68 (1995) 1, ZPHY C68 (1995) 179, ZPHY C68 (1995) 203, ZPHY C68 (1995) 519, ZPHY C68 (1995) 531, ZPHY C68 (1995) 555, PL B368 (1996) 244, PL B369 (1996) 163, PL B370 (1996) 174, PL B370 (1996) 185, PL B374 (1996) 341, PL B376 (1996) 232, PL B376 (1996) 315, ZPHY C69 (1996) 195, ZPHY C69 (1996) 543, ZPHY C70 (1996) 197, ZPHY C70 (1996) 357, and ZPHY C71 (1996) 1.

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### CERN-LEP-06

(Proposed 1988, Approved Sep 1989, Began data-taking 1990, Completed data-taking Feb 1992)

#### THE SEARCH FOR HIGHLY IONIZING PARTICLES IN $e^+e^-$ COLLISIONS AT LEP USING MODAL

L6-MODAL COLLABORATION

ALBERTA U - J L Pinfeld (✓ Spokesperson)  
BOLOGNA U & INFN, BOLOGNA - G Giacomelli, F Patrizii, F Predieri, P Serra  
HARVARD U - K Kinoshita

Accelerator CERN-LEP Detector Plastic

Reactions

$$e^+ e^- \rightarrow 90 \text{ GeV } (E_{\text{cm}})$$

Particles studied monopole

Brief description The MODAL (MONopole Detector At LEP) detector is designed to search for monopoles, dyons, and other highly ionizing particles. It is formed from lexan/CR39 dielectric track detector modules arranged in a polyhedral configuration around the intersection region.

Journal papers PR D46 (1992) 881.

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## SUMMARIES OF CERN EXPERIMENTS

### CERN-NA-012-2

(Proposed Aug 1985, Approved Feb 1986, Began data-taking Oct 1986, Completed data-taking Nov 1993)

#### SEARCH FOR MESONS AND GLUEBALLS DECAYING INTO MULTIPHOTON FINAL STATES PRODUCED IN CENTRAL HADRON COLLISIONS AND STUDY OF INCLUSIVE PRODUCTION OF HEAVY QUARK MESONS

##### GAMS COLLABORATION

ANNECY - T Kinashi, J P Peigneux, M Poulet  
 KEK - S Inaba, M Kobayashi, T Tsuru  
 LOS ALAMOS - D Alde, E A Knapp  
 PISA U & INFN, PISA - R Bellazzini, A Brez, M M Massai, M R Torquati  
 SERPUKHOV - S V Donskov, A V Inyakin, G V Khaustov, A V Kulik, A A Lednev, S A Polovnikov, V A Polyakov, Y D Prokoshkin (✓ Spokesperson), S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, V P Sugonyaev  
 BRUSSELS U & BRUSSELS U, IISN - F Binon, J P Stroot (✓ Spokesperson)  
 CHIBA U - H Kawai  
 MIYAZAKI U - T Nakamura, K Takamatsu  
 YAMAGATA U - H Shimizu  
 CERN - M Boutemur

Accelerator CERN-SPS Detector GAMS-4000

##### Reactions

$\pi^- p \rightarrow p \pi^- 2\gamma (\gamma\text{'s})$	300 GeV/c
$\pi^- p \rightarrow 2\gamma (\gamma\text{'s}) X$	"
$\pi^- n \rightarrow n \pi^- 2\gamma (\gamma\text{'s})$	"
$\pi^- n \rightarrow 2\gamma (\gamma\text{'s}) X$	"
$p p \rightarrow 2p 2\gamma (\gamma\text{'s})$	450 GeV/c

Particles studied glueball, exotic, meson<sup>0</sup>,  $\eta_c(1S)$ ,  $\chi_c(\text{unspec})$

Brief description Searches for neutral mesons, exotics like glueballs, hybrids, and many-quark states produced in central hadron-proton collisions. Studies the inclusive hadronic production of neutral heavy quark mesons. Uses the 4092-cell electromagnetic calorimeter GAMS-4000 supplemented with a forward magnetic spectrometer and microstrip gas chambers. Data analysis in progress (July 96).

Journal papers NIM A268 (1988) 112, NIM A269 (1988) 101, PL B201 (1988) 160, YF 47 (1988) 1273, YF 47 (1988) 1639, NIM A276 (1989) 652, YF 49 (1989) 712, ZPHY C43 (1989) 541, DANS 316 (1991) 900, NIM A315 (1992) 21, NIM A342 (1994) 389, PL B340 (1994) 122, NC A107 (1994) 1867, NC A107 (1994) 1911, ZPHY C61 (1994) 35, YF 58 (1995) 662, DANS 344 (1995) 469, ZPHY C66 (1995) 375, and ZPHY C66 (1995) 379.

Related experiments CERN-NA-012, CERN-WA-091, CERN-WA-102

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### CERN-NA-045-2

(Proposed Jan 1994, Approved Apr 1995, Began data-taking Nov 1995, In progress)

#### STUDY OF LOW-MASS ELECTRON PAIR AND PHOTON PRODUCTION IN LEAD-LEAD COLLISIONS

##### CERES COLLABORATION

BROOKHAVEN - P Holl, H Kraner, P Rehak  
 CERN - J Schukraft  
 DUBNA - G Agakichiev, Y Minaev, Y Panebrattsev, S Razin, S Shimanski, V Yurevich  
 DARMSTADT, GSI - P Braun-Munzinger, D Miskowicz  
 HEIDELBERG, MAX PLANCK INST - F Ceretto,  
 U Faschingbauer, C Fuchs, M Hemberger, O Nix, J P Wurm  
 HEIDELBERG U, IHEP - R Baur, C Bormann, A Drees,  
 S Esumi, P Glaessel, C H Jung, B Lenkeit, M Messer, A Pfeiffer,  
 H J Specht, J Stachel, T S Ullrich, C Voigt, J P Wessels

MILAN POLYTECHNIC - E Gatti, M Sampietro  
 WEIZMANN INST - C P de los Heros, Z Fraenkel, I Ravinovich,  
 E Socol, G Tel-Zur, I Tserruya (✓ Spokesperson)

Accelerator CERN-SPS Detector Ring imaging Čerenkov,  
 Drift chamber, Multiwire proportional chamber

##### Reactions

$^{207}\text{Pb nucleus} \rightarrow e^+ e^- X$	160 GeV/c ( $P_{\text{lab}}/N$ )
$^{207}\text{Pb nucleus} \rightarrow e^+ e^- \gamma X$	"

Brief description A continuation of the CERN-NA-045 experiment dedicated to the measurement of  $e^+e^-$  pairs and direct photons produced in nucleus-nucleus collisions. The main goal is the study of the  $e^+e^-$  pair continuum in the invariant mass region from 50 MeV/c<sup>2</sup> up to 2 GeV/c<sup>2</sup> in a search for thermal emission from the conjectured quark-gluon plasma. It also addresses the question of chiral symmetry restoration in high density matter through the study of the vector mesons  $\rho$ ,  $\omega$  and  $\phi$ . The CERES spectrometer has been upgraded to cope with the higher multiplicities and background of the central Pb-nucleus collisions. The basic spectrometer consists of two ring imaging Čerenkov (RICH) detectors separated by a superconducting double solenoid. The main elements of the upgrade are additional detectors, two silicon radial-drift chambers (instead of one in the original setup) and a pad chamber (a large MWPC with pad readout) located behind the spectrometer. They allow real tracking and help the pattern recognition of the RICH detectors, by providing an a priori knowledge of the ring location in the UV counters. The two silicon radial-drift chambers allow precise vertex reconstruction and provide rapidity density information. They also play, together with the first RICH, a major role in the rejection of  $\gamma$  conversions and  $\pi^0$ -Dalitz decays. The upgrade includes also a new DAQ system with a rate capability higher by more than one order of magnitude compared to the one used in CERN-NA-045. Taking data (July 96).

Journal papers Includes the list of papers by the CERN-NA-045 experiment. IEEE TNS 35 (1988) 404, IEEE TNS 35 (1988) 432, NIM A273 (1988) 798, IEEE TNS 37 (1990) 241, IEEE TNS 39 (1992) 619, NIM A316 (1992) 259, NIM A326 (1993) 273, NP A553 (1993) 857c, NIM A343 (1994) 87, NIM A343 (1994) 231, NP A566 (1994) 87c, NP A566 (1994) 347c, PL B332 (1994) 471, NIM A355 (1995) 329, NP A590 (1995) 103c, and PRL 75 (1995) 1272.

Related experiments CERN-NA-045

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 itzhak.tserruya@cern.ch

WWW Home-page <http://ceres6.physi.uni-heidelberg.de/>

### CERN-NA-047

(Proposed Dec 1988, Approved Apr 1989, Began data-taking Aug 1991, In progress)

#### MEASUREMENT OF THE SPIN DEPENDENT STRUCTURE FUNCTIONS OF THE NEUTRON AND PROTON

##### SPIN MUON COLLABORATION (SMC)

NIKHEF, AMSTERDAM - N de Groot, T J Ketel, E Kok, M Litmaath, J E J Oberski, H Postma, E P Sichtermann, R van Dantzig, G van Middelkoop  
 BIELEFELD U - G Baum, S Bueltmann, D Kraemer  
 CERN - P Hautle, C A Heusch, W Kroeger, J-M Le Goff, T O Niinikoski, U Stiegler, R Voss  
 DUBNA - A Karev, Y Kisselev, V Krivokhijine, K Medved, A Nagajcev, D Peshekhonov, D Pose, I Savin, G Smirnov  
 FREIBURG U - U Landgraf, A Witzmann  
 GKSS, GEESTHACHT - H Stuhmann, R Willumeit, J Zhao  
 HELSINKI U OF TECH - P Berglund, J Kyynarainen, J Ylostalo  
 BOGAZICI U - E Arik, T Cuhadar, E Gulmez  
 ISTANBUL, TECH U - T Akdogan, H Guven, C Ozben, I Reyhancan, G Unel  
 MAINZ U - E M Kabuss, G K Mallot, J Pretz, R Seitz, A Steinmetz, D von Harrach  
 MONS U - R Windmolders  
 MUNICH U - L Betev, A Staude, J Vogt

## SUMMARIES OF CERN EXPERIMENTS

NAGOYA U - T Hasegawa, N Hayashi, N Horikawa, S Ishimoto,  
 T Iwata, T Kageya, A Kishi, T Matsuda, K Mori, A Ogawa  
 NORTHEASTERN U - J Moromisato, E von Goeler  
 NORTHWESTERN U - D Fasching, D Miller, R Segel,  
 P Shanahan, M Velasco  
 RICE U - B E Bonner, J Cranshaw, S Eichblatt, T Gaussiran,  
 M Lowe, J B Roberts  
 SACLAY - N de Botton, E Burtin, A de Lesquen, F Feinstein,  
 B Frois, F Lehar, A Magnon, F Marie, J Martino, F Perrot-  
 Kunne, S Platchkov  
 SANTIAGO DE COMPOSTELA U - B Adeva, C Fernandez,  
 J A Garzon, A Gomez, G Gracia, S Lopez-Ponte, C A Perez,  
 M Plo, J Saborido  
 TEL AVIV U - J Lichtenstadt, I Sabo  
 TRIESTE U, IST FIS & INFN, TRIESTE - R Birsa,  
 F Bradamante, A Bressan, M Clocchiatti, S Dalla Torre,  
 M Giorgi, M Lamanna, A Martin, A Penzo, R Puntaferro,  
 P Schiavon, F Simeoni, F Tassarotto, A Zanetti  
 UCLA - B Derro, C Dulya, G Igo, C Whitten  
 HOUSTON U - B Mayes, L Pinsky, J Pyrluk, R Weinstein  
 UPPSALA U - A Arvidson, P Bjorkholm, A Dyring, M Rodriguez  
 VIRGINIA TECH - D Crabb, J McCarthy  
 WARSAW, INST NUCL STUDIES - B Badelek, J Kiryluk,  
 K Kurek, J Polec  
 SOLTAN INST, SWIERK - J Nassalski, E Rondio, A Sandacz,  
 M Szeleper, W Wislicki  
 YALE U - A Deshpande, S Dhawan, V W Hughes (Spokesperson),  
 R Piegala

Accelerator CERN-SPS Detector EMC

Reactions Polarized beam and target

muon  $p \rightarrow$  muon X 100 - 200 GeV ( $E_{lab}$ )  
 muon deut  $\rightarrow$  muon X "

Particles studied  $p, n, deut$

Brief description Measures the spin-dependent asymmetries  $A_1$  and  $A_2$  in deep inelastic scattering of longitudinally polarized muons by longitudinally and transversely polarized protons and deuterons. Tests the nucleon spin structure and Ellis-Jaffe and Bjorken sum rules. The apparatus is the upgraded forward spectrometer which was used originally by the European and New Muon Collaborations. To minimize the systematic uncertainties the target contains two oppositely polarized cells, which are exposed to the muon beam simultaneously. The polarized target has a high cooling power and field homogeneity, and long target cells. It was used with proton (butanol beads) and deuteron target materials in previous years, and with proton material (ammonia) in 1996. Taking data (June 96).

Journal papers PL B302 (1993) 533, NIM A343 (1994) 400, NIM A349 (1994) 334, PL B320 (1994) 400, PL B329 (1994) 399, PL B336 (1994) 125, and PL B369 (1996) 93.

Related experiments CERN-NA-002, CERN-NA-009, CERN-NA-028, CERN-NA-037

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WWW Home-page <http://na47sun05.cern.ch/welcome.html>

### CERN-NA-048

(Proposed Jul 1990, Approved Nov 1991, In preparation)

#### A PRECISION MEASUREMENT OF $\epsilon'/\epsilon$ IN CP-VIOLATING $K^0 \rightarrow 2\pi$ DECAYS

NA48 COLLABORATION

SACLAY - J Alitti, S Anvar, D Bederede, F Bugeon, J-B Cheze,  
 M De Beer, P Debu, J L Fallou, A Givernaud, H Le Provost,  
 F Louis, E Mazzucato, A Migliori, M Mur, B Peyaud,  
 S Schanne, G Tarte, R Turlay, B Vallage  
 CERN - F Bal, G D Barr, G Bocquet, P Buchholz, D Cundy,  
 N Doble, F Formenti, W Funk, L Gatignon, A Gonidec,  
 P Grafstrom, B Hallgren, W Iwanski, G Kessler, A Lacourt,  
 G Laverriere, G Linser, M Martini, M Mast, J P Matheys,  
 A Norton, P Ponting, D Schinzel, W Seidl, M Sozzi, H Taureg,  
 P Vande Vyvre, M Velasco, O Vossnack, H Wahl, P Wertelaers,  
 J Weterings, M Ziolkowski  
 CAGLIARI U & INFN, CAGLIARI - V Fanti, A Lai, L Musa,  
 A Nappi, P Randaccio, M-G Setzu

CAMBRIDGE U - S Katvars, R Moore, D J Munday, A Parker,  
 S F Takach, T O White  
 DUBNA - V D Kalagin, A M Kalinin, M N Kapishin,  
 V D Kekelidze, P Khristov, D A Kirillov, I A Kojevnikov,  
 Y K Potrebennikov  
 EDINBURGH U - L Bertolotto, O Boyle, B Hay, A Main,  
 N McKay, G Oakland, K J Peach, E Veitch, L L J Vick,  
 A Walker  
 FERRARA U & INFN, FERRARA - D Bettoni, R Calabrese,  
 P Dalpiaz, J Duclos, P Ferretti Dalpiaz, P Frabetti, A Gianoli,  
 V Guidi, E Luppi, F Petrucci, L Piemontese, F Rossi, M Savrie  
 FLORENCE U & INFN, FLORENCE - A Bizetti, M Calvetti  
 ( $\checkmark$  Spokesperson), M Lenti, A Michetti  
 MAINZ U, INST PHYS - H-G Becker, T Beier, H Bluemer,  
 B Bockholt, C Ebersberger, A Kalter, K Kleinknecht, H-  
 C Knoeppler, U Koch, L Koepke, S Luitz, B Renk, J Scheidt,  
 J Schmidt, V Schoenharthng, J Staeck, R Wilhelm, A Winhardt,  
 M Wittgen  
 VIENNA, OAW - H Dibon, M Jeitler, M Markytan, I Mikulec,  
 G Neuhofer, M Pernicka, A Taurak, C E Wulz  
 ORSAY, LAL - J-N Albert, E Auge, G Barrand, J-E Campagne,  
 J-C Chollet, C de la Taille, L Fayard, L Iconomidou-Fayard,  
 G Martin-Chassard, A Schaffer, G Unal  
 PERUGIA U & INFN, PERUGIA - G Anzivino, F Bordacchini,  
 P Cenci, A Del Rosso, P Lubrano, M Pepe, M Punturo,  
 C Talamonti  
 PISA U & INFN, PISA - A Bast, L Bertanza, A Bigi, P Calafiura,  
 R Carosi, C Cerri, F Costantini, R Fantechi, F Fidecaro,  
 B Gorini, F Laico, I Mannelli, V Marzulli, G M Pierazzini,  
 F Raffaelli  
 TURIN U - C Biino, A Ceccuci, R Cester, P Maas, F Marchetto,  
 E Menichetti, R Mussa, S Palestini, N Pastrone  
 SIEGEN U - I Augustin, M Bender, G Gillissen, M Holder,  
 W Otto, M Roschangar, C Schmitz, B Schofer, R Werthenbach,  
 S Winkler  
 WARSAW U - A Chlopik, Z Guzik, J Nassalski, E Rondio,  
 M Szeleper, W Wislicki

Accelerator CERN-SPS Detector Calorimeter, Spectrometer

Particles studied  $K_S, K_L, \Lambda$

Brief description The goal is to measure  $\text{Re}(\epsilon'/\epsilon)$  with an accuracy of  $2 \times 10^{-4}$ . The experiment uses the 450 GeV/c SPS proton beam to produce two nearly collinear  $K_S$  and  $K_L$  beams concurrently. Kaon decays are distinguished by tagging the protons generating the  $K_S$  component. The detector is optimized for the detection of  $\pi^+\pi^-$  and  $\pi^0\pi^0$  final states from neutral kaons with momenta between 70 and 170 GeV/c. Charged decays are measured in a magnetic spectrometer with a central dipole magnet and two sets of large and high-precision drift chambers on each side. Neutral decays are recorded in a homogeneous liquid krypton calorimeter designed for high rate capability, good energy and space resolution, and sub-nanosecond time resolution. This configuration permits collecting all four modes concurrently with minimal systematic error. Other components of the apparatus include a proton tagger, a hadron calorimeter, and counters to veto muons and particles outside the detector acceptance. The first charged kaon test data have been collected during 1995. The installation is being completed with the positioning of the LKr calorimeter (Summer 96). First data taking is expected in early 1997.

Journal papers NIM A316 (1992) 1, NIM A323 (1992) 393, NIM A344 (1994) 487, NIM A344 (1994) 507, NIM A360 (1995) 224, NIM A361 (1995) 466, NIM A365 (1995) 268, NIM A367 (1995) 263, NIM A370 (1996) 413, and NIM A373 (1996) 213.

Related experiments CERN-PS-195, FNAL-832

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WWW Home-page <http://www1.cern.ch/NA48/Welcome.html>

### CERN-NA-050

(Proposed Nov 1991, Approved Feb 1992, Began data-taking Nov 1994, In progress)

#### STUDY OF MUON PAIRS AND VECTOR MESONS PRODUCED IN HIGH ENERGY Pb Pb INTERACTIONS

NA50 COLLABORATION

## SUMMARIES OF CERN EXPERIMENTS

ANNECY - C Baglin, A Bussiere, V Capony, R Kossakowski  
 BUCHAREST, IAP - C Alexa, V Boldea, S Constantinescu,  
 S Dita  
 CAGLIARI U & INFN, CAGLIARI - M Ceru, C Cicalo,  
 A De Falco, P Macciotta, A Masoni, G Puddu, S Serici,  
 P Temnikov, G Usai  
 CLERMONT-FERRAND U - A Baldit, J Castor, T Chambon,  
 I Chevrot, A Devaux, B Espagnon, J Fargeix, P Force,  
 G Landaud, L Luquin, S Mourgues, P Saturnini  
 CRACOW, INST PHYS NUCL TECH - W Dabrowski  
 CERN - C Lourenco, R Shahoian, P Sonderegger  
 LISBON, LIP - M C Abreu, P Bordalo, S Ramos, S Silva  
 MOSCOW, INR - Y K Gavrilov, M G Golubeva, M Gotra,  
 T L Karavicheva, A B Kurepin, N S Topilskaya  
 ORSAY, IPN - J Astruc, C Gerschel, D Jouan, Y Le Bornec,  
 X Tarrago, N Willis  
 ECOLE POLYTECHNIQUE - A Borhani, B Chaurand, F Fleuret,  
 M Gonin, L Kluberg ( $\checkmark$  Spokesperson), P Petiau, A Romana  
 STRASBOURG, CRN - P Gorodetzky, C Racca  
 TURIN U & INFN, TURIN - S Alessandro, S Beole, G Bonazzola,  
 E Chiavassa, G Dellacasa, N De Marco, M Gallio, P Giubellino,  
 P Guaita, M Idzik, A Marzari Chiesa, M Masera, A Musso,  
 A Piccotti, W L Prado da Silva, L Ramello, P Rato Mendes,  
 L Riccati, E Scomparin, E Vercellin  
 LYON, IPN - M Bedjidian, F Bellaiche, B Cheynis, O Drapier,  
 J Y Grossiord, A Guichard, R Haroutunian, M Jacquin,  
 F Malek, J R Pizzi  
 YEREVAN PHYS INST - A A Grigoryan, H R Gulkanyan,  
 R S Hakobyan, S S Mehrabyan

Accelerator CERN-SPS Detector Calorimeter, Spectrometer

### Reactions

$Pb\ nucleus \rightarrow \mu^+ \mu^- X$  160 GeV ( $T_{lab}/N$ )

Particles studied  $\nu$ mesons

Brief description Studies dimuons produced in Pb-Pb collisions at the nucleon-nucleon  $E_{c.m.}$  of 18 GeV. The setup is optimized for a mass range which includes signals probing QGP (Quark and Gluon Plasma), namely  $\phi$ ,  $J/\psi$ ,  $\psi'$ , and (unseparated)  $\rho$  and  $\omega$  vector mesons. It also covers Drell-Yan dimuons which serve as a normalization. The detector is an improved version of the CERN-NA-038 setup, with neutral energy and multiplicity detectors following the target, the Zero Degrees quartz fiber hadron calorimeter (ZDC) embedded in the hadron dump, and a muon spectrometer following the dump. Taking data (June 96).

Related experiments CERN-NA-038

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WWW Home-page <http://www.cern.ch/NA50/>

## CERN-NA-051

(Proposed Apr 1992, Approved Apr 1992, Began data-taking Jun 1992, Completed data-taking Jul 1992)

### DRELL-YAN STUDY OF SEA ISOSPIN SYMMETRY

NA51 COLLABORATION

CERN - P Sonderegger  
 CLERMONT-FERRAND U - A Baldit, C Barriere, J Castor,  
 T Chambon, A Devaux, B Espagnon, J Fargeix, P Force,  
 G Landaud, P Saturnini, F Vazeille  
 LISBON, LIP - M C Abreu, P Bordalo, R Ferreira, C Lourenco,  
 S Ramos, S Silva, J Varela  
 ORSAY, IPN - C Gerschel, D Jouan, X Tarrago  
 ECOLE POLYTECHNIQUE - B Chaurand, L Kluberg  
 ( $\checkmark$  Spokesperson), A Romana  
 STRASBOURG, CRN - P Gorodetzky, D Lazic, R Mazini,  
 C Racca  
 TURIN U & INFN, TURIN - B Alessandro, E Chiavassa,  
 G Dellacasa, M Gallio, P Giubellino, P Guaita, A Marzari-  
 Chiesa, M Masera, M Monteno, A Musso, L Ramello, L Riccati,  
 E Scomparin, E Vercellin  
 LYON, IPN - M Bedjidian, D Contardo, E Descroix, O Drapier,  
 J Y Grossiord, A Guichard, R Haroutunian, F Malek,  
 R Mandry, J R Pizzi

Accelerator CERN-SPS Detector Spectrometer

### Reactions

$pp \rightarrow \mu^+ \mu^- X$  450 GeV/c ( $P_{lab}$ )

$p\ deut \rightarrow \mu^+ \mu^- X$  "

### Brief description

The purpose of the experiment is to study the isospin symmetry in the light-quark sea of the proton. Its violation is one possible explanation of recent unexpected muon deep inelastic scattering experimental results which disagree with the Gottfried sum rule. The experiment makes use of the large acceptance muon spectrometer used previously by CERN-NA-010 and CERN-NA-038. It detects muon pairs produced by the Drell-Yan mechanism in  $pp$  and  $pd$  reactions. A beam of 450 GeV/c protons impinges on alternating liquid hydrogen and deuterium targets. The aim is to measure the cross-section ratio at dimuon masses above  $4\text{ GeV}/c^2$ , which is a sensitive probe of the relative content of light antiquarks  $\bar{u}$  and  $\bar{d}$  in the proton sea.

Journal papers PL B332 (1994) 244.

Related experiments FNAL-288, FNAL-711

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WWW Home-page <http://lyoinfo.in2p3.fr/eiexp/na51.html>

## CERN-PS-185-2

(Proposed Jan 1992, Approved Nov 1992, Began data-taking Jul 1994, Completed data-taking Jun 1995)

### HIGH PRECISION MEASUREMENT OF $\bar{p}p \rightarrow \bar{\Lambda}\Lambda$ CROSS-SECTIONS IN THE MASS REGION AROUND 2232 MeV/c<sup>2</sup>

CERN - N Hamann, (deceased)

CARNEGIE MELLON U - G Franklin, R McCrady, C A Meyer,  
 B Quinn, R Schumacher

ERLANGEN U - H Dennert, W Eyrich, J Haufler, F Stinzing

FREIBURG U - D Afzali, J Franz, J Rauch, E Roessle, M Ruh,

D Ruschmeier, H Schmitt, R Todenhagen, T Walter, H Wirth

JULICH, FORSCHUNGSZENTRUM - R Broeders, R Geyer,

K Kilian ( $\checkmark$  Spokesperson), W Oelert, K Roehrich

( $\checkmark$  Spokesperson), K Sachs, T Seifick

LOS ALAMOS - P D Barnes

ILLINOIS U, URBANA - R A Eisenstein, P Harris, D Hertzog,

T Jones, R Tayloe

NEW MEXICO U - H Fischer

UPPSALA U - T Johansson, E Traneus

Accelerator CERN-LEAR Detector Wire chamber

### Reactions

$\bar{p}p \rightarrow \bar{\Lambda}\Lambda$  1.435 - 1.450 GeV/c ( $P_{lab}$ )

### Brief description

The aim of the experiment is to verify a possible structure in the excitation function of the reaction  $\bar{p}p \rightarrow \bar{\Lambda}\Lambda$  indicated by the recent threshold data of the CERN-PS-185 collaboration at an invariant mass of about 2232 MeV/c<sup>2</sup>. Studies the total and differential cross-sections as well as polarizations and spin correlations, within a few MeV around the reaction threshold. Uses an upgraded version of the PS-185 detector. The full  $\bar{\Lambda}\Lambda$  kinematics is reconstructed from tracks in a 30 cm long stack of MWPC's and drift chambers. The production vertex is reconstructed by making use of four planes of  $\mu$ -strip counters upstream the CH<sub>2</sub> sandwich target. Hyperon and antihyperon are distinguished by means of a magnetic solenoid with three drift chambers inside. The setup provides a large acceptance, a high efficiency, and a low annihilation background.

Related experiments CERN-PS-185, CERN-PS-185-3

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WWW Home-page

<http://hpfr02.physik.uni-freiburg.de/ps185/ps185.html>

## CERN-PS-195

(Proposed Jan 1985, Approved Sep 1985, Began data-taking 1991, In progress)

### TESTS OF CP VIOLATION WITH $\bar{K}^0$ AND $K^0$ AT LEAR

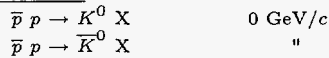
## SUMMARIES OF CERN EXPERIMENTS

### CLEAR COLLABORATION

ATHENS U - A Angelopoulos, A Apostolakis, E Rozaki, L Sakelliou, K Sarigiannis  
 BASEL U - P Kokkas, F Leimgruber, P Pavlopoulos (✓ Spokesperson), G Polivka, R Rickenbach, T Schietinger, L Tauscher, S Vlachos  
 BOSTON U - M Chertok, D Francis, J P Miller, B L Roberts, D Zimmerman  
 SACLAY - G Chardin, M Dejardin, J Derre, D Garreta, C Guyot, C Kochowski, G Marel, P Schune, A Soares, C Yeche  
 CERN - P Bloch, M Fidecaro, T Ruf, A Schopper, C Touramanis  
 COIMBRA U - J Carvalho, R Ferreira-Marques, E Machado, J Pinto da Cunha, E Von Beveren  
 DELFT UNIV TECH - R W Hollander, R Kreuger, C W E Van Eijk  
 FRIBOURG U - F Blanc, L Faravel, L A Schaller  
 IOANNINA U - I Evangelou, N Manthos, F Triantis  
 LIVERPOOL U - A Benelli, M Carroll, E Cawley, A Cody, J R Fry, E Gabathuler, R Gamet, A Haselden, P J Hayman  
 LJUBLJANA U - A Filipic, I Mandic, M Mikuz, D Zavrtanik  
 ORSAY, CSNSM - C Thibault  
 PSI, VILLIGEN - P R Kettle, T Nakada, O Wigger  
 ROYAL INST TECH, STOCKHOLM - P Carlson, M Danielsson, A Go, K Jon-And  
 THESSALONIKI U - S Charalambous, S Dedoussis, C Eleftheriadis, A Liolios, I Papadopoulos  
 MARSEILLE, CPPM - E Aslanides, V Bertin, A Ealet, F Henry-Couannier, E Hubert, R Le Gac, F Montanet, F Touchard  
 ZURICH, ETH - O Behnke, W Fetscher, H J Gerber, B Pagels, M Schaefer, P Weber, M Wolter

Accelerator CERN-LEAR Detector Spectrometer, Calorimeter

#### Reactions



Particles studied  $K^0, \bar{K}^0$

Brief description Measures time-dependent  $K^0-\bar{K}^0$  decay rate asymmetries for nonleptonic and semileptonic decays. They are sensitive to CP and T violation in different and complementary ways, and also provide sensitive tests of CPT. A beam of  $10^6 \bar{p}$ /sec provided by LEAR is brought to rest in a hydrogen gas target, producing  $K^0$  and  $\bar{K}^0$  through the reaction  $\bar{p} p \rightarrow K^\pm \pi^\mp K^0(\bar{K}^0)$ . Decays of the  $K^0$  and  $\bar{K}^0$  are recorded under the same operating conditions, inside a magnetic field and using tracking chambers and a gas sampling electromagnetic calorimeter. The strangeness of the neutral kaon is tagged by detecting the sign of accompanying charged kaon identified by Čerenkovs and scintillators. Hardware processors are used to reconstruct and select different decay topologies on-line in less than 25 microseconds. Taking data (July 96).

Journal papers NIM A279 (1989) 285, NIM A279 (1989) 305, NIM A279 (1989) 317, NIM A283 (1989) 484, NC 102A (1989) 127, NIM A297 (1990) 126, NIM A301 (1991) 424, NP (PROC SUPPL) 24A (1991) 45, PL B267 (1991) 154, NIM A311 (1992) 78, NIM A321 (1992) 458, NIM A323 (1992) 511, NP (PROC SUPPL) 27 (1992) 285, PW 3 (1992) 40, PL B286 (1992) 180, SJNP 55 (1992) 840, NIM A333 (1993) 93, NIM A333 (1993) 513, NP (PROC SUPPL) 31 (1993) 196, NP A558 (1993) 43c, NP A558 (1993) 437c, NP A558 (1993) 449c, PAN 57 (1994) 1772, ZPHY C63 (1994) 541, PL B363 (1995) 237, PL B363 (1995) 243, PL B364 (1995) 239, ZPHY C65 (1995) 199, NIM A368 (1996) 666, PL B369 (1996) 367, PL B370 (1996) 167, PL B374 (1996) 313, and ZPHY C70 (1996) 211.

Related experiments CERN-NA-048, FNAL-621, FNAL-832

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WWW Home-page <http://www1.cern.ch/cplear/Welcome.html>

### CERN-PS-196

(Proposed Mar 1985, Approved Nov 1985, In progress)

#### PRECISION COMPARISON OF $\bar{p}$ AND $p$ MASSES IN A PENNING TRAP

HARVARD U - G Gabrielse (✓ Spokesperson), D Phillips  
 MAINZ U, INST PHYS - K Heimann, H Kalinowsky  
 SEOUL NATIONAL U - W Jhe

Accelerator CERN-LEAR Detector Other

Particles studied  $\bar{p}$

Brief description Compares  $p$  and  $\bar{p}$  masses to an accuracy of one part in  $10^{10}$  within a small volume of an ion trap, and develops trapping and cooling techniques to allow the production and study of low energy antiprotons and antihydrogen. Antiprotons have been trapped below 3 keV. Electron cooling from keV to  $< 10^{-3}$  eV has been observed in the trap. Also measures the antiproton storage lifetime. First attempt to make cold antihydrogen is scheduled for late 1996. Taking data through Dec 96.

Journal papers PRL 57 (1986) 2504, RSI 58 (1987) 2197, PL A129 (1988) 38, PRL 63 (1989) 1360, PRL 65 (1990) 1317, PRL 74 (1995) 3544, PRL 75 (1995) 806, and PRL 77 (1996) (in press).

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### CERN-PS-197

(Proposed Oct 1985, Approved Apr 1986, Began data-taking 1989, In progress)

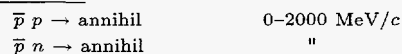
#### THE CRYSTAL BARREL: MESON SPECTROSCOPY AT LEAR WITH A $4\pi$ DETECTOR

##### CRYSTAL BARREL COLLABORATION

RUHR U, BOCHUM - K Beuchert, T Degener, H Koch, M Kunze, J Luedemann, H Matthaey, K Peters, H Stoeck  
 BONN U - B Barnett, R Hackmann, M Herz, H Kalinowsky, B Kalteyer, E Klempt, S Resag, C Strassburger, U Thoma  
 BUDAPEST, CRIP - P Hidas  
 CERN - M Doser, J Kisiel, R Landua, L Montanet, R Ouared, U Wiedner  
 CARNEGIE MELLON U - A Berdoz, R McCrady, C A Meyer  
 HAMBURG U - J Meier, P Schmidt, R Seibert, U Strobusch  
 KARLSRUHE U - S Bischoff, P Bluem, D Engelhardt, C Holtzhausen, M Tischhaeuser  
 LBL - D Armstrong, T Case, K M Crowe, F H Heinsius, P Kammel, M Lakata  
 QUEEN MARY - WESTFIELD COLL - D V Bugg, I Scott, B Zou  
 MUNICH U - K Braune, O Cramer, N Djaoshvili, W Duennweber, M A Faessler (✓ Spokesperson), N P Hessey, D Jamnik, C Regenfus, W Roethel, C Voelcker, D Walther, C Zupancic  
 NORTHWESTERN U - B Kaemmler, K Seth  
 PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE - M Benayoun  
 RUTHERFORD - C A Baker, C J Batty, C Pinder  
 STRASBOURG, CRN - M Suffert  
 UCLA - R P Haddock  
 ZURICH U - C Amsler, P Giaritta, F Ould-Saada, S Spanier, S von Dombrowski

Accelerator CERN-LEAR Detector CRYSTAL-BARREL

#### Reactions



Particles studied glueball, meson

Brief description The spectrometer is designed to provide complete and precise information on nearly every final state produced in  $\bar{p} p$  and  $\bar{p} d$  annihilations at low energy and to collect high statistics data samples. The physics goal is to identify all light mesons in the mass range from 0.14 to 2.3  $\text{GeV}/c^2$ , to determine their properties and the annihilation dynamics, and to search for the glueball and hybrid degrees of freedom. The apparatus consists of a barrel shaped electromagnetic calorimeter with 1380 CsI(Tl) crystals read out by photodiodes, a cylindrical jet drift chamber, a silicon  $\mu$ -strip vertex detector, and silicon hodoscopes. The whole detector is embedded in a solenoidal magnet with field strength up to 1.5 T. Uses liquid and gaseous  $\text{H}_2$  and  $\text{D}_2$  targets. Scheduled to run till the end of 1996.

## SUMMARIES OF CERN EXPERIMENTS

Journal papers NP (PROC SUPPL) 8 (1989) 65, PL B260 (1991) 249, NP A527 (1991) 491c, IEEE TNS 39 (1992) 826, NIM A321 (1992) 69, PL B291 (1992) 347, PL B294 (1992) 451, PL B297 (1992) 214, SJNP 55 (1992) 767, PL B311 (1993) 362, PL B311 (1993) 371, PL B319 (1993) 373, ZPHY C58 (1993) 175, PAN 57 (1994) 1711, PL B322 (1994) 431, PL B323 (1994) 233, PL B327 (1994) 425, PL B333 (1994) 271, PL B333 (1994) 277, PL B340 (1994) 259, PAN 57 (1994) 1465 = YF 57 (1994) 1542, NC 107A (1994) 1815, ZPHY A351 (1994) 325, PL B342 (1995) 433, PL B346 (1995) 203, PL B346 (1995) 363, PL B352 (1995) 187, PL B353 (1995) 571, PL B355 (1995) 425, and PL B358 (1995) 389.

Related experiments CERN-PS-201

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WWW Home-page <http://www.phys.cmu.edu/cb/cb.html>

### CERN-PS-201

(Proposed Jan 1986, Approved Sep 1986, Began data-taking Aug 1990, In progress)

#### STUDY OF ANTINEUTRON ANNIHILATIONS AT LEAR WITH OBELIX, A LARGE-ACCEPTANCE AND HIGH RESOLUTION DETECTOR BASED ON THE OPEN AXIAL FIELD SPECTROMETER

##### OBELIX COLLABORATION

BOLOGNA U & INFN, BOLOGNA - A Bertin, M Bruschi, M Capponi, I D'Antone, S De Castro, A Ferretti, D Galli, B Giacobbe, U Marconi, I Massa, M Piccinini, M Poli, N Semprini-Cesari, R Spighi, S Vecchi, A Vezzani, F Vigotti, M Villa, A Vitale, A Zoccoli  
 BRESCIA U & INFN, BRESCIA - G Belli, M Corradini, A Donzella, E Lodi Rizzini, L Venturelli, A Zenoni  
 CAGLIARI U & INFN, CAGLIARI - A Adamo, C Cicalo, A Lai, A Masoni, L Musa, G Puddu, S Serci, P Temnikov, G L Usai  
 DUBNA - O Y Denisov, O E Gorchakov, V P Nomokonov, S N Prakhov, A M Rozhdstvensky, M G Sapozhnikov, V I Tretyak  
 FRASCATI - P Gianotti, C Guaraldo, A Lanaro, V Lucherini, F Nichitiu, C Petrascu, A Rosca  
 LEGNARO - V G Ableev, C Cavion, U Gastaldi, L Lombardi, G Maron, R A Ricci, L Vannucci, G Vedovato  
 PADUA U & INFN, PADUA - A Andrighetto, M Morando  
 PAVIA U & INFN, PAVIA - G Bendiscioli, V Filippini, A Fontana, C Marciano, P Montagna, A Rotondi (✓ Spokesperson), A Saino, P Salvini  
 TURIN POLYTECHNIC & INFN, TURIN - M Agnello, F Iazzi, B Minetti  
 TURIN U & INFN, TURIN - F Balestra, G C Bonazzola, E Botta, T Bressani, M P Bussa, L Busso, D Calvo, P Cerello, S Costa, D D'Isep, L Fava, A Feliciello, L Ferrero, A Filippi, R Garfagnini, A Grasso, A Maggiora, S Marcello, D Panzieri, D Parena, E Rossetto, F Tosello, G Zosi  
 TRIESTE U, IST FIS & INFN, TRIESTE - G Margagliotti, G Pauli, S Tessaro  
 UDINE U & INFN, UDINE - L Santi

Accelerator CERN-LEAR Detector Spectrometer

##### Reactions

$\bar{p} p \rightarrow$ annih	0-0.2 GeV/c ( $P_{lab}$ )
$\bar{p} deut \rightarrow$ annih	"
$\bar{p} nucleus \rightarrow$ annih	"
$\bar{n} p \rightarrow$ annih	0-0.4 GeV/c ( $P_{lab}$ )
$\bar{n} nucleus \rightarrow$ annih	"

Particles studied mesons

Brief description Studies (1) spectroscopy of  $q\bar{q}$ , exotic, glueball, and hybrid mesons, (2) dynamics of  $N\bar{N}$  interactions, (3) atomic physics with  $\bar{p}$ 's, and (4)  $\bar{p}$  annihilations onto more than one nucleon. A Spiral Projection Chamber (SPC) is used as vertex detector. The magnet and the jet drift chamber of the Open Axial Field Spectrometer (AFS) are used for charged particles momentum and  $dE/dx$  measurements. Two concentric arrays of plastic scintillators identify and trigger on charged kaons. Gamma showers are reconstructed in three dimensions with gas

sampling calorimeter moduli. Taking data (July 96). Scheduled to complete the data taking by the end of 1996.

Journal papers IEEE TNS 38 (1991) 331, IEEE TNS 38 (1991) 337, IEEE TNS 38 (1991) 393, NIM A306 (1991) 305, PL B256 (1991) 349, NIM A323 (1992) 523, PL B284 (1992) 448, PL B285 (1992) 15, PL B287 (1992) 368, SJNP 55 (1992) 806, NIM A325 (1993) 417, NIM A334 (1993) 391, NP A553 (1993) 651c, NP A558 (1993) 13c, NP A558 (1993) 137c, NP A558 (1993) 369c, NP A558 (1993) 665c, NP A562 (1993) 617, PR A47 (1993) 4517, PL B329 (1994) 407, PL B334 (1994) 237, PL B337 (1994) 226, PAN 57 (1994) 1614 = YF 57 (1994) 1684, PAN 57 (1994) 1716 = YF 57 (1994) 1787, PAN 57 (1994) 1745 = YF 57 (1994) 1816, NC A107 (1994) 943, NC A107 (1994) 1325, NC A107 (1994) 2837, NP A569 (1994) 761, NIM A356 (1995) 270, PL B361 (1995) 187, PRL 74 (1995) 371, NP A585 (1995) 577, NP A594 (1995) 375, and PL B369 (1996) 77.

Related experiments CERN-PS-195, CERN-PS-197, CERN-PS-202, BNL-852, FNAL-760

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### CERN-PS-202

(Proposed 1986, Approved Feb 1987, Began data-taking Jul 1991, Completed data-taking Sep 1994)

#### JETSET: PHYSICS AT LEAR WITH AN INTERNAL GAS JET TARGET AND AN ADVANCED GENERAL PURPOSE DETECTOR

##### PS202 COLLABORATION

BARI U & INFN, BARI - C Evangelista, A Palano  
 CERN - D Drijard, M Ferro-Luzzi, R Jones, B Mouellic, J M Perreau, M J Price  
 ERLANGEN U - W Eyrich, R Geyer, S Pomp, F Stinzing  
 FREIBURG U - H Fischer, J Franz, E Roessle, H Schmitt, M Tscheulin, H J Urban, H Wirth  
 GENOA U & INFN, GENOA - A Buzzo, M Lovetere, M Macri (✓ Spokesperson), M Marinelli, S Passaggio, M G Pia, A Pozzo, E Robutti, A Santroni  
 ILLINOIS U, URBANA - P Debevec, R A Eisenstein, P Harris, D Hertzog, S Hughes, P Reimer, J Ritter  
 KERNFORSCHUNGSANLAGE, JULICH - K Kilian, W Oelert, K Roehrich, M Rook, O Steinkamp  
 OSLO U - H Korsmo  
 UPPSALA U - T Johansson

Accelerator CERN-LEAR Detector JETSET

##### Reactions

$\bar{p} p \rightarrow \phi \phi$	0.6-1.9 GeV/c
$\bar{p} p \rightarrow K^+ K^- K^+ K^-$	"
$\bar{p} p \rightarrow K_S K_S$	"

Particles studied glueball

Brief description Uses an internal gas jet target surrounded by an advanced, compact, nonmagnetic detector. Aim is a search for glueballs ( $gg$  or  $ggg$ ) and hybrids ( $gq\bar{q}$ ) over the mass range 2.04 to 2.4 GeV/c<sup>2</sup>. Data analysis in progress (July 96).

Journal papers NP (PROC SUPPL) 8 (1989) 69, SJNP 55 (1992) 827, NIM A335 (1993) 255, NP A558 (1993) 27c, NIM A346 (1994) 57, NC 107A (1994) 2329, PAN 57 (1994) 1503 = YF 57 (1994) 1578, and PL B345 (1995) 325.

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### CERN-UA-004-2

(Approved Jul 1990, Completed data-taking)

#### A PRECISE MEASUREMENT OF THE REAL PART OF THE ELASTIC SCATTERING AMPLITUDE AT THE $S\bar{p}pS$

GENOA U & INFN, GENOA - M Bozzo, G Sette, M Zito  
 ECOLE POLYTECHNIQUE - C Augier, D Bernard, J Bourotte, M Haguenaer (Spokesperson)

## SUMMARIES OF CERN EXPERIMENTS

PRAGUE, INST PHYS - V Kunderat, S Nemecek, M Novak, M Smizanska

ROME U, TORVERGATA & INFN, ROME - R Cardarelli,

L Cerrito, G Matthiae, F Natali

VALENCIA U - F Alted, R Cases, E Sanchis, J Velasco

Accelerator CERN-PBAR/P Detector Wire chamber

### Reactions

$\bar{p} p \rightarrow \bar{p} p$  630 GeV ( $E_{cm}$ )

Brief description Measures the total cross-section and the ratio  $\rho$  of the real to the imaginary part of the forward elastic scattering amplitude. The setup is composed of two pairs of Roman Pots placed symmetrically at 45 m from the crossing point. The horizontal scattering angle is measured by drift chambers and the vertical coordinate is obtained by using a hodoscope. Data analysis in progress (June 96).

Journal papers PL B315 (1993) 503, PL B316 (1993) 448, and PL B344 (1995) 451.

Related experiments CERN-UA-004

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### CERN-WA-079

(Proposed Apr 1983, Approved Jun 1983, Began data-taking Aug 1986, Completed data-taking Aug 1991)

#### STUDY OF NEUTRINO-ELECTRON SCATTERING AT THE SPS

##### CHARM-II COLLABORATION

BRUSSELS U, IIHE - P Vilain, G Wilquet

CERN - R Beyer, W Flegel, H Grote, T Mouthuy, H Overas, J Panman, A Rozanov, K Winter (✓ Spokesperson), G Zacek, V Zacek

HAMBURG U - F W Busser, C Foos, L Gerland, T Layda, F Niebergall, G Radel, P Stahelin, T Voss

LOUVAIN U - D Favart, G Gregoire, E Knoops, V Lemaitre

MOSCOW, ITEP - P Gorbunov, E A Grigoriev, V D Khovansky, A Maslennikov

MUNICH U, EXP PHYS - W Lippich, A Nathaniel, A Staude, J Vogt

NAPLES U, IFS & INFN, NAPLES - A G Cocco, A Ereditato, G Fiorillo, F Marchetti-Stasi, V Palladino, P Strolin

INFN, ROME - A Capone, D De Pedis, U Dore, A Frenkel-Rambaldi, P F Loverre, D Macina, G Piredda, R Santacesaria

FERRARA U & INFN, FERRARA - E Di Capua, S Ricciardi, B Saitta

MIDDLE EAST TECH U, ANKARA - B Akkus, E Arik, M Serin-Zeyrek, R Sever, P Tolun

BERLIN-ZEUTHEN ADW - K Hiller, R Nahnauer, H E Roloff

Accelerator CERN-SPS Detector CHARM-II

### Reactions

$\nu_\mu e^-$  5-100 GeV/c

$\bar{\nu}_\mu e^-$  "

Brief description Aims at determining the electroweak mixing angle  $\theta_W$  and the ratio  $g_A/g_V$  from the ratio of  $\nu e^-$  and  $\bar{\nu} e^-$  scattering cross-sections. The obtained values are to be compared to those determined with  $10^6$  times larger  $Q^2$  at LEP. The CHARM-II neutrino detector consists of a massive, fine-grained, and low-density electronic calorimeter, followed by a muon spectrometer made of magnetized iron, with scintillators and drift chambers as active elements. The measurements are performed in the horn-focused wide band neutrino beam.

Journal papers NIM A252 (1986) 443, NIM A260 (1987) 368, NIM A263 (1988) 109, PL B213 (1988) 554, NIM A277 (1989) 83, NIM A277 (1989) 170, NIM A278 (1989) 670, PL B231 (1989) 317, PL B232 (1989) 539, PL B245 (1990) 271, PL B247 (1990) 131, NP (PROC SUPPL) 19 (1991) 306, PL B259 (1991) 499, PL B281 (1992) 159, PL B302 (1993) 351, PL B309 (1993) 463, PL B313 (1993) 267, PL B320 (1993) 203, PL B332 (1994) 465, PL B335 (1994) 246, ZPHY C64 (1994) 539, PL B343 (1995) 453, PL B345 (1995) 115, and PL B364 (1996) 121.

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### CERN-WA-085

(Proposed Oct 1984, Mar 1987, Approved Apr 1987, Began data-taking Oct 1987, Completed data-taking Sep 1991)

#### STUDY OF HIGH ENERGY NUCLEUS-NUCLEUS INTERACTIONS USING THE $\Omega'$ SPECTROMETER EQUIPPED WITH A MULTIPARTICLE HIGH $p_{\perp}$ DETECTOR

##### WA85 COLLABORATION

ATHENS U - S Abatzis, G Vassiliadis

BARI U - N Di Bari, D Elia, R Fini, B Ghidini, A Jacholkowski, V Lenti, R A Loconsole, V Manzari, F Navach

BERGEN U - H Helstrup

BIRMINGHAM U - R Barnes, A C Bayes, J N Carney, J P Davies, D Evans (✓ Spokesperson), J B Kinson, A Kirk, M Venables, O Villalobos-Baillie, M F Votruba

CERN - A Andrighetto, F Antinori, W Beusch, J P Dufey, B R French, A K Holme, K Knudson, J C Lassalle, E Quercigh, L Rossi, K Safarik

MADRID, CIEMAT - B de la Cruz

COLLEGE DE FRANCE - M Benayoun, J Kahane, P Leruste, J L Narjoux, M Sene, R Sene, A Volte

OSLO U - J A Lien, T Storas

Accelerator CERN-SPS Detector OMEGA-PRIME

### Reactions

$p$  Wt 200 GeV ( $T_{lab}$ )

$^{32}\text{S}$  Wt 200 GeV ( $T_{lab}/N$ )

Particles studied  $K^0$ ,  $\Lambda$ ,  $\bar{\Lambda}$ ,  $\Xi^-$ ,  $\bar{\Xi}^+$ ,  $\Omega^-$ ,  $\bar{\Omega}^+$

Brief description An exploratory experiment to look for new physics, and particularly for evidence of a quark-gluon plasma, through an increase in strange particle and antiparticle production. Some of the goals are a study of  $\Xi$  and anti- $\Xi$  production, and the full reconstruction of  $\Omega$  and anti- $\Omega$  hyperons. Also compares the strange and multistrange particle (anti-particle) productions in  $p$  W and S W interactions. Data analysis in progress (July 96).

Journal papers NP A498 (1989) 369c, PL B244 (1990) 130, NP (PROC SUPPL) 16 (1990) 409, PL B259 (1991) 508, PL B270 (1991) 123, NP A525 (1991) 441c, NP A525 (1991) 445c, NP A544 (1992) 321c, PL B316 (1993) 615, NP A566 (1994) 225c, NP A566 (1994) 491c, PL B347 (1995) 158, PL B355 (1995) 401, PL B359 (1995) 382, and NP A590 (1995) 307c.

Related experiments CERN-WA-094, CERN-WA-097

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### CERN-WA-089

(Proposed Aug 1987, Aug 1987, Approved Feb 1988, Began data-taking 1990, Completed data-taking Sep 1994)

#### NEW HYPERON BEAM EXPERIMENT AT THE CERN-SPS USING THE OMEGA FACILITY

BRISTOL U - D Newbold, V Smith

CERN - W Beusch, W Klempt

GENOA U & INFN, GENOA - D Barberis, L Rossi

GRENOBLE U - C Berat, M Buenerd, F Charignon, J Chauvin, A Fournier, P Martin, M Rey-Campagnolle, E Vesin

HEIDELBERG, MAX PLANCK INST - E Albertson,

M Beck, S Brons, W Brueckner, C Buescher, U Dersch,

F Dropmann, S G Gerassimov, M Godbersen, T Haller,

M Heidrich, K Koenigsmann, I Konorov, D Maier, S Masciocci,

R Michaels, C Newsom, S Paul (Spokesperson), B Povh, Z Ren,

L Schmitt, A Trombini, K Vorwalter, R Werding, E Wittmann,

M Zizelsberger

HEIDELBERG U - M Boss, P Lennert, K Martens, H Rieseberg,

H W Siebert, A Simon, O Thilmann, G Waelder

MAINZ U, INST KERNPHYS - E Chudakov, U Mueller,

G Rosner, H Rudolph, B Volkemer, T Walcher

LEBEDEV INST - M I Adamovich, Y A Alexandrov,

M V Zavertyaev

RUTGERS U - R Ransome

Accelerator CERN-SPS Detector OMEGA



## SUMMARIES OF CERN EXPERIMENTS

### Reactions

$\Sigma^-$ Cu	330 GeV/c ( $P_{lab}$ )
$\Sigma^-$ C	"
$\Xi^-$ Cu	270 GeV/c ( $P_{lab}$ )
$\Xi^-$ C	"
$\Omega^-$ Cu	"
$\Omega^-$ C	"

**Particles studied**  $\Lambda_c^+$ ,  $\Sigma_c(2455)$ ,  $\Xi_c^0$ ,  $\Xi_c^+$ ,  $\Omega_c^0$ ,  $\Omega^-$ ,  $\Omega^*$ (unspec),  $\Xi^*$ (unspec), dibaryon( $S = -2$ ),  $U(3100)$

**Brief description** The aims are (1) to study charmed strange baryons, (2) to see if the  $U(3100)$  actually exists, (3) to study  $\Omega$  decays and  $\Xi$  and  $\Omega$  resonances, (4) to look for  $H$ , the doubly strange dibaryon, (5) to measure semileptonic decays of charmed particles, (6) to study hyperon polarization phenomena, and (7) to study  $\Sigma^- e^-$  elastic scattering. Uses the upgraded OMEGA facility and a hyperon beam installed at the end of the H1 beamline. Data analysis in progress (July 96).

**Journal papers** NIM A313 (1992) 203, NIM A313 (1992) 345, NIM A313 (1992) 429, NIM A323 (1992) 373, NIM A338 (1994) 310, NIM A342 (1994) 364, NIM A343 (1994) 60, NIM A343 (1994) 258, NIM A343 (1994) 279, NIM A348 (1994) 444, NIM A355 (1995) 351, NIM A357 (1995) 274, PL B358 (1995) 151, ZPHY A350 (1995) 379, NIM A371 (1996) 27, and NIM A371 (1996) 192.

**Related experiments** CERN-WA-062

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### CERN-WA-091

(Proposed Jan 1990, Approved Apr 1990, Began data-taking Jun 1991, Completed data-taking Jun 1994)

#### SEARCH FOR CENTRALLY PRODUCED NON- $q\bar{q}$ MESONS IN PROTON-PROTON INTERACTIONS AT 450 GeV/c BY USING THE CERN $\Omega$ SPECTROMETER

##### WA91 COLLABORATION

ATHENS U - S Abatzis, G Vassiliadis  
 BARI U & INFN, BARI - N Di Bari, R Fini, B Ghidini, V Lenti, A Loconsole, V Manzari, F Navach  
 BIRMINGHAM U - A C Bayes, J N Carney, S Clewer, J P Davies, C J Dodenhoff, J B Kinson, K Norman, O Villalobos-Baillie, M F Votruba  
 CERN - F Antinori, D Barberis, W Beusch, D Evans, B R French, A Jacholkowski, A Kirk ( $\checkmark$  Spokesperson), K Knudson, J C Lassalle, E Quercigh  
 DUBNA - Y Kulchitsky, S Maljukov, I Minashvili, V Romanovsky, N Russakovich, A Semenov, A Soloviev, G Tchlatshidze  
 COLLEGE DE FRANCE - M Sene, R Sene

**Accelerator** CERN-SPS **Detector** OMEGA

##### Reactions

$p p \rightarrow p p X$  450 GeV/c

**Particles studied** mesons

**Brief description** A search for new, non- $q\bar{q}$  states in the central region, with at least 10 times the statistics of the CERN-WA-076 experiment. Uses a liquid hydrogen target. Data analysis in progress (July 96).

**Journal papers** PL B324 (1994) 509, NC 107A (1994) 1557, and PL B353 (1995) 589.

**Related experiments** CERN-WA-076, CERN-WA-102

**E-mail contact** andrew.kirk@cern.ch

### CERN-WA-092

(Proposed Mar 1990, Approved Jul 1990, Began data-taking Jun 1992, Completed data-taking Sep 1993)

#### MEASUREMENT OF BEAUTY PARTICLE LIFETIMES AND HADROPRODUCTION CROSS-SECTIONS

##### BEATRICE COLLABORATION

BOLOGNA U & INFN, BOLOGNA - A Forino, R Gessaroli, L Malferrari, P Mazzanti, A Quareni  
 CERN - F Antinori, W Beusch, J P Dufey, P Farthouat, B R French, A Kirk, J C Lassalle, M Passaseo, V Ryzhov, G Schuler  
 DUBNA - S Maljukov, I Minashvili, N Russakovich, A Semenov, A Soloviev  
 GENOA U & INFN, GENOA - M Adinolfi, D Barberis, M Dameri, G Darbo, R Hurst, P Martinengo, B Osculati, L Rossi ( $\checkmark$  Spokesperson), C Salvo  
 IMPERIAL COLL - D Barney, J Batten, A Duane, N Hummadi, D M Websdale  
 LEBEDEV INST - M Adamovich, Y Alexandrov, P Nechaeva, M Zavertyaev  
 PISA U & INFN, PISA - C Angelini, A Cardini, V Flaminio, C Lazzeroni, C Roda  
 ROME U & INFN, ROME - C Bacci, F Ceradini, G Ciapetti, A Frenkel, K Harrison, F Lacava, G Martellotti, A Nisati, D Orestano, G Penso, E Petrolo, L Pontecorvo, M Torelli, S Veneziano, M Verzocchi, L Zanello  
 ROME U, TORVERGATA & INFN, ROME - R Cardarelli, A Di Ciaccio, R Santonico  
 SOUTHAMPTON U - J G McEwen

**Accelerator** CERN-SPS **Detector** OMEGA-PRIME

##### Reactions

$\pi^-$  nucleus  $\rightarrow B \bar{B} X$  350 GeV/c

**Particles studied** bottom, charm

**Brief description** An experimental search for beauty particles produced in fixed target hadronic interactions. Uses a high precision Decay Detector and a fast secondary vertex trigger processor. Data analysis in progress (July 96).

**Journal papers** NIM A315 (1992) 95, NP (PROC SUPPL) 27 (1992) 251, NIM A337 (1994) 225, NIM A351 (1994) 222, NIM A351 (1994) 225, NIM A361 (1995) 506, NIM A368 (1995) 185, NP (PROC SUPPL) 44 (1995) 435, PL B348 (1995) 256, and PL B353 (1995) 563.

**Related experiments** FNAL-653, FNAL-771

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### CERN-WA-094

(Proposed Jan 1991, Approved Apr 1991, Began data-taking Oct 1991, Completed data-taking Nov 1993)

#### STUDY OF BARYON AND ANTIBARYON SPECTRA IN SULPHUR-SULPHUR INTERACTIONS AT 200 GeV/c PER NUCLEON

##### WA94 COLLABORATION

ATHENS U - S Abatzis, G Vassiliadis  
 BARI U - D Di Bari, D Elia, R Fini, B Ghidini, A Jacholkowski, V Lenti, R A Loconsole, V Manzari, F Navach  
 BERGEN U - E Andersen, K Fanebust, H Helstrup, G Lovhoiden, P Sennels, T F Thorsteinsen  
 BIRMINGHAM U - J N Carney, J P Davies, D Evans, J B Kinson ( $\checkmark$  Spokesperson), A Kirk, K Norman, M Venables, O Villalobos-Baillie, M F Votruba  
 COMENIUS U - J Ftacnik, R Lietava  
 CERN - F Antinori, W Beusch, B R French, A K Holme, K Knudson, J C Lassalle, M Passaseo, E Quercigh, K Safarik  
 KOSICE, IEF - J Boehm, I Kralik, K Piska, L Sandor, J Urban, P Zavada  
 LEGNARO - R A Ricci  
 MADRID, CIEMAT - B de la Cruz, P Ladron de Guevara  
 PADUA U & INFN, PADUA - A Andrighetto, N Carrer, M Morando, F Pellegrini, G Segato

## SUMMARIES OF CERN EXPERIMENTS

COLLEGE DE FRANCE - M Benayoun, J Kahane, P Leruste,  
 J L Narjoux, M Sene, R Sene, A Volte  
 SERPUKHOV - V A Kachanov, A V Singovsky  
 STRASBOURG, CRN - T Kachelhoffer, M E Michalon-Mentzer,  
 A Michalon  
 TRIESTE U & INFN, TRIESTE - A Bravar, A Penzo

Accelerator CERN-SPS Detector OMEGA

Reactions

Su Su 200 GeV ( $T_{lab}/N$ )  
 p Su 200 GeV ( $T_{lab}$ )

Particles studied strange

Brief description Extends analysis of CERN-WA-085 from S W to S S interactions. For the 1992 run the apparatus has been modified to measure charged particle spectra (in particular p and  $\bar{p}$ ) with particle identification using an array of silicon microstrip detectors and a newly upgraded ring imaging Čerenkov detector.

Journal papers NP A566 (1994) 499, PL B354 (1995) 178, NP A590 (1995) 317, and NIM A371 (1996) 22.

Related experiments CERN-WA-085, CERN-WA-097

E-mail contact jbk@hep.ph.bham.ac.uk

### CERN-WA-095

(Proposed Dec 1990, Approved Sep 1991, Began data-taking May 1994, In progress)

#### A NEW SEARCH FOR $\nu_\mu \leftrightarrow \nu_\tau$ OSCILLATIONS

##### CHORUS COLLABORATION

CUKUROVA U - E Eskut, A Kayis, G Onengut  
 NIKHEF, AMSTERDAM - J Konijn, R G C Oldeman,  
 J W E Uiterwijk, R van Dantzig, C A F J van der Poel  
 MIDDLE EAST TECH U, ANKARA - A S Ayan, E Pesen,  
 M Serin-Zeyrek, R Sever, P Tolun, M T Zeyrek  
 BARI U - N Armenise, F Cassol, M G Catanesi, M T Muciaccia,  
 E Radicioni, S Simone  
 HUMBOLDT U, BERLIN - P Lendermann, A Meyer-Sievers,  
 T Patzak, K Winter ( $\checkmark$  Spokesperson)  
 BRUSSELS U, IIHE - P Annis, M Gruwe, C Mommaert,  
 M Van der Donckt, P Vilain, G Wilquet  
 FERRARA U & INFN, FERRARA - E Di Capua, C Luppi,  
 S Ricciardi, B Saitta  
 TOHO U - T Kawamura, M Kazuno, S Ogawa, H Shibuya  
 CERN - R Beyer, J Brunner, M de Jong, J P Fabre, R Ferreira,  
 W Flegel, R Gurin, M Litmaath, L Ludovici, D Macina,  
 R Meijer Drees, H Meinhard, E Niu, H Overas, J Panman,  
 F Riccardi, A Rozanov, D Saltzberg, G Stefanini, R Tzenov,  
 C Weinheimer, H Wong, P Zucchelli  
 HAIFA U - J Goldberg, K Hopfner  
 KINKI U - H Chikawa  
 BOGAZICI U - E Arik, I Birol, A A Mailov  
 GYEONGSANG NATIONAL U - C H Hahn, H I Jang, D C Kim,  
 I G Park, M S Park, J S Song, C S Yoon  
 AICHI U OF EDUCATION - K Kodama, N Ushida  
 KOBE U - S Aoki, T Hara  
 LOUVAIN U - G Brooijmans, D Favart, G Gregoire, J Herin,  
 V Lemaitre  
 MOSCOW, ITEP - A Artamonov, P Gorbunov, V Khovansky,  
 V Shamanov, V Smirnitsky  
 MUNSTER U - D Bonekamper, D Frekers, D Rondeshagen,  
 T Wolff  
 NAGOYA U - K Hoshino, M Kobayashi, Y Kotaka, T Kozaki,  
 M Nakamura, T Nakano, K Niu, K Niwa, Y Obayashi, O Sato,  
 T Toshito  
 NAPLES U, IFS & INFN, NAPLES - S Buontempo, A Cocco,  
 A Ereditato, G Fiorillo, F Garufi, F Marchetti-Stasi,  
 P Migliozi, V Palladino, P Strolin  
 OSAKA CITY U - K Nakamura, T Okusawa, T Yoshida  
 ROME U & INFN, ROME - A Capone, D De Pedis, S Di Liberto,  
 U Dore, P F Loverre, A Maslennikov, M A Mazzoni, F Meddi,  
 G Piredda, P Righini, R Santacesaria  
 SALERNO U & INFN, SALERNO - A di Bartolomeo, G Grella,  
 G Romano, G Rosa  
 UTSUNOMIYA U - Y Sato, I Tezuka

Accelerator CERN-SPS Detector Spectrometer, Calorimeter

Reactions

$\nu_\tau$  nucleon  $\rightarrow \tau^- X$  25 GeV ( $E_{lab}$ )

Brief description The setup consists of a target region, an aircore magnet, a high-precision calorimeter, and a muon spectrometer. Nuclear emulsion stacks form the 800-kg mass of the fiducial target volume. Decays of short-lived particles, such as the  $\tau$ , are visualized with high efficiency. Tracks are located in the emulsion with high-precision scintillating fiber trackers, and readout with optoelectronic image intensifiers coupled to CCD cameras, thus permitting computer-assisted scanning. The hexagonal aircore magnet provides the measurement of the charge-sign of low energy hadrons and muons. The high-precision calorimeter, which is based on spaghetti technology, tags the  $\tau^-$  decay by its transverse momentum imbalance. The spectrometer identifies muons and measures their momentum and charge. A second phase of data taking with new emulsion stacks is under way (July 96).

Journal papers NIM A344 (1994) 143, NIM A349 (1994) 70, IJMP C5 (1994) 835, NIM A357 (1995) 243, and NIM A367 (1995) 367.

Related experiments CERN-WA-096, FNAL-803

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WWW Home-page <http://choruswww.cern.ch/welcome.html>

### CERN-WA-096

(Proposed 1991, Approved 1991, Began data-taking Apr 1994)

#### SEARCH FOR THE OSCILLATION $\nu_\mu \leftrightarrow \nu_\tau$

##### NOMAD COLLABORATION

ANNECY - G Bassompierre, J M Gaillard, M Gouanere,  
 J P Mendiburu, L Mossuz, H Pessard, D Sillou, D Verkindt  
 CERN - D Autiero, L Camilleri, L Di Lella ( $\checkmark$  Spokesperson),  
 D Ferrere, A Geiser, J J Gomez-Cadenas, A Grant, W Huta,  
 L Linsen, P Nedelec, A Placci, B Pope, C Roda, A Rubbia,  
 P Steffen, E Tsesmelis, F Wilson  
 CALABRIA U - L La Rotonda, M Valdata  
 DORTMUND U - D Geppert, C Goessling, D Nordmann,  
 D Pollmann, B Schmidt, T Weisse, K Zuber  
 DUBNA - S Bunyatov, O Klimov, Y Nefedov, B Popov,  
 S Tereshchenko, S Valuev  
 FLORENCE U & INFN, FLORENCE - G Conforto, G Graziani,  
 E Iacopini, M Kirsanov, A Lupi, A Marchionni, F Martelli,  
 E Pennacchio, C Ricci, M Veltri  
 HARVARD U - A Bueno, T Dignan, G Feldman, P Hurst,  
 S Mishra  
 JOHNS HOPKINS U - B Blumenfeld, J Long, D M Steele  
 LAUSANNE U - K Benslama, I Bird, H Degaudenzi, C Joseph,  
 M C Nguyen, J P Perroud, G Sozzi, M Steininger, M T Tran,  
 J M Vieira, M Werlen  
 MELBOURNE U - N Hyett, G Moorhead, C Poulsen, M Sevier,  
 G Taylor, S Tovey, L Winton  
 MOSCOW, INR - S Gninenko, A Kovzelev, A Toropin, S Volkov  
 PADUA U & INFN, PADUA - M Baldo-Ceolin, F Bobisut,  
 G Collazuol, M Contalbrigo, D Gibin, A Guglielmi, S Lacaprarà,  
 M Laveder, M Mezzetto, G Miari, A Sconza, M Vascon,  
 P Zuccon  
 PARIS, CURIE UNIV VI & PARIS, UNIV VII, LPNHE -  
 P Astier, M Banner, J Dumarchez, E Gangler, A Letessier-  
 Selvon, J-M Levy, K Schamaneche, A M Touchard, F Vannucci  
 PAVIA U & INFN, PAVIA - P Cattaneo, C Conta, R Ferrari,  
 M Fraternali, A Lanza, M Livan, D Orestano, F Pastore,  
 R Petti, G Polesello, A Rimoldi, F Salvatore, V Vercesi  
 PISA U & INFN, PISA - C Angelini, V Cavasinni, T Del Prete,  
 A De Santo, V Flaminio, C Lazzeroni, G Renzoni  
 DAPNIA, SACLAY - A Baldissieri, J Bouchez, J Gosset,  
 C Hagner, X Mechain, J P Meyer, A Pluquet, P Rathouit,  
 T Stolarczyk, M Vo, H Zaccone  
 SYDNEY, ANSTO - I J Donnelly, K Varvell  
 SYDNEY U - S Boyd, L Peak, P Soler, J Ulrichs, B Yabsley  
 UCLA - A Cardini, R Cousins, T Vinogradova, F Weber  
 MASSACHUSETTS U, AMHERST - J D Hernando  
 BOŠKOVIĆ INST, ZAGREB - D Kekez, A Ljubičić, M Stipčević

## SUMMARIES OF CERN EXPERIMENTS

Accelerator CERN-SPS Detector Spectrometer

Reactions

$p \text{ nucleon} \rightarrow \nu X$  450 GeV/c  
 $\nu_\tau \text{ nucleon} \rightarrow \tau X$  —

Particles studied  $\nu$

Brief description Searches for the oscillation  $\nu_\mu \leftrightarrow \nu_\tau$  in a wide band, 10–200 GeV neutrino beam. Aims at detecting  $\nu_\tau$  charged-current interactions by observing the production of the  $\tau$  through its various decay modes by means of kinematical criteria. The detector reconstructs the event kinematics. It uses the CERN-UA-001 magnet. The target consists of 44 drift chamber planes with a total mass of 2.9 tons over a fiducial volume of  $2.6 \times 2.6 \times 4 \text{ m}^3$ . It is followed by transition radiation detectors, by additional tracking chambers and by an electromagnetic calorimeter consisting of 875 lead glass blocks and including a preshower detector. A hadronic calorimeter made of iron and scintillator is located behind the electromagnetic calorimeter outside of the magnetic field volume. A muon detector has two stations of large-area drift-tube chambers on both sides of an iron absorber. The sensitivity of the detector to  $(\Delta m)^2$  is larger than  $1 \text{ eV}^2$ . Taking data (July 96). Expected to continue data taking until the end of 1997.

Journal papers NIM A372 (1996) 556, and NIM A373 (1996) 358.

Related experiments CERN-WA-095, FNAL-803

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WWW Home-page <http://nomadinfo.cern.ch/>

### CERN-WA-102

(Proposed Sep 1994, Approved Sep 1994, Began data-taking Apr 1995, In progress)

**A SEARCH FOR CENTRALLY PRODUCED NON- $q\bar{q}$  MESONS IN PROTON PROTON INTERACTIONS AT 450 GeV/c USING THE  $\Omega$  SPECTROMETER AND GAMS-4000**

WA102 COLLABORATION

ANNECY – J P Peigneux, M Poulet  
 ATHENS U – M Spyropoulou-Stassinaki, G Vassiliadis  
 BERGEN U – K Myklebost, J M Olsen  
 BIRMINGHAM U – J N Carney, J P Davies, D Evans,  
 J B Kinson, K Norman, M Venables, O Villalobos Baillie,  
 M F Votruba  
 BRUSSELS U, IISN – F G Binon, J M Frere, J P Stroot  
 CERN – W Beusch, B R French, A Jacholkowski, A Kirk  
 (√ Spokesperson), W Klempt, P Martinengo, E Quercigh,  
 H Rotscheid, M Sene, R Sene  
 DUBNA – Y Kulchitsky, S Maljukov, I Minashvili, V Romanovsky,  
 V Roumiantsev, N Russakovich, A Semenov, A Soloviev,  
 G Tchatchidze  
 KEK – S Inaba, T Ishida, T Kinashi, T Nakagawa, H Shimizu,  
 K Takamatsu, T Tsuru, Y Yasu  
 UNIVERSITY COLL, LONDON – G Crone, M Esten  
 LOS ALAMOS – D Alde, E A Knapp, T Lopez  
 MANCHESTER U – I Duerdoth, N Lumb, S Snow, R Thompson  
 OSLO U – K Danielsen, T Jacobsen  
 SERPUKHOV – A V Dolgoplov, S V Donskov, A V Inyakin,  
 G V Khaustov, V Kolossov, A A Kondashov, A A Lednev,  
 V A Polovnikov, S A Polyakov, Y D Prokoshkin, S A Sadovsky,  
 V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky,  
 V P Sugonyaev

Accelerator CERN-SPS Detector OMEGA, GAMS-4000

Reactions

$p p \rightarrow p p X$  450 GeV/c ( $P_{lab}$ )

Particles studied mesons

Brief description Proposes to perform two 100 day runs combining the multiphoton detection of GAMS-4000 with the charged particle detection of the Omega Spectrometer to search for non- $q\bar{q}$  mesons in the reaction  $pp \rightarrow p_f X^0 p_s$  at 450 GeV/c. Here,  $p_f$  and  $p_s$  stand for the fastest and the slowest particles

in the lab system. Particular attention will be paid to the final states decaying to  $\eta\eta, \eta\eta'$  and  $\eta'\eta'$ . The physics goal is a better understanding of non-perturbative QCD. Taking data (July 96).

Related experiments CERN-WA-076, CERN-WA-091

E-mail contact andrew.kirk@cern.ch

### CERN-LHC-ATLAS

(Proposed Oct 1992, Dec 1994, Approved Jan 1996, In preparation)

**A TOROIDAL LHC APPARATUS - ATLAS**

ATLAS COLLABORATION

Accelerator CERN-LHC Detector ATLAS

Brief description ATLAS is a general purpose experiment for recording the proton-proton collisions at LHC. The detector design has been optimized to cover searches for Higgs bosons, alternative schemes of the symmetry breaking, searches for supersymmetric particles and other new particles, study of compositeness of quarks and leptons,  $CP$  violation in the  $B$  sector, measurements of the properties of the third family of quarks, and more. The apparatus includes an inner tracking detector inside a 2-tesla solenoid, electromagnetic and hadronic calorimeters outside the solenoid and in the forward regions, and barrel and endcap air-core-toroid muon spectrometers. Under construction (July 96). The collaboration consists of more than 1500 scientists, engineers, and graduate students from 148 participating institutions. For further details, please contact the Spokesperson, Dr. Peter Jenni [CERN], or the Deputy Spokesperson, Dr. Torsten Akesson [Lund U.]

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WWW Home-page <http://atlasinfo.cern.ch/Atlas/Welcome.html>

### CERN-LHC-CMS

(Proposed Oct 1992, Approved Jan 1996, In preparation)

**THE COMPACT MUON SOLENOID - CMS**

CMS COLLABORATION

Accelerator CERN-LHC Detector CMS

Brief description CMS is a general purpose detector designed to run at the highest luminosity at the LHC. It has been optimized for the search of the Standard Model Higgs boson over a mass range from 90 GeV to 1 TeV, but it also allows detection of a wide range of possible signatures from alternative electroweak symmetry breaking mechanisms. Furthermore, it is well adapted for the study of top, beauty and tau physics at lower luminosities and will cover several important aspects of the heavy ion physics program. CMS identifies and measures muons, photons and electrons with high precision. At the core of the detector sits a large superconducting solenoid generating a uniform magnetic field of 4 T. The strong magnetic field allows a compact design for the muon spectrometer without compromising the momentum resolution. The central tracker consists of silicon pixels, silicon microstrips and microstrip gas chambers. The electromagnetic calorimeter is based on Lead Tungstate crystals. Under construction (July 96). The collaboration consists of almost 1500 scientists, engineers, and graduate students from 134 participating institutions in 30 countries. For further details, please contact the Spokesperson, Dr. Michel della Negra [CERN], or the Deputy Spokesperson, Dr. Tejinder S. Virdee [Imperial Coll.]

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 tejinder.virdee@cern.ch

WWW Home-page

<http://cmsinfo.cern.ch/cmsinfo/Welcome.html>

## Other CERN Experiments

Listed here are some other CERN experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the annual report 'Experiments at CERN', which lists all the current CERN experiments and R&D projects. Find additional information at the Web site: <http://www.cern.ch/CERN/Experiments.html>

**CERN-EMU-011** (Taking data)

### STUDY OF PARTICLE PRODUCTION AND NUCLEAR FRAGMENTATION IN RELATIVISTIC HEAVY ION COLLISIONS IN NUCLEAR EMULSION

Spokesperson: P.L. Jain [SUNY, Buffalo]

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**CERN-EMU-012** (Taking data)

### PARTICLE PRODUCTION, DENSITY FLUCTUATIONS, AND BREAK UP OF DENSE NUCLEAR MATTER IN CENTRAL Pb Ag AND Pb Pb INTERACTIONS AT 60-160 A GeV

Spokesperson: I. Otterlund [Lund U.]

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**CERN-EMU-013** (Completed data-taking)

### INTERACTIONS OF 160 GeV/NUCLEON $^{207}\text{Pb}$ NUCLEI IN EMULSION CHAMBERS WITH COPPER AND LEAD TARGETS

By KLMM Collaboration

Spokesperson: W. Wolter [Cracow, INP-Exp]

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**CERN-EMU-014** (Taking data)

### STUDY OF MULTIPLICITY AND ANGULAR CHARACTERISTICS IN Pb + A INTERACTION AT 200 A GeV/c

Spokesperson: D. Ghosh [Jadavpur U.]

**CERN-EMU-015** (Taking data)

### INVESTIGATION OF CENTRAL Pb Pb INTERACTIONS AT ENERGIES OF 160 GeV/NUCLEON WITH THE HELP OF THE EMULSION MAGNETIC CHAMBER

Spokesperson: K.A. Kotelnikov [Lebedev Inst.]

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**CERN-EMU-016** (Taking data)

### ISOSPIN CORRELATIONS IN HIGH ENERGY Pb Pb INTERACTIONS

Spokesperson: Y. Takahashi [Alabama U., Huntsville]

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**CERN-EMU-017** (Completed data-taking Dec 1994)

### FRAGMENTATION OF Pb PROJECTILES AT SPS ENERGIES

Spokesperson: Wolfgang Heinrich [Siegen U.]

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**CERN-EMU-018** (Taking data)

### EXPOSURES OF CR39 STACKS TO LEAD IONS AT THE CERN-SPS

Spokesperson: G. Giacomelli [Bologna U. and INFN, Bologna]

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**CERN-EMU-019** (Taking data)

### NUCLEAR FRAGMENTATION INDUCED BY RELATIVISTIC PROJECTILES STUDIED IN THE $4\pi$ CONFIGURATION OF PLASTIC TRACK DETECTORS

Spokesperson: H.A. Khan [Pinstech, Islamabad]

**CERN-EMU-020** (Taking data)

### $\bar{p}$ -INDUCED FISSION STUDIES WITH PLASTIC TRACK DETECTORS USING $4\pi$ GEOMETRY

Spokesperson: H.A. Khan [Pinstech, Islamabad]

**CERN-NA-035** (Completed data-taking May 1992)

### STUDY OF RELATIVISTIC NUCLEUS-NUCLEUS COLLISIONS

By NA35 Collaboration

Spokesperson: Peter Seyboth [Munich, Max Planck Inst.]

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*WWW Home-page* <http://hpna49-1.cern.ch/na35.html>

**CERN-NA-038** (Completed data-taking May 1992)

### STUDY OF HIGH-ENERGY NUCLEUS-NUCLEUS INTERACTIONS WITH THE ENLARGED NA10 DIMUON SPECTROMETER

Spokesperson: Louis Kluberg [Ecole Polytechnique, LPNHE]

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*WWW Home-page* <http://www.cern.ch/NA38/>

**CERN-NA-043-2** (Taking data)

### INVESTIGATIONS OF THE COHERENT HARD PHOTON YIELDS FROM 50-300 GeV/c $e^{\pm}$ IN STRONG CRYSTALLINE FIELDS OF DIAMOND, Si, AND Ge CRYSTALS

Spokesperson: Erik Uggerhoj [Aarhus U.]

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**CERN-NA-044** (Taking data)

### A FOCUSSED SPECTROMETER FOR ONE AND TWO PARTICLES

Spokesperson: Hans Boggild [Bohr Inst.]

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*WWW Home-page* <http://p2hp2.lanl.gov/na44/na44.html>

**CERN-NA-045** (Completed data-taking Apr 1995)

### STUDY OF LOW-MASS ELECTRON PAIR PRODUCTION IN HADRON AND NUCLEAR COLLISIONS AT THE CERN SPS

By CERES Collaboration

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## SUMMARIES OF CERN EXPERIMENTS

**CERN-NA-049** (Taking data)

**LARGE ACCEPTANCE HADRON DETECTOR FOR AN INVESTIGATION OF Pb-INDUCED REACTIONS AT THE CERN SPS**

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*WWW Home-page* <http://hpna49-1.cern.ch/na49.html>

**CERN-NA-052** (Taking data)

**STRANGELET AND PARTICLE SEARCH IN Pb Pb COLLISIONS**

Spokesperson: Klaus Pretzl [Bern U.]

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*WWW Home-page* <http://www.lhep.unibe.ch/newmass/>

**CERN-NA-053** (Taking data)

**ELECTROMAGNETIC DISSOCIATION OF TARGET NUCLEI BY  $^{208}\text{Pb}$  PROJECTILES**

Spokesperson: J.C. Hill [Iowa State U.]

*E-mail contact* jhill@iastate.edu

**CERN-NA-054** (Taking data)

**DETERMINATION OF CROSS-SECTIONS OF FAST-MUON INDUCED REACTIONS TO COSMOGENIC RADIONUCLIDES**

Spokesperson: E. Nolte [Munich, Tech U.]

**CERN-NA-055** (In preparation)

**INVESTIGATION OF FAST NEUTRON PRODUCTION BY 100 TO 250 GeV MUON INTERACTION ON THIN TARGETS**

Spokesperson: N. Mascarenhas [Cal Tech]

**CERN-NA-056** (In preparation)

**MEASUREMENT OF PION AND KAON FLUXES BELOW 60 GeV/c PRODUCED BY 450 GeV/c PROTONS ON A BERYLLIUM TARGET**

By SPY Collaboration

Spokesperson: S. Ragazzi [Milan U. and INFN, Milan]

*WWW Home-page* <http://www.cern.ch/NA56/>

**CERN-PS-185-3** (In preparation)

**A MEASUREMENT OF DEPOLARIZATION AND SPIN TRANSFER IN  $\bar{p}p \rightarrow \Lambda\Lambda$**

Spokesperson:

Klaus Roehrich [Julich, Forschungszentrum] *WWW Home-page*  
<http://hpr02.physik.uni-freiburg.de/ps185/ps185.html>

**CERN-PS-189** (Completed data-taking Dec 1992)

**HIGH PRECISION MASS MEASUREMENTS WITH A RADIOFREQUENCY MASS SPECTROMETER - APPLICATION TO THE MEASUREMENT OF THE  $p$   $\bar{p}$  MASS DIFFERENCE**

Spokesperson: Catherine Thibault [Orsay, CSNSM]

*E-mail contact* catherine.thibault@cern.ch

**CERN-PS-194-3** (Taking data)

**MEASUREMENT OF STOPPING POWERS AND SINGLE IONIZATION CROSS-SECTIONS FOR ANTIPROTONS AT LOW ENERGIES**

Spokesperson: Erik Uggerhoj [Aarhus U.]

**CERN-PS-200** (Taking data)

**CAPTURE, ELECTRON COOLING, AND COMPRESSION OF ANTIPROTONS IN A LARGE PENNING TRAP AND PHYSICS EXPERIMENTS WITH AN ULTRA-LOW-ENERGY EXTRACTED ANTIPROTON BEAM**

Spokespersons: M.H. Holzscheiter, M.M. Nieto [Los Alamos]

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**CERN-PS-203** (Completed data-taking Dec 1993)

**ANTIPROTON INDUCED FISSION AND FRAGMENTATION OF NUCLEI**

Spokesperson: T. von Egidy [Munich, Tech. U.]

*E-mail contact* till.v.egidy@physik.tu-muenchen.de

**CERN-PS-205** (Taking data)

**LASER SPECTROSCOPY OF ANTIPROTONIC HELIUM ATOMS**

By PS205 Collaboration

Spokesperson: T. Yamazaki [Tokyo U., INS]

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eades@vxcern.cern.ch

*WWW Home-page* [http://www.cern.ch/LEAR\\_PS205/](http://www.cern.ch/LEAR_PS205/)

**CERN-PS-206** (Completed data-taking Sep 1993)

**MEASUREMENT OF THE  $\bar{p}p \rightarrow \bar{n}n$  CHARGE-EXCHANGE DIFFERENTIAL CROSS SECTION**  
By CCX Collaboration

Spokesperson: Franco Bradamante [Trieste U. and INFN, Trieste]

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**CERN-PS-207** (Taking data)

**PRECISION MEASUREMENT OF THE ENERGIES AND LINE SHAPES OF ANTIPROTONIC LYMAN AND BALMER TRANSITIONS FROM HYDROGEN AND HELIUM ISOTOPES**

Spokesperson: D. Gotta [Julich, Forschungszentrum]

**CERN-PS-209** (Taking data)

**NEUTRON HALO AND ANTIPROTON-NUCLEUS POTENTIAL FROM ANTIPROTONIC X-RAYS**

Spokesperson: J. Jastrzebski [Warsaw U., Heavy Ion Lab]

**CERN-PS-210** (Taking data)

**ANTIHYDROGEN PRODUCTION IN  $\bar{p}Z$  INTERACTION**

Spokesperson: W. Oelert [Julich, Forschungszentrum]

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*WWW Home-page* <http://ikpe1101.ikp.kfa-juelich.de/ps210/>

## SUMMARIES OF CERN EXPERIMENTS

CERN-PS-211 (In preparation)

### EXPERIMENTAL STUDY OF THE PHENOMENOLOGY OF SPALLATION NEUTRONS IN A LARGE LEAD BLOCK

Spokesperson: C. Rubbia [CERN]

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CERN-PS-212 (In preparation)

### LIFETIME MEASUREMENT OF $\pi^+\pi^-$ ATOMS TO TEST LOW-ENERGY QCD PREDICTIONS

Spokesperson: L. Nemenov [Dubna, JINR]

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CERN-WA-084 (Completed data-taking Sep 1991)

### STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF BEAUTY FLAVORED HADRONS

Spokesperson: Giuseppe Martellotti [Rome U. and INFN, Rome]

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CERN-WA-097 (Taking data)

### STUDY OF BARYON AND ANTIBARYON SPECTRA IN Pb Pb INTERACTIONS AT 160 GeV/c PER NUCLEON

Spokesperson: Emanuele Quercigh [CERN]

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CERN-WA-098 (Taking data)

### LARGE ACCEPTANCE MEASUREMENT OF PHOTONS AND CHARGED PARTICLES IN HEAVY ION REACTIONS

Spokesperson: Hans H. Gutbrod [Darmstadt, GSI]

*E-mail contact* gutbrod@vxwa80.cern.ch

*WWW Home-page* <http://www.cern.ch/WA98/Welcome.html>

CERN-WA-099 (Completed data-taking Apr 1995)

### MEASUREMENTS OF PAIR PRODUCTION AND ELECTRON CAPTURE FROM THE CONTINUUM IN HEAVY PARTICLE COLLISIONS

Spokesperson: S. Datz [Oak Ridge]

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CERN-WA-099-2 (Taking data)

### CHARGE CHANGING COLLISIONS, ENERGY LOSS, AND EM NUCLEAR REACTIONS OF 160 GeV A $^{208}\text{Pb}$

Spokesperson: S. Datz [Oak Ridge]

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CERN-WA-101 (Taking data)

### STUDY OF VARIOUS PROCESSES WITH A 160 GeV/c PER NUCLEON Pb BEAM

Spokesperson: Yudong He [UC, Berkeley]

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## CERN Future Plans

CERN's main project for the start of the next millennium is the LHC proton-proton collider in the 27-kilometer LEP tunnel, currently scheduled to begin experiments in 2005. Besides the LHC, the ongoing program also continues CERN's tradition of serving a wide research community. The LEP electron-positron collider, after six years of running at and around the Z resonance, has been equipped with superconducting accelerating cavities, thereby becoming LEP2, and began operating in Summer 1996 at a collision energy of 161 GeV, the threshold to produce pairs of W bosons. The collision energy of LEP2 is being further increased as additional superconducting cavities are added. The collider is scheduled to operate till the end of 1999. At the SPS proton synchrotron, flagship experiments continue with neutrino and muon beams and in the study of CP violation. In addition, the heavy ion program at the SPS serves a large range of experiments for a separate research community. While the LEAR low energy antiproton ring is being closed in 1996, a new facility is being foreseen to supply a modest level of antiprotons for experiments on 'trapped' antiparticles. The ISOLDE on-line isotope separator, served by the 1 GeV Booster synchrotron, caters to yet another group of researchers.

# SUMMARIES OF CORNELL EXPERIMENTS

## CESR Experiments

### CESR-CLEO

(Proposed 1975, Approved 1977, Began data-taking Oct 1979, In progress)

#### THE CLEO EXPERIMENT AT CESR

##### CLEO COLLABORATION

CAL TECH - B Barish, M Chadha, S Chan, G Eigen, J S Miller, C O'Grady, M Schmidtler, J Urheim, A J Weinstein, F Wuerthwein

CARLETON U - K W Edwards

COLORADO U - R Balest, B H Behrens, K Cho, W T Ford, H Park, P Rankin, J Roy, J G Smith

CORNELL U - J P Alexander, G Bebek, B E Berger, K Berkelman, K Bloom, D G Cassel, H A Cho, D M Coffman, D S Crowcroft, M Dickson, P S Drell, K M Ecklund, R Ehrlich, R Elia, A Foland, P Gaidarev, R S Galik, B Gittelman, S W Gray, D L Hartill, B K Heltsley, P Hopman, S L Jones, J Kandaswamy, P C Kim, D L Kreinick, T Lee, Y Liu, G S Ludwig, J Masui, J Mevissen, N B Mistry, C R Ng, E Nordberg, M Ogg, J R Patterson, D Peterson, D Riley, A Soffer, B Valant-Spaight, C Ward

FLORIDA U - M Athanas, P Avery, C D Jones, M Lohner, C Prescott, J Yelton

HARVARD U - G Brandenburg, R A Briere, Y Gao, D Kim, R Wilson, H Yamamoto

HAWAII U - T E Browder, F Li, Y Li, J Rodriguez

ILLINOIS U, URBANA - T Bergfeld, B I Eisenstein, J Ernst, G E Gladding, G D Gollin, R M Hans, E Johnson, M Marsh, M Palmer, M Selen, J J Thaler

MCGILL U - A Bellerive, D I Britton, R Janicek, D B MacFarlane, K W McLean, P M Patel

ITHACA COLL - A J Sadoff

KANSAS U - R Ammar, P Baringer, A Bean, D Besson, D Coppage, C Darling, R Davis, N Hancock, S Kotov, I Kravchenko, N Kwak

MINNESOTA U - S Anderson, Y Kubota, M Lattery, S Lee, J J O'Neill, S Patton, R A Poling (✓ Spokesperson), T Riehle, V Savinov, A Smith

SUNY, ALBANY - M S Alam, B Athar, Z Ling, A H Mahmood, H Severini, S Timm, F Wappler

OHIO STATE U - A Anastassov, J E Duboscq, D Fujino, K K Gan, T Hart, K Honscheid, H Kagan, R Kass, J Lee, M Spencer, M Sung, A Undrus, A Wolf, M M Zoeller

OKLAHOMA U - B Nemati, S J Richichi, W R Ross, P Skubic, M Wood

PURDUE U - M Bishai, J Fast, E Gerndt, J W Hinson, N Menon, D H Miller, E I Shibata, I P J Shipsey, M Yurko

ROCHESTER U - L Gibbons, S D Johnson, Y Kwon, S Roberts, E H Thorndike, L Tian

SLAC - C P Jessop, K Lingel, H Marsiske, M L Perl, S F Schaffner, R Schindler, D Ugolini, R Wang, X Xhou

SOUTHERN METHODIST U - T E Coan, V Fadeyev, I Korolkov, Y Maravin, I Narsky, V Shelkov, J Staack, R Stroynowski, I Volobuev, J Ye

SYRACUSE U - M Artuso, A Efimov, F Frasconi, M Gao, M Goldberg, R Greene, D He, N Horwitz, S Kopp, G C Moneti, R Mountain, Y Mukhin, S Schuh, T Skwarnicki, S Stone, G Viehauser, X Xing

UC, SAN DIEGO - D M Asner, D W Bliss, W S Brower, G Masek, H P Paar, V Sharma, M Sivertz

UC, SANTA BARBARA - J Gronberg, R Kutschke, D J Lange, S Menary, R J Morrison, H N Nelson, T K Nelson, C Qiao, J D Richman, D Roberts, A Ryd, M S Witherell, A Wu

VANDERBILT U - J Bartelt, S E Csorna, V Jain, S Marka

VIRGINIA TECH - R Godang, K Kinoshita, I C Lai, P Pomianowski, S Schrenk

WAYNE STATE U - G Bonvicini, D Cinabro, L Perera, G Sun, G J Zhou

*Accelerator* CESR *Detector* CLEO

#### Reactions

$e^+ e^- \rightarrow$ hadrons	9.0-12.0 GeV ( $E_{cm}$ )
$e^+ e^- \rightarrow e^+ e^-$	"
$e^+ e^- \rightarrow \mu^+ \mu^-$	"
$e^+ e^- \rightarrow e^+ e^-$ hadrons	"
$e^+ e^- \rightarrow \tau^+ \tau^-$	"

*Particles studied*  $\Upsilon(1S)$ ,  $\Upsilon(2S)$ ,  $\Upsilon(3S)$ ,  $\Upsilon(4S)$ ,  $B$ ,  $\tau$ ,  $D^+$ ,  $D^0$ ,  $D_s^+$ , charmed-baryon

*Brief description* Since 1979 the collaboration has conducted

studies of  $b$ ,  $c$ ,  $\tau$  and  $\gamma\gamma$  physics in  $e^+e^-$  interactions near 10 GeV. Current topics include determination of the CKM parameters and the Standard Model tests in decays of heavy flavors, as well as QCD tests in a variety of processes. Successive detector upgrades have kept pace with luminosity improvements to the Cornell Electron Storage Ring (CESR), which has delivered over  $6 \text{ fb}^{-1}$  of integrated luminosity to date. The CLEO-II detector (proposed 1983, approved 1984, operational since 1989) consists of drift chambers for tracking charged particles and measuring  $dE/dx$ , time-of-flight counters, a 7800-element CsI electromagnetic calorimeter, a 1.5 tesla superconducting solenoid, iron for flux return and muon identification, and muon chambers. A three-layer silicon vertex detector was added in the Fall of 1995. Taking data (July 96). A major upgrade, the CLEO-III detector, was proposed and approved in 1994, and the installation is planned for 1998.

*Journal papers* PRL 44 (1980) 1108, PRL 45 (1980) 219, PRL 46 (1981) 84, PRL 46 (1981) 88, PRL 46 (1981) 1181, PRL 48 (1982) 1070, PRL 49 (1982) 357, PRL 49 (1982) 610, PRL 49 (1982) 617, NIM 211 (1983) 47, PL B122 (1983) 317, PRL 50 (1983) 807, PRL 50 (1983) 877, PRL 50 (1983) 881, PRL 51 (1983) 347, PRL 51 (1983) 634, PRL 51 (1983) 1139, PRL 51 (1983) 1143, PR D27 (1983) 475, PR D27 (1983) 1665, PL B137 (1984) 277, PRL 52 (1984) 799, PRL 52 (1984) 1084, PRL 53 (1984) 24, PRL 53 (1984) 1309, PR D29 (1984) 1285, PR D30 (1984) 1433, PR D30 (1984) 1996, PR D30 (1984) 2279, PRL 54 (1985) 381, PRL 54 (1985) 1894, PRL 55 (1985) 923, PRL 55 (1985) 1248, PR D31 (1985) 2161, PR D31 (1985) 2386, PR D32 (1985) 2294, PR D32 (1985) 2468, PRL 56 (1986) 800, PRL 56 (1986) 1222, PRL 56 (1986) 1893, PRL 56 (1986) 2676, PRL 56 (1986) 2781, PR D33 (1986) 300, PR D34 (1986) 905, PR D34 (1986) 3279, PL B183 (1987) 429, PL B191 (1987) 318, PRL 58 (1987) 183, PRL 58 (1987) 307, PRL 58 (1987) 1814, PRL 59 (1987) 22, PRL 59 (1987) 407, PRL 59 (1987) 1993, PR D35 (1987) 19, PR D35 (1987) 1081, PR D35 (1987) 2747, PR D35 (1987) 3533, PR D36 (1987) 690, PR D36 (1987) 1289, PRL 60 (1988) 1614, PR D37 (1988) 1719 [erratum: PR D39 (1989) 1471], PR D38 (1988) 2679 [erratum: PR D40 (1989) 1701], PL B223 (1989) 470, PL B224 (1989) 445, PL B226 (1989) 192, PL B226 (1989) 401, PRL 62 (1989) 8, PRL 62 (1989) 863, PRL 62 (1989) 1240, PRL 62 (1989) 2233, PRL 62 (1989) 2436, PRL 63 (1989) 1667, PR D39 (1989) 3528, PR D40 (1989) 263, PR D40 (1989) 712 [erratum: PR D40 (1989) 3790], PL B243 (1990) 169, PL B251 (1990) 223, PRL 64 (1990) 16, PRL 64 (1990) 2117, PRL 64 (1990) 2226, PRL 65 (1990) 1184, PRL 65 (1990) 1531, PRL 65 (1990) 2842, PR D41 (1990) 805, PR D41 (1990) 774, PR D41 (1990) 1401, NIM A302 (1991) 261, PRL 67 (1991) 1692, PRL 67 (1991) 1696, PR D43 (1991) 651, PR D43 (1991) 1448, PR D43 (1991) 2836, PR D43 (1991) 3599, PR D44 (1991) 593, PR D44 (1991) 3383, PR D44 (1991) 3394, NIM A320 (1992) 66, PL B283 (1992) 161, PL B291 (1992) 488, PL B294 (1992) 139, PRL 68 (1992) 1275, PRL 68 (1992) 1279, PRL 69 (1992) 2041, PRL 69 (1992) 2046, PRL 69 (1992) 3278, PRL 69 (1992) 3610 [erratum: PRL 71 (1993) 3395], PR D45 (1992) 1, PR D45 (1992) 21, PR D45 (1992) 752, PR D45 (1992) 2212, PR D45 (1992) 3965, PR D45 (1992) 3976, PR D46 (1992) 4822, MPL A8 (1993) 869, PL B303 (1993) 377, PL B317 (1993) 647, PL B319 (1993) 365, PRL 70 (1993) 138, PRL 70 (1993) 1207, PRL 70 (1993) 2681, PRL 70 (1993) 3700, PRL 71 (1993) 674, PRL 71 (1993) 1311, PRL 71 (1993) 1680, PRL 71 (1993) 1791, PRL 71 (1993) 1973, PRL 71 (1993) 2391, PRL 71 (1993) 3070, PRL 71 (1993) 3255, PRL 71 (1993) 3259, PRL 71 (1993) 3922, PRL 71 (1993) 4111, PR D47 (1993) 791, PR D47 (1993) 3671, PR D48 (1993) 4007, NIM A345 (1994) 219, NIM A351 (1994) 19, NIM A351 (1994) 43, PL B323 (1994) 429, PL B324 (1994) 255, PL B325 (1994) 257, PL B331 (1994) 236 [erratum: PL B342 (1995) 453], PL B337 (1994) 405, PL B340 (1994) 129, PL B340 (1994) 194, PRL 72 (1994) 1406, PRL 72 (1994)

## SUMMARIES OF CORNELL EXPERIMENTS

1972, PRL 72 (1994) 2328, PRL 72 (1994) 3762, PRL 73 (1994) 934, PRL 73 (1994) 1079, PRL 73 (1994) 1472, PRL 73 (1994) 1890, PRL 73 (1994) 3503 [erratum: PRL 74 (1995) 3090], PR D49 (1994) 40, PR D49 (1994) 5690, PR D49 (1994) 5701, PR D50 (1994) 43, PR D50 (1994) 1884, PR D50 (1994) 3027, PR D50 (1994) 4265, PR D50 (1994) 5484, NIM A368 (1995) 68, PL B341 (1995) 435 [erratum: PL B347 (1995) 469], PL B350 (1995) 256, PL B356 (1995) 580, PRL 74 (1995) 2885, PRL 74 (1995) 3113 [erratum: PRL 75 (1995) 4155], PRL 74 (1995) 3331, PRL 74 (1995) 3534, PRL 75 (1995) 624, PRL 75 (1995) 785, PRL 75 (1995) 3232, PRL 75 (1995) 3804, PRL 75 (1995) 3809, PRL 75 (1995) 4364, PR D51 (1995) 1014, PR D51 (1995) 2053, PR D52 (1995) 2656, PR D52 (1995) 2661, PR D52 (1995) 4860, PL B365 (1996) 431, PL B369 (1996) 186, PL B373 (1996) 261, PL B373 (1996) 334, PRL 76 (1996) 1570, PRL 76 (1996) 2637, PRL 76 (1996) 3065, PRL 76 (1996) 3898, PRL 76 (1996) 4119, PR D53 (1996) 1013, PR D53 (1996) 1039, PR D53 (1996) 4734, PR D53 (1996) 6033, and PR D53 (1996) 6037.

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## CESR Future Plans

The Cornell Electron Storage Ring (CESR) is currently delivering peak luminosities of  $4 \times 10^{32} \text{ cm}^{-2}\text{s}^{-1}$ . In 1998, operations will shut down for detector and machine upgrades that will enable the machine to deliver peak luminosities in excess of  $1.5 \times 10^{33} \text{ cm}^{-2}\text{s}^{-1}$ . The detector modifications will include new tracking devices and a high performance fast RICH detector with  $\pi/K$  separation out to the kinematic limit for  $B$  meson daughters. When CESR starts running again in late 1998, the physics focus of the upgrade will be rare  $B$  decays and  $CP$  violation. R&D is currently underway to further increase the luminosity of the storage ring to  $10^{34} \text{ cm}^{-2}\text{s}^{-1}$ , and the CESR/CLEO plans promise a rich physics program well into the next century.



## SUMMARIES OF DESY EXPERIMENTS

### DESY Experiments

#### DESY-DORIS-ARGUS

(Proposed 1978, Approved 1979, Began data-taking Sep 1982, Completed data-taking Oct 1992)

#### ARGUS — A NEW DETECTOR FOR DORIS

##### ARGUS COLLABORATION

DESY — H Albrecht, T Hamacher, R P Hofmann, T Kirchhoff, R Mankel, A Nau, S Nowak, D Rensing, H Schroeder (✓ Spokesperson), H D Schulz, M Walter, R Wurth  
 DORTMUND U — C Hast, H Kapitza, H Kolanoski, A Kosche, A Lange, A Lindner, M Schieber, T Siegmund, H Thurn, D Toepfer, D Wegener  
 DRESDEN, TECH U — C Frankl, M Schmidtler, M Schramm, K R Schubert, R Schwierz, B Spaan, R Waldi  
 ERLANGEN U — K Reim, H Wegener  
 HAMBURG U — R Eckmann, H Kuipers, O Mai, R Mundt, T Oest, R Reiner, W Schmidt-Parzefall  
 HEIDELBERG U, IHEP — J Stiewe, S Werner  
 HEIDELBERG, MAX PLANCK INST — K Ehret, W Hofmann, A Huepper, K T Knoepfle, J Spengler  
 IPP, CANADA & MCGILL U & TORONTO U — P Krieger, D B MacFarlane, J D Prentice, P R B Saull, K Tzamariudaki, R Van de Water, T S Yoon  
 KARLSRUHE U — M Schneider, S Weseler  
 STEFAN INST, LJUBLJANA & LJUBLJANA U — M Bracko, G Kernel, P Krizan, E Kriznic, G Medin, T Podobnik, T Zivko  
 MOSCOW, ITEP — V Balagura, S Barsuk, I Belyaev, R Chistov, M Danilov, V Eiges, E Gershtein, Y Gershtein, A Golutvin, O Igonkina, I Korolko, G Kostina, D Litvintsev, P Pakhlov, S Semenov, A Snizhko, I Tikhomirov, Y Zaitsev

Accelerator DESY-DORIS-III Detector ARGUS

##### Reactions

$e^+ e^-$	9.3–10.6 GeV ( $E_{cm}$ )
$e^+ e^- \rightarrow \text{charm X}$	"
$e^+ e^- \rightarrow \text{bottom X}$	"
$e^+ e^- \rightarrow \Upsilon(\text{unspec})$	"
$e^+ e^- \rightarrow \text{hvy-lepton X}$	"
$e^+ e^- \rightarrow e^+ e^- \gamma \gamma$	"

Particles studied charm, bottom,  $\Upsilon(\text{unspec})$ , hvy-lepton,  $\nu_\tau$

Brief description Studies  $b$ - and  $c$ -quark physics, the  $\tau$  lepton and its neutrino,  $\Upsilon$  spectroscopy, two-photon physics, fragmentation of quarks and gluons, and searches for new particles. The detector consists of a silicon strip detector and a microvertex drift chamber surrounding the beam pipe, a tracking chamber, shower and TOF counters, solenoid coils, and a large iron yoke. Upgraded in 1990/91. Data analysis in progress (July 96).

Journal papers NIM 163 (1979) 77, NIM 195 (1982) 475, NIM 205 (1983) 125, NIM 216 (1983) 35, NIM 217 (1983) 153, PL B134 (1984) 137, PL B135 (1984) 498, PL B146 (1984) 111, NIM A235 (1985) 26, NIM A237 (1985) 464, PL B150 (1985) 235, PL B153 (1985) 343, PL B154 (1985) 452, PL B156 (1985) 134, ZPHY C28 (1985) 45, PL B157 (1985) 326, PL B158 (1985) 525, PL B160 (1985) 331, PL B162 (1985) 395, PL B163 (1985) 404, ZPHY C29 (1985) 167, NIM A249 (1986) 277, NIM A252 (1986) 384, PTE 2 (1986) 66, PRL 56 (1986) 549, PL B167 (1986) 360, ZPHY C31 (1986) 181, PL B179 (1986) 398, PL B179 (1986) 403, PL B182 (1986) 95, ZPHY C33 (1986) 7, ZPHY C33 (1987) 359, PL B185 (1987) 218, PL B185 (1987) 223, PL B185 (1987) 228, PL B187 (1987) 425, PL B192 (1987) 245, PL B195 (1987) 102, PL B195 (1987) 307, PL B196 (1987) 101, PL B197 (1987) 452, PL B198 (1987) 255, PL B198 (1987) 577, ZPHY C35 (1987) 283, PL B199 (1987) 291, PL B199 (1987) 447, PL B199 (1987) 451, PL B199 (1987) 457, PL B199 (1987) 580, PL B202 (1988) 149, ZPHY C39 (1988) 177, PL B207 (1988) 109, PL B207 (1988) 349, PL B209 (1988) 119, PL B209 (1988) 380, PL B210 (1988) 258, PL B210 (1988) 263, PL B210 (1988) 267, PL B210 (1988) 273, PL B211 (1988) 489, PL B212 (1988) 528, PL B215 (1988) 424, PL B215 (1988) 429, ZPHY C41 (1988) 1, ZPHY C41 (1988) 405, NIM A274 (1989) 189, NIM A275 (1989) 1, NIM A283 (1989) 544, NAT WISS 76 (1989) 52, ZPHY C41 (1989) 557, PL B217 (1989) 205, PL B219 (1989) 121, PL

B221 (1989) 422, ZPHY C42 (1989) 349, ZPHY C42 (1989) 519, ZPHY C42 (1989) 543, ZPHY C43 (1989) 45, ZPHY C43 (1989) 181, ZPHY C44 (1989) 547, PL B229 (1989) 175, PL B229 (1989) 304, PL B230 (1989) 162, PL B230 (1989) 169, PL B231 (1989) 208, PL B232 (1989) 398, PL B232 (1989) 554, MPL A5 (1990) 73, ZPHY A335 (1990) 231, ZPHY C46 (1990) 9, ZPHY C46 (1990) 15, ZPHY C48 (1990) 183, ZPHY C48 (1990) 543, PL B234 (1990) 409, PL B236 (1990) 102, PL B241 (1990) 278, PL B245 (1990) 315, PL B246 (1990) 278, PL B247 (1990) 121, PL B249 (1990) 359, PL B250 (1990) 164, PL B254 (1991) 288, PL B255 (1991) 297, PL B255 (1991) 634, PL B260 (1991) 259, PL B262 (1991) 148, PL B267 (1991) 535, PL B269 (1991) 234, ZPHY C49 (1991) 349, ZPHY C50 (1991) 1, ZPHY C52 (1991) 353, PL B274 (1992) 239, PL B275 (1992) 195, PL B277 (1992) 209, PL B278 (1992) 202, PL B288 (1992) 367, PL B292 (1992) 221, PL B297 (1992) 425, ZPHY C53 (1992) 361, ZPHY C53 (1992) 367, ZPHY C54 (1992) 1, ZPHY C54 (1992) 13, ZPHY C55 (1992) 25, ZPHY C55 (1992) 179, ZPHY C55 (1992) 357, ZPHY C56 (1992) 1, ZPHY C56 (1992) 7, ZPHY C56 (1992) 339, MPL A8 (1993) 573, PL B303 (1993) 368, PL B308 (1993) 435, PL B316 (1993) 608, PL B317 (1993) 227, PL B318 (1993) 397, ZPHY C57 (1993) 533, ZPHY C58 (1993) 61, ZPHY C58 (1993) 191, ZPHY C58 (1993) 199, ZPHY C60 (1993) 11, NIM A348 (1994) 465, PL B324 (1994) 249, PL B326 (1994) 320, PL B332 (1994) 451, PL B335 (1994) 526, PL B337 (1994) 383, PL B338 (1994) 390, PL B340 (1994) 125, PL B340 (1994) 217, ZPHY C61 (1994) 1, ZPHY C62 (1994) 371, ZPHY C64 (1994) 375, PL B341 (1995) 441, PL B342 (1995) 397, PL B349 (1995) 576, PL B353 (1995) 554, ZPHY C65 (1995) 619, ZPHY C66 (1995) 63, ZPHY C68 (1995) 25, ZPHY C68 (1995) 215, NIM A373 (1996) 387, PL B374 (1996) 249, PL B374 (1996) 256, PL B374 (1996) 265, and ZPHY C69 (1996) 405.

Related experiments CESR-CLEO-II

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#### DESY-HERA-HERMES

(Proposed Jan 1990, Approved Oct 1992, Began data-taking 1995, In progress)

#### MEASUREMENT OF SPIN DEPENDENT STRUCTURE FUNCTIONS OF NUCLEONS

##### HERMES COLLABORATION

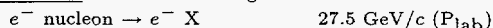
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Accelerator DESY-HERA Detector Spectrometer

Reactions Polarized target



Particles studied  $p, n$

Brief description This is an internal target experiment in the HERA electron storage ring. It measures both inclusive and semi-inclusive spin dependent deep inelastic scattering from the proton and neutron, and tests the fundamental Bjorken sum rule. Employs polarized internal gas targets of hydrogen, deuterium, and  $^3\text{He}$ . Internal targets have the advantage of being pure atomic species with no dilution factor. The angles and the energies of scattered particles are determined by a magnetic spectrometer. Taking date (July 96).

Journal papers NIM A (in press).

Related experiments CERN-NA-047, SLAC-E-142, SLAC-E-143, SLAC-E-154

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WWW Home-page <http://dxhra1.desy.de/>

### DESY-HERA-H1

(Proposed Jun 1985, Approved Jul 1986, Began data-taking May 1992, In progress)

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## SUMMARIES OF DESY EXPERIMENTS

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ZURICH, ETH - R A Eichler (✓ Spokesperson), C Grab,  
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*Accelerator* DESY-HERA *Detector* H1

### Reactions

$e^- p$  —

*Brief description* Measures energy and direction of electrons, photons, and particle jets. Identifies leptons by the shower shape and neutrinos by precise missing energy measurements. The detector consists of a large superconducting solenoid with tracking chambers and a liquid argon calorimeter inside. An additional iron absorber instrumented with streamer tubes is outside the solenoidal coil. In 1995, the backward (electron) direction EM calorimeter was replaced by a SpaCal-type electromagnetic + hadronic calorimeter, and Roman pots were added in the forward (proton) direction to measure elastically scattered protons. In 1996, silicon vertex detectors were added in the barrel (CST) and backward (BST) directions, and a SpaCal-type neutron counter installed in the forward direction. Taking data (July 96).

*Journal papers* NIM A240 (1985) 63, NIM A253 (1987) 467, NIM A257 (1987) 479, NIM A265 (1988) 419, NIM A269 (1988) 560, NIM A270 (1988) 334, IEEE TNS 36 (1989) 331, NIM A275 (1989) 197, NIM A275 (1989) 246, NIM A277 (1989) 368, NIM A279 (1989) 57, NIM A279 (1989) 217, NIM A283 (1989) 375, NIM A283 (1989) 467, NIM A283 (1989) 471, NIM A283 (1989) 487, NIM A283 (1989) 537, NIM A283 (1989) 622, NP (PROC SUPPL) 16 (1989) 518, NIM A289 (1990) 446, NIM A302 (1991) 277, NIM A310 (1991) 535, NIM A312 (1992) 457, NIM A323 (1992) 184, NIM A323 (1992) 401, NIM A323 (1992) 532, NIM A323 (1992) 537, NIM A336 (1993) 460, NIM A336 (1993) 499, PL B297 (1992) 205, NIM A336 (1993) 460, NIM A336 (1993) 499, PL B298 (1993) 469, PL B299 (1993) 374, PL B299 (1993) 385, PL B314 (1993) 436, NP B396 (1993) 3, NP B407 (1993) 515, NIM A344 (1994) 492, NIM A350 (1994) 57, PL B321 (1994) 161, PL B324 (1994) 241, PL B328 (1994) 176, PL B338 (1994) 507, PL B340 (1994) 205, APP B25 (1994) 319, APP B25 (1994) 1883, NC 107A (1994) 2109, NC 107A (1994) 2345, ZPHY C61 (1994) 59, ZPHY C63 (1994) 377, ZPHY C64 (1994) 545, NP B429 (1994) 477, PL B346 (1995) 415, PL B348 (1995) 681, PL B353 (1995) 578, PL B354 (1995) 494, PL B356 (1995) 118, PL B358 (1995) 412, ZPHY C66 (1995) 529, ZPHY C67 (1995) 565, ZPHY C69 (1995) 27, NP B435 (1995) 3, NP B439 (1995) 471, NP B445 (1995) 3, NP B445 (1995) 195, NP B449 (1995) 3, NIM A372 (1996) 188, NIM A372 (1996) 399, NIM A374 (1996) 149, PL B369 (1996) 173, PL B279 (1996) 319, ZPHY C70 (1996) 17, ZPHY C70 (1996) 609, NP B463 (1996) 3, NP B468 (1996) 3, and NP B470 (1996) 3.

*Related experiments* DESY-HERA-ZEUS

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### DESY-HERA-ZEUS

(Proposed Jun 1985, Mar 1986, Approved Nov 1986, Began data-taking May 1992, In progress)

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MCGILL U - F Corriveau, D S Hanna, J Hartmann, L W Hung,  
J N Lim, C Matthews, P M Patel, M Riveline, M St Laurent,  
D G Stairs, R Ullmann, G Zacek  
MEIJI GAKUIN U - T Tsurugai  
MOSCOW PHYS ENG INST - V Bashkirov, B A Dolgoshein,  
A Stifutkin  
MOSCOW STATE U - G L Bashindzhagian, P F Ermolov,  
L K Gladiilin, Y A Golubkov, V D Kobrin, I A Korzhavina,  
V A Kuzmin, O Y Lukina, A S Proskuryakov, A A Savin,  
L M Shcheglova, A N Solomin, N P Zotov  
NIKHEF, AMSTERDAM & AMSTERDAM U - M Botje,  
F Chlebana, M de Kamps, E de Wolf, J Engelen, P Kooijman,  
A Kruse, H Tiecke, A Van Sighem, R van Woudenberg,  
W Verkerke, J Vosseveld, M Vreeswijk, L Wiggers  
OHIO STATE U - D Acosta, B Bylsma, L S Durkin, J Gilmore,  
C Li, T Y Ling, P Nylander, I H Park, T A Romanowski  
OXFORD U - D Bailey, R J Cashmore, A M Cooper-Sarkar,  
R C E Devenish, N Harnew, M Lancaster, L Lindemann,  
J McFall, C Nath, V A Noyes, A Quadt, J R Tickner,  
H Uijterwaal, R Walczak, D S Waters, F F Wilson, T Yip  
PADUA U & INFN, PADUA - A Bertolin, R Brugnera,  
R Carlin, F Dal Corso, M De Giorgi, U Dosselli, S Limentani,  
M Morandin, M Posocco, L Stanco, R Stroili, C Voci, F Zuin  
PENN STATE U - J Bulmahn, R G Feild, B Y Oh, J Whitmore  
ROME U & INFN, ROME - G D'Agostini, G Marini, A Nigro  
RUTHERFORD - J C Hart, N A McCubbin, T P Shah

## SUMMARIES OF DESY EXPERIMENTS

UC, SANTA CRUZ - E Barberis, T Dubbs, C Heusch, W Lockman, J T Rahn, H F Sadrozinski, A Seiden, M Van Hook, D C Williams  
 SIEGEN U - J Biltzinger, O Schwarzer, R J Seifert, A H Walenta  
 TEL AVIV U - H Abramowicz, G Briskin, S Dagan, A Levy  
 TOKYO U, INS - J I Fleck, M Inuzuka, T Ishii, M Kuze, S Mine, M Nakao, I Suzuki, K Tokushuku, K Umemori, S Yamada, Y Yamazaki  
 TOKYO METROPOLITAN U - M Chiba, R Hamatsu, T Hirose, K Homma, S Kitamura, T Matsushita, K Yamauchi  
 TURIN U & INFN, TURIN - R Cirio, M Costa, M I Ferrero, S Maselli, C Peroni, R Sacchi, A Solano, A Staiano  
 TURIN U, ALESSANDRIA & INFN, TURIN - M Dardo  
 TORONTO U - D C Bailey, F Benard, M Brkic, C P Fagerstrom, G F Hartner, K K Joo, G M Levman, J F Martin, R S Orr, S Polenz, C R Sampson, D Simmons, R J Teuscher  
 UNIVERSITY COLL, LONDON - J M Butterworth, C D Catterall, T W Jones, P B Kaziewicz, J B Lane, R L Saunders, J Shulman, M R Sutton  
 VIRGINIA TECH - B Lu, L W Mo  
 WARSAW U, IEP - W Bogusz, J Ciborowski, J Gajewski, G Grzelak, M Kasprzak, M Krzyzanowski, K Muchorowski, R J Nowak, J M Pawlak, T Tymieniecka, A K Wroblewski, J A Zakrzewski, A F Zarnecki  
 WARSAW, INST NUCL STUDIES - M Adamus  
 WEIZMANN INST - C Oldewey, Y Eisenberg, D Hochman, U Karshon, D Revel, D Zer-Zion  
 WISCONSIN U - W F Badgett, J Breitweg, D Chapin, R Cross, S Dasu, C Foudas, R J Loveless, S Mattingly, D D Reeder, S Silverstein, W H Smith, A Vaiculis, M Wodarczyk  
 YORK U, CANADA - S Bhadra, M L Cardy, W R Frisken, M Khakzad, W N Murray, W B Schmidke

Accelerator DESY-HERA Detector ZEUS

### Reactions

$e^- p$  300 GeV ( $E_{cm}$ )  
 $e^+ p$  "

Particles studied leptons,  $p$ ,  $K^0$ ,  $\Lambda$ , strange,  $\rho^0$ ,  $\omega$ ,  $\phi$ ,  $J/\psi(1S)$ , vmeson, charm

Brief description Measures neutral and charged current processes in electron-proton and positron-proton interactions (27.5 GeV on 820 GeV) and searches for new interactions and new particles. The detector emphasis is on accurate identification and measurement of jets and leptons. The main detector components are a high-resolution compensating uranium-scintillator calorimeter and a central tracking detector surrounded by a superconducting coil. An instrumented iron absorber catches the tail of hadronic showers and identifies muons. A large fraction of the solid angle is further covered by muon detectors. Bending magnets of the machine are used as spectrometers for forward scattered protons. Additional calorimeters measure forward neutron production and tag electrons and positrons scattered with small transverse momentum. Taking data (July 96).

Journal papers IEEE TNS 36 (1989) 465, NIM A274 (1989) 134, NIM A289 (1990) 115, NIM A290 (1990) 95, NIM A292 (1990) 259, NIM A300 (1991) 480, NIM A306 (1991) 485, NIM A309 (1991) 101, NIM A313 (1992) 126, NIM A321 (1992) 356, PL B297 (1992) 404, PL B293 (1992) 465, NIM A333 (1993) 342, NIM A336 (1993) 23, PL B303 (1993) 183, PL B306 (1993) 158, PL B306 (1993) 173, PL B315 (1993) 481, PL B316 (1993) 207, PL B316 (1993) 412, ZPHY C59 (1993) 231, NIM A338 (1994) 254, NIM A342 (1994) 260, PL B322 (1994) 287, PL B332 (1994) 228, PL B338 (1994) 483, NC 107A (1994) 2123, ZPHY C63 (1994) 391, PL B342 (1995) 417, PL B345 (1995) 576, PL B346 (1995) 399, PL B348 (1995) 665, PL B349 (1995) 225, PL B350 (1995) 120, PL B354 (1995) 163, PL B356 (1995) 129, PL B356 (1995) 601, PL B363 (1995) 201, PRL 75 (1995) 1006, ZPHY C65 (1995) 379, ZPHY C65 (1995) 627, ZPHY C67 (1995) 81, ZPHY C67 (1995) 93, ZPHY C67 (1995) 227, ZPHY C68 (1995) 29, ZPHY C68 (1995) 113, ZPHY C68 (1995) 569, ZPHY C69 (1995) 39, PL B369 (1996) 55, ZPHY C69 (1996) 607, ZPHY C70 (1996) 1, and ZPHY C70 (1996) 391.

Related experiments DESY-HERA-H1

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WWW Home-page <http://zow00.desy.de:8000/>

## DESY-HERA-B

(Proposed May 1994, Approved Jun 1994, Feb 1995, In preparation)

AN EXPERIMENT TO STUDY  $CP$  VIOLATION IN THE  $B$  SYSTEM USING AN INTERNAL TARGET AT THE HERA PROTON RING

HERA-B COLLABORATION

Accelerator DESY-HERA Detector Spectrometer

Brief description The main goal is to measure the violation of  $CP$  symmetry in the decay channel  $B \rightarrow K_S^0 J/\psi$ . Uses the 820 GeV HERA proton ring and an internal fixed target. The target consists of a set of movable wires which act like collimators in the halo of the proton beam. The detector provides a good  $B$  decay vertex resolution, lepton and kaon identification, and multiple events reconstruction per bunch crossing. A 2 m long vertex detector consists of layers of double-sided silicon with perpendicular orientation to the beam. It is followed by tracking chambers inside the spectrometer magnet which provides a field integral of 2.2 Tm, by RICH and TRD counters for particle identification, and by the electromagnetic calorimeter and the muon system. The collaboration consists of about 240 physicists from thirteen countries and more than 30 institutions. Expected to begin data taking in June 1998. For more information, please contact the Spokesperson, Dr. Andreas Schwarz [DESY].

Related experiments CERN-WA-089, FNAL-771, FNAL-789

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WWW Home-page <http://www-hera-b.desy.de/>

## DESY Future Plans

The HERA accelerator experiments remain in the focus of particle physics research at DESY in the coming years. H1 and ZEUS, the two collision experiments using the 27-GeV electron/positron beam and 820-GeV proton beam will continue to study the proton structure functions at very low  $x$ , test the QCD and electroweak interactions and search for new phenomena. HERMES, which uses a longitudinally polarized electron/positron beam and a polarized nucleon gas target, will keep investigating the origin of the nucleon spin. The second beam-target experiment, HERA-B, which is scheduled to begin the study of  $CP$  violation in the  $B$  meson system in 1998, will use the proton beam and an internal aluminum wire target. In machine physics, the efforts are focused on the Next Accelerator project, an electron-positron linear collider at 500 GeV c.m. International collaborations based at DESY are studying two possible paths: One is the S-Band Linear Collider (SBLC) which uses normally-conducting copper resonators operating in the frequency region of 3 GHz, and the other is the TeV-Energy Superconducting Linear Accelerator (TESLA) with superconducting accelerating structures operating in the frequency region of 1.3 GHz. TESLA is the only linear collider project worldwide which uses the integrated X-ray lasers. Test facilities for both projects are under construction at DESY.

# SUMMARIES OF FERMILAB EXPERIMENTS

## Selected FNAL Experiments

### FNAL-665

(Proposed Oct 1980, Approved Jul 1981, Jan 1989, Began data-taking 1987, Completed data-taking Jan 1992)

#### MUON SCATTERING WITH HADRON DETECTION AT THE TEVATRON

FREIBURG U - T Dreyer, M Erdmann, J Haas, M Lenski, W Mohr, G Seigert, H E Stier, M O Wilhelm  
 ARGONNE - D F Geesaman, R Gilman, M C Green, H E Jackson, S Kaufman, E R Kinney, T B W Kirk, D H Potterveld, S Tentindo-Repond, H J Trost, A Zghiche  
 UC, SAN DIEGO - R D Kennedy, H G E Kobrak, P Madden, J R Ostrick, A Salvarani, R A Swanson  
 FERMILAB - B R Baller, G B Coutrakon, J E Hanlon, S Krzywdzinski, H Melanson, H E Montgomery, J G Morfin, C Salgado, S A Wolbers  
 HARVARD U - J M Conrad, G Y Fang, A V Kotwal, D G Michael, R B Nickerson, F M Pipkin, M H Schmitt, R Wilson  
 ILLINOIS U, CHICAGO - M R Adams, D A Averill, T J Carroll, R S Guo, C Halliwell, D E Jaffe, S R Magill, D W Mcleod, T McKibben  
 CRACOW - A Eskreys, J Figiel, P Malecki, K Olkiewicz, B Pawlik, P Stopa  
 CRACOW, INST PHYS NUCL TECH - K Dziunikowska  
 LIVERMORE - P L Anthony, F S Dietrich  
 MARYLAND U - S Aid, S Kunori, S C O'Day, E J Ramberg, A Skuja, G A Snow, P H Steinberg, R Talaga  
 MIT - M Baker, W Busza, L S Osborne, J J Ryan  
 MUNICH, MAX PLANCK INST - M Aderholz, F Botterveck, I Derado, V Eckardt, H J Gebauer, D Hantke, G Jancso, K Kadija, N Koschorz, A S Manz, P Mooshofer, N Schmitz, H J Seyerlein, S Soldner-Rembold, M Vidal, W Wittek  
 NORTHWESTERN U - H M Schellman ( $\checkmark$  Spokesperson), P Spentzouris  
 OHIO U - H L Clark, R W Finlay, K H Hicks  
 PENN U - A Banerjee, K Griffioen  
 WASHINGTON U, SEATTLE - A A Bhatti, U Bratzler, R Davisson, W M Dougherty, D M Jansen, Z Jin, J J Lord, H J Lubatti, M J Mitchell, R S Perry, B Venema, R J Wilkes, T C Zhao  
 WUPPERTAL U - H M Braun, H Breidung, U Ecker, R Otten, A Roeser  
 YALE U - S K Dhawan, V W Hughes, V Papavassiliou, K P Schueler, H Venkataramania

Accelerator FNAL-TEV Detector CCM

<u>Reactions</u>	Polarized beam	
muon $e^- \rightarrow$ muon $e^-$		< 750 GeV/c
muon $p \rightarrow$ muon hadrons		"
muon $p \rightarrow$ muon $\rho$ X		"
muon $p \rightarrow$ muon $\phi$ X		"
muon deut $\rightarrow$ muon hadrons		"
muon deut $\rightarrow$ muon $\rho$ X		"
muon deut $\rightarrow$ muon $\phi$ X		"
muon nucleus $\rightarrow$ muon hadrons		"
nucleus		"
muon nucleus $\rightarrow$ muon hadrons $n$		"
muon nucleus $\rightarrow$ muon $\rho$ X		"
muon nucleus $\rightarrow$ muon $\phi$ X		"

Brief description Studies (1) the properties of hadron systems recoiling from deep inelastic muon collisions, (2) the nucleon structure functions, and (3) exclusive vector meson production. Uses the superconducting vertex magnet from CERN. The first run was completed in 1988, the second run, with a number of different targets ( $H_2$ ,  $D_2$ , C, Ca, Xe, and Pb) and an upgrade of the vertex spectrometer tracking system, in 1990/91. Data analysis in progress (July 96).

Journal papers IEEE TNS 33 (1986) 205, NIM A291 (1990) 533, PL B272 (1991) 163, PL B287 (1992) 375, PRL 68 (1992) 3266, PRL 69 (1992) 1026, PL B308 (1993) 418, PL B309 (1993) 477, PR D48 (1993) 5057, PRL 72 (1994) 466, PL B335 (1994) 535,

ZPHY C61 (1994) 179, ZPHY C61 (1994) 539, PR D50 (1994) 1836, PRL 74 (1995) 1525, PRL 74 (1995) 5198, PRL 75 (1995) 1466, ZPHY C65 (1995) 225, ZPHY C67 (1995) 403, ZPHY C71 (1996) 391, and PR D54 (1996) (in print).

Related experiments FNAL-098

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WWW Home-page <http://fnmux4.fnal.gov/>

### FNAL-672A

(Proposed Feb 1981, Approved Jul 1981, Began data-taking 1987, Completed data-taking Jan 1992)

#### A STUDY OF HADRONIC FINAL STATES PRODUCED IN ASSOCIATION WITH HIGH-MASS DIMUONS

FERMILAB - J C Krider  
 ILLINOIS U, CHICAGO - H S Goldberg, R L Jesik, H Mendez, J Solomon, F Vaca  
 INDIANA U - R R Crittenden, A R Dzierba, A M Gribushin, S Kartik, J Li, R Li, T R Marshall, H J Martin, P T Smith, T Sulanke, A Zieminski ( $\checkmark$  Spokesperson)  
 LOUISVILLE U - C L R Davis  
 MICHIGAN U, FLINT - L J Dauwe  
 SERPUKHOV - V V Abramov, Y M Antipov, B Baldin, S P Denisov, A Dyshkant, V Glebov, Y Gorin, V I Koreshev, A Krinitsyn, A A Petrukhin, V Podstavkov, V I Sirotenko, R Sulayev

Accelerator FNAL-TEV Detector Spectrometer

#### Reactions

$p$ nucleus $\rightarrow \mu^+ \mu^- X$	500, 800 GeV/c
$\pi^-$ nucleus $\rightarrow \mu^+ \mu^- X$	500 GeV/c

Particles studied  $J/\psi(1S)$ ,  $\psi(2S)$ ,  $\chi_{c1}(1P)$ ,  $\chi_{c2}(1P)$ ,  $\rho$ ,  $\omega$ ,  $\phi$ , bottom

Brief description Studies particles produced in association with vector mesons (including  $J/\psi$ ) and high mass dimuons. Ran with H, Be and Cu targets. Collected approximately 2M fully linked dimuon events (over 30K  $\psi$ 's) with different beams. Uses E672/E706 spectrometer. Data analysis in progress (May 96).

Journal papers NIM A270 (1988) 99, PR D41 (1990) 1, PRL 74 (1995) 495, and PR D53 (1996) 4723.

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### FNAL-687

(Proposed Jan 1981, Approved Dec 1983, Began data-taking 1987, Completed data-taking Jan 1992)

#### HIGH-ENERGY PHOTOPRODUCTION OF STATES CONTAINING HEAVY QUARKS AND OTHER RARE PHENOMENA

##### E687 COLLABORATION

BOLOGNA U - V Giordano, G Molinari  
 COLORADO U - C W Bogart, H W K Cheung, P Coteus, S W Culy, J P Cumalat ( $\checkmark$  Spokesperson), C J Dallapiccola, D P Edmonds, J Ginkel, V Greene, G Introzzi, W E Johns, R L Ladbury, M Nehring, G E Schultz  
 FERMILAB - M E Binkley, J N Butler ( $\checkmark$  Spokesperson), S Cihangir, I Gaines, P H Garbincius, L Garren, M F Gormley, S A Gourlay, D J Harding, P H Kasper, A E Kreymer, P L G Lebrun, J Peoples, Jr., S Shukla, J T Volk  
 FRASCATI - S Bianco, S Camponeschi, F Celani, G Digiovanni, M Enorini, F Fabbri, G Ferretti, M Giardoni, G Graudo, A Maccari, L Passamonti, D Riordinio, G Rivellini, V Russo, S Sarwar, A Scotti Di Uccio, A Zallo  
 ILLINOIS U, URBANA - F D Cogswell, R L Culbertson, R W Gardner, R Greene, G R Jaross, T Kroc, K L Lingel, T A O'Halloran, Jr., T Protzman, H G Scott, P D Sheldon, V J Simaitis, T E Trumpinski, J R Wilson, J E Wiss  
 KOREA U - B G Cheon, J S Kang, K Y Kim  
 MILAN U & INFN, MILAN - G Alimonti, G Bacchiocchi, G Bellini, L Bodini, D Brambilla, B Caccianiga, W R Cavaletti,

## SUMMARIES OF FERMILAB EXPERIMENTS

L Cinquini, P D'Angelo, M Di Corato, P A Falbo, P Frabetti, M G Giammarchi, S Grabar, D Hazan, P Inzani, F Leveraro, E Macavero, S Malvezzi, P F Manfredi, G Massimiliano, M Mazzanti, D Menasce, S Meneghini, E Meroni, L Moroni, S Moroni, G Oriani, F Palombo, D Pedrini, L Perasso, F Ragusa, A Sala-Grabar, S Sala, M Szaswowski, D Torretta, M Vittone, F Zuffa

NORTHWESTERN U - M Artuso, T N Boulos, D A Buchholz, D R Claes, B Gobbi, B O'Reilly, S-W Park, R A Schluter, R Yoshida

NOTRE DAME U - J M Bishop, N N Biswas, J K Busenitz, N M Cason, J D Cunningham, S Grenquist, C J Kennedy, V P Kenney, G N Kim, T F Lin, J Maier, E Mannel, A P Mcmanus, R J Mountain, D L Pusejlic, R C Rucht, W D Shephard, J A Swiatek, P Wilkins, Z Y Wu, M E Zanabria

PAVIA U - V Arena, G Belli, G Boca, C Castoldi, S Cerlesi, R Diaferia, G Ferretti, C Fontana, G Fontana, G Gianini, S Rahti, S P Ratti, S Rescia, C Riccardi, V Speziali, P Trespi, L Viola, P Vitulo

UC, DAVIS - G P Grim, V Paolone, P M Yager

PUERTO RICO U, RIO PIEDRAS - A Lopez, L Mendez, J C Palathingal

MEXICO, IPN - H Mendez

NORTH CAROLINA U - T F Davenport

TENNESSEE U - G Blackett, W Bugg, K Danyo, T Handler, G Kondo, M Phisharody

Accelerator FNAL-TEV Detector Spectrometer

### Reactions

$\gamma$  nucleus  $\rightarrow$  X < 350 GeV/c  
 $\gamma$  nucleus  $\rightarrow$  charm X "  
 $\gamma$  nucleus  $\rightarrow$  charm charm X "  
 $\gamma$  nucleus  $\rightarrow \mu^+ \mu^- X$  "  
 $\gamma$  nucleus  $\rightarrow$  lepton<sup>+</sup> lepton<sup>-</sup> X "

Particles studied charmed-meson, charmed-baryon

Brief description Continues studies of FNAL-087 and -401.

Uses bremsstrahlung photons from a wide band 350 GeV ( $\pm 15\%$ ) electron beam, a new large-aperture multiparticle spectrometer, a beryllium target, and a silicon microstrip decay-vertex detector. Studies the dynamics of heavy quark photoproduction, and decays of charm particles. Data analysis in progress (July 96).

Journal papers IEEE TNS 30 (1983) 3768, NIM A225 (1984)

619, NIM A241 (1985) 107, NIM A251 (1986) 40, NIM A252 (1986) 366, PL B251 (1990) 639, PL B263 (1991) 584, NIM A305 (1991) 48, NP (PROC SUPPL) 27 (1992) 207, PL B300 (1993) 190, PL B307 (1993) 262, PL B308 (1993) 193, PL B313 (1993) 253, PL B314 (1993) 477, PL B315 (1993) 203, PL B316 (1993) 197, PRL 70 (1993) 1381, PRL 70 (1993) 1755, PRL 70 (1993) 2058, PRL 71 (1993) 827, PL B321 (1994) 295, PL B323 (1994) 459, PL B328 (1994) 187, PL B328 (1994) 193, PL B331 (1994) 217, PL B338 (1994) 106, PL B340 (1994) 254, PRL 72 (1994) 324, PRL 72 (1994) 961, NC 107A (1994) 2025, PR D50 (1994) 2953, PL B346 (1995) 199, PL B351 (1995) 591, PL B354 (1995) 486, PL B357 (1995) 678, PL B359 (1995) 403, PL B363 (1995) 259, PL B364 (1995) 127, PL B365 (1996) 461, and PL B370 (1996) 222.

Related experiments FNAL-831

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WWW Home-page <http://www.hep.uiuc.edu/e687/>

## FNAL-690

(Proposed Feb 1981, Approved Jul 1981, Nov 1983, Apr 1987, Began data-taking 1990, Completed data-taking Jan 1992)

### STUDY OF HADRONIC PRODUCTION AND SPECTROSCOPY OF STRANGE, CHARM AND BOTTOM PARTICLES AT THE TEVATRON

COLUMBIA U - A G Gara, B C Knapp ( $\checkmark$  Spokesperson)

ILLINOIS U, URBANA - E Gottschalk

FERMILAB - D C Christian, G Gutierrez, A A Wehmann

GUANAJUATO U - J Felix, G Moreno, M Reyes, M Sosa

MASSACHUSETTS U - M C Berriso, E P Hartouni, M N Kreisler, S Lee, K Markianos, M Wang, D Wesson

Accelerator FNAL-TEV Detector Spectrometer

### Reactions

$p p \rightarrow p X$  800 GeV/c

Particles studied strange, charm, bottom

Brief description Initial goals include (1) a systematic study of exclusive reactions, particularly diffraction dissociation, (2) cataloging of the remaining stable charmed particles, with details of production and decay, and (3) determining the scale of bottom production. Uses an innovative spectrometer with a hardware processor. Current focus is on the study of the charm production cross-section in diffraction dissociation and spin/parity analysis of centrally produced light mesons. Data analysis in progress (July 96).

Journal papers NC 107A (1994) 1847.

Related experiments BNL-766

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## FNAL-740 (DZERO)

(Proposed Sep 1983, Approved Feb 1984, Began data-taking May 1992, In progress)

### STUDY OF $\bar{p}p$ COLLISIONS USING A LARGE DETECTOR AT D0

#### D0 COLLABORATION

ANDES U, BOGOTA - B Gomez, R Gomez, B Hoeneisen, D Mendoza, P Mooney, P Nechev, J P Negret, J M R Roldan, A Serna, M E Zanabria

ARIZONA U - K P Davis, D K Fein, G E Forden, J A Guida, R Jayanti, K A Johns, A M Narayanan, J P Rutherford, M A Shupe, D Vititoe

BOSTON U - J M Butler

BROOKHAVEN - B Gibbard, H A Gordon, N Graf, S A Kahn, J R Kotcher, S D Protopopescu, S Snyder

BROWN U - J W Bantly, D Cullen-Vidal, D Cutts, T Fahland, J M Guida, J S Hoftun, F Nang, R A Partridge, G T Watts

BUENOS AIRES U - S Grinstein, R Piegaia

UC, DAVIS - P C Bloom, R Breedon, Y V Fisyak, S M Glenn, G Grim, C B Klopfenstein, W Ko, R L Lander, S Mani, D E Pellett

UC, IRVINE - J Drinkard, G Griffin, R E Hall, A J Lankford, D Stoker, J N Tarazi

UC, RIVERSIDE - J H Cochran, Jr, J A Ellison, P Gartung, A P Heinson, M Mason, S J Wimpenny

RIO DE JANEIRO, CBPF - G A Alves, W P Carvalho, H Da Motta Filho, J M De Miranda, A K A Maciel, M Mendes, J M Miranda, L J P Moreira, M Nicola, A F D S Santoro, M H G Souza, A Sznajder, M Vaz

MEXICO, IPN - H Castilla-Valdez, J L Gonzalez-Solis, R Hernandez-Montoya, L Magana-Mendoza, A Sanchez-Hernandez

COLUMBIA U - I M Adam, A Kotwal, P M Tuts, B Winer

DELHI U - V Bhasin, M Bhattacharjee, R K Shivpuri, S K Soni

DUBNA - G D Alexeev, V I Dodonov, A V Eftemov,

Y A Gornushkin, M A Ignatenko, N N Khovansky, Z V Krumstein, L K Lytkin, V L Malyshev, A A Nozdrin, I L Pisarev, T O Rudenko, N A Russakovich, B M Sabirov, A B Sadovsky, Y V Sedykh, A N Sissakian, L G Thatchev, V V Tokmenine, E G Tskhadadze, L S Vertogradov, Y A Yatsunenko, A I Zinchenko

FERMILAB - S C Ahn, B Baldin, J F Bartlett, P C Bhat,

G C Blazey, A S Boehnlein, F O Borcherding, A Brandt, A D Bross, J H Christenson, W E Cooper, M Demarteau, D S Denisov, H T Diehl, M Diesburg, S Feher, H E Fisk, S C Fuess, K Genser, C E Gerber, D R Green, H B Greenlee, W X Gu, H F Haggerty, S Hansen, U Heintz, J D Hobbs, T Hu, A S Ito, M E Johnson, A M Jonckheere, H Jostlein, B Klima, S Krzywdzinski, G Landsberg, Q H Li-Demarteau, R J Lipton, Q Liu, L Lueking, H S Mao, M I Martin, H L Melanson, K W Merritt, C S Mishra, N Mokhov, H E Montgomery ( $\checkmark$  Spokesperson), M Narain, N Oshima, A Para, P Z Quintas,

## SUMMARIES OF FERMILAB EXPERIMENTS

R Raja, P A Rapidis, W Smart, R P Smith, M A Tartaglia,  
W J Womersley, R Yamada  
FLORIDA U - G Mitselmakher  
FLORIDA STATE U - S K Blessing, S L Hagopian, V Hagopian,  
T C Huring, R J Hirosky, S L Linn, R W Madden,  
J McDonald, H Piekarz, H B Prosper, C Shaffer, H D Wahl,  
G L Wang, S Youssef  
HAWAII U - J Balderston, M A Cummings, M D Jones,  
M W Peters, C Y Yoshikawa  
ILLINOIS U, CHICAGO - M R Adams, M Chung, H S Goldberg,  
T M McKibben, II, C R Murphy, J Solomon  
INDIANA U - G Alvarez, T Hu, R L Jesik, T R Marshall,  
D Zieminska, A Zieminski  
IOWA STATE U - E W Anderson, J M Hauptman, B Lauer,  
J A Wightman  
KOREA U - J S Kang, C L Kim  
KYUNGSUNG U - Y M Park  
CRACOW - A Eskreys, J Figiel, B Pawlik, P Stopa  
LBL - A R Clark, O I Dahl, P M Grudberg, S C Loken,  
R J Madaras, M L Stevenson, M W Strovink, T G Trippe,  
E W Varnes  
MARYLAND U - A R Baden, W G Cobau, S C Eno, G Gomez,  
N J Hadley, S Kunori, A L Lyon, P Tamburello, J A Thompson  
MICHIGAN U - N A Amos, S Chopra, K W Del Signore, T-  
C F Hsieh, D W Lincoln, H A Neal, L Oesch, J M Qian  
MICHIGAN STATE U - M A Abolins, R L Brock, G DiLoreto,  
D L Edmunds, E M Flattum, K C Frame, T L Geld,  
R J Genik, II, S A Jerger, F Landry, J T Linnemann,  
J McKinley, D P Owen, B G Pope, T D Rockwell, N Varelas,  
H J Weerts  
MOSCOW STATE U - A Belyaev, E E Boos, L V Dudko,  
P F Ermolov, A K Leflat, M Merkin, A Pukhov, E K Shabalina,  
E Sirotenko, N Sotnikova, E G Zverev  
NEBRASKA U - J Krane, G R Snow  
NEW YORK U - B K Abbott, A Mincer, M Mudan, P Nemethy,  
J Sculli, K R T Streets  
NORTHEASTERN U - E Amidi, S M Chang, J H Morimiso,  
S Reucroft, E von Goeler, D R Wood, T Yasuda  
NORTHERN ILLINOIS U - M R Fortner, J M Green, D R Hedin,  
R Markeloff, V I Sirotenko, S E Willis  
NORTHWESTERN U - I Bertram, D A Buchholz, B Gobbi,  
T Joffe-Minor, S Y Jun, B May, P Rubinov, H M Schellman,  
R M Snihur, T L Taylor  
NOTRE DAME U - J Bishop, N N Biswas, J Jaques, R L Kehoe,  
M L Kelly, R C Ruchti, J Warchol, M Wayne  
OKLAHOMA U - G M Guglielmo, P Gutierrez, G R Kalbfleisch,  
T M McMahon, J M Snow, M Strauss  
PANJAB U - S Beri, V Bhatnagar, J M Kohli, H Singh, J Singh,  
P M Sood  
ST PETERSBURG, INP - V Golovtsov, V Kim, P V Neustroev,  
N K Terentev, L Uvarov  
SERPUKHOV - V V Babintsev, V A Bezzubov, N I Bojko,  
V S Burtovoi, S V Chekulayev, S P Denisov, O V Eroshin,  
V N Evdokimov, A N Galyaev, P I Goncharov, S N Gurzhiev,  
Y E Gutnikov, B I Klochkov, V I Klyukhin, V I Kochetkov,  
A V Kostitskii, A V Kozelov, E A Kozlovski, A A Mayorov,  
V M Podstavkov, D A Stoianova, A A Volkov, A P Vorobiev  
PURDUE U - S Carabello, D S Koltick, I Levine,  
Y M Pischalnikov  
RICE U - D L Adams, G W Eppley, H E Miettinen, B P Padley,  
E Platner, P P Yepes  
RIO DE JANEIRO STATE U - J R T de Mello Neto,  
J G R Lima, V Oguri  
ROCHESTER U - D P Casey, C E Cretsinger, M K Fatyga,  
T Ferbel, S Grunendahl, K S Hahn, F Lobkowicz, M F Paterno,  
E Won, Z H Zhu, M Zielinski  
SACLAY - Y Ducros, J F Lebrat, A Zylberstein  
SEOUL NATIONAL U - S Choi, S K Kim, Y S Yu  
SUNY, STONY BROOK - M M Baarmand, Z Casilum,  
D Chakraborty, W M Chen, S Cinar, D R Claes, V D Elvira,  
R J Engemann, G Finocchiaro, A Goussiou, P D Grannis  
(✓ Spokesperson), T Hu, C K Jung, H L Li, R L McCarthy,  
S Rajagopalan, M M Rijssenbeek, R D Schamberger, D Shpakov,  
Z Z Zhang  
TATA INST - B S Acharya, S Banerjee, S R Dugad, A Gupta,  
M R Krishnaswamy, N K Mondal, V S Narasimham, N Parua,  
M V S Rao, H C Shankar, P R Vishwanath  
TEXAS U, ARLINGTON - K De, P A Draper, E J Gallas, J Li,  
J Perkins, L Sawyer, S Shin, M D Sosebee, R W Stephens,  
A P White

TEXAS A AND M - L T Goss, F R Huson, D M Norman,  
J T White, J V D Wirjawan

*Accelerator* FNAL-COLLIDER *Detector* D0

### Reactions

$\bar{p} p$  2000 GeV ( $E_{cm}$ )

*Particles studied*  $W^+$ ,  $W^-$ ,  $Z^0$ , bottom, top

*Brief description* The experiment studies the properties of 2-TeV  $\bar{p}p$  collisions with particular emphasis on measurement and identification of jets, leptons and missing transverse momentum. The detector incorporates three main systems: a central detector, uranium-liquid argon calorimetry over nearly 4 $\pi$  solid angle, and a magnetized iron muon spectrometer. Data was taken from 1992 to early 1996 (Run I), with physics covering the top quark properties, precision electroweak measurements, studies of QCD,  $b$ -quark production and searches for new particles and phenomena. The detector is being upgraded for operation in 1999 with the higher luminosity upgraded Collider. Tracking detectors will be replaced with silicon strip and scintillating fiber detectors in a solenoidal magnetic field, and other detectors upgraded for higher rate operation. Upgrade in progress (July 96).

*Journal papers* IEEE TNS 32 (1985) 1473, NIM A244 (1986) 356, NIM A247 (1986) 107, CPC 45 (1987) 245, IEEE TNS 34 (1987) 710, NIM A256 (1987) 305, NIM A257 (1987) 556, NIM A261 (1987) 420, NIM A263 (1988) 78, NIM A265 (1988) 157, NIM A269 (1988) 492 [erratum: NIM A273 (1988) 453], NIM A277 (1989) 401, NIM A279 (1989) 107, NIM A279 (1989) 243, NIM A279 (1989) 310, NIM A279 (1989) 331, NIM A279 (1989) 359, NIM A280 (1989) 36, IEEE TNS 36 (1989) 384, NIM A289 (1990) 438, NIM A289 (1990) 543, NIM A290 (1990) 122, NIM A290 (1990) 346, NIM A293 (1990) 125, NIM A297 (1990) 121, IEEE TNS 38 (1991) 286, IEEE TNS 38 (1991) 398, NP (PROC SUPPL) 23B (1991) 402, NIM A324 (1993) 53, NIM A325 (1993) 393, NP (PROC SUPPL) 32 (1993) 29, NP (PROC SUPPL) 32 (1993) 83, NIM A338 (1994) 185, NIM A342 (1994) 33, NIM A351 (1994) 72, NIM A351 (1994) 77, PRL 72 (1994) 965, PRL 72 (1994) 2138, PRL 72 (1994) 2332, NIM A366 (1995) 263, NP (PROC SUPPL) 44 (1995) 12, NP (PROC SUPPL) 44 (1995) 153, PL B357 (1995) 500, PL B358 (1995) 405, PRL 74 (1995) 2422, PRL 74 (1995) 2632, PRL 74 (1995) 3548, PRL 75 (1995) 618, PRL 75 (1995) 1023, PRL 75 (1995) 1028, PRL 75 (1995) 1034, PRL 75 (1995) 1456, PRL 75 (1995) 3226, PRL 75 (1995) 3618, PR D52 (1995) 4877, PL B370 (1996) 239, PRL 76 (1996) 734, PRL 76 (1996) 2222, PRL 76 (1996) 2228, PRL 76 (1996) 3271, and PR D53 (1996) 6000.

*Related experiments* FNAL-823

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*WWW Home-page* <http://d0sgio0.fnal.gov/>

### FNAL-741 (CDF)

(Proposed Aug 1981, Approved Apr 1982, Began data-taking 1987, In progress)

#### STUDY OF $\bar{p}p$ COLLISIONS USING A LARGE DETECTOR AT B0 — THE CDF DETECTOR

##### CDF COLLABORATION

ARGONNE - R E Blair, K Byrum, D Crane, S Kuhlmann,  
T LeCompte, L J Nodulman, J Proudfoot, R G Wagner,  
A B Wicklund  
BOLOGNA U & INFN, BOLOGNA - V Bolognesi, L Breccia,  
M Deninno, G Farinelli, I Fiori, L Malferrari, P Mazzanti,  
N Moggi, G M Piacentino, F Rimondi, F Semeria, S Zucchelli  
BRANDEIS U - S Behrends, J R Bensinger, C Blocker,  
L E Kirsch, J Lamoureux  
CHICAGO U - A Amadon, J Berryhill, M Contreras,  
R Culbertson, H J Frisch, C Grosso-Pilcher, M J Shochet,  
D A Toback, J Wahl, P Wilson  
DUKE U - D Cronin-Hennessy, J R Dittmann, L Fortney,  
A T Goshaw, S A Hauger, W Kowald, S H Oh, T Phillips,  
W J Robertson, W Walker, C H Wang, C Wei  
FERMILAB - M G Albrow, M Atac, A Beretvas, J P Berge,  
K Biery, M E Binkley, E Buckley-Geer, A Byon-Wagner,

## SUMMARIES OF FERMILAB EXPERIMENTS

- S Cihangir, J Cooper, S Delchamps, R Demina, P Derwent, F DeJongh, J E Elias, W Erdmann, B Flaughner, G W Foster, J E Freeman, S Geer, S R Hahn, R Harris, R Hughes, J Hylan, J Incandela, H B Jensen, U Joshi, D Jovanovic, R D Kephart, W Koska, I J Kroll, S Lammel, J D Lewis, P Limon, P Lukens, K Maeshima, J P Marriner, T Miao, A Mukherjee, C A Nelson, C Newman-Holmes, J F Patrick, K Pitts, R Plunkett, P Schlabach, E E Schmidt, S L Segler, J Spalding, L Spiegel, J Strait, D Stuart, S Tkaczyk, A V Tollestrup, R Vidal, R L Wagner, W Wester, E Wicklund, A Yagil, G P Yeh, J Yoh, J C Yun
- FRASCATI - M Barone, E Barzi, S Bertolucci, M Cordelli, S Dell'Agnello, F Donno, P Giromini, L Keeble, E Meschi, S Miscetti, A Parri, A Sansoni
- GENEVA U - A Clark, C Couyoumtzelis, H Kambara, T Speer, X Wu
- HARVARD U - T P Baumann, J F de Troconiz, M Franklin, C Gay, A Gordon, R Hamilton, J E Huth, D Kestenbaum, J Konigsberg, G Michail, O Poujade, F Ptohos, M G Spiropulu
- HIROSHIMA U & OSAKA U - Y Iwata, T Ohmoto, T Ohsugi, R Takashima, N Tamura
- ILLINOIS U, URBANA - L Christafek, D Errede, S M Errede, L E Holloway, R M Keup, B Kharadia, T Liss, A J Martin, R M Roser
- IPP, CANADA & MCGILL U & TORONTO U - B Hinrichsen, A Holscher, H S Kim, K Kordas, K Ragan, G Sganos, P Sinervo, K Strahl, W J Taylor, W Trischuk, A Warburton, Y Ye
- JOHNS HOPKINS U - B A Barnett, J Cammerata, Z Feng, D Gerdes, J Guimaraes, J Skarha, C Smith, F Snider, J Tseng
- KEK - Y Fukui, S Mikamo, Y Morita
- LBL - W Ashmanskas, W Carithers (✓ Spokesperson), W Chinowsky, K Einsweiler, R P Ely, A B Galtieri, M Garcia-Sciveres, C H Haber, R Kadel, Y K Kim, M Lancaster, J Lys, M Paulini, M D Peters, D Reher, M Shapiro, J L Siegrist, H Wenzel, W Yao
- MIT, LNS - G Bauer, J Benloch, W Bokhari, T Daniels, J Friedman, E Hafen, K Kelley, A Korytov, P Maksimovic, C-Y P Ngan, L Rosenson, T Shah, P Spicas, S Sumorok, S Tether, D Vucinic
- MICHIGAN STATE U - C Bromberg, J Huston, R Miller, S Murgia
- MICHIGAN U - D Amidei, K Burkett, M Campbell, J Chapman, N Eddy, E Guillian, E James, S-B Kim, M Krasberg, C-C Miao, R Thun, S Truitt, S Vejck, D Winn, D Wolinski
- NEW MEXICO U - M Bailey, N Bruner, M Gold, J Matthews, E Moore, S Seidel, T L Thomas, S Worm, L Yu
- OSAKA CITY U - Y Kato, T Okusawa, T Takahashi, Y Teramoto, H Toyoda, T Yoshida
- PADUA U & INFN, PADUA - P Azzi, N Bacchetta, D Bisello, G Busetto, A Castro, T Dorigo, M Gallinaro, Y Gotra, M Loreti, F Mando, L Pescara, A Ribon, L Stanco, J Wyss
- PENN U - F Azfar, D Benton, B Bevensee, L Gladney, B Harral, J Heinrich, C Holck, R J Hollebeek, G Houk, N Lockyer, O Long, S D Metzler, R Oliveira, F Ukegawa, G Unal, R Wilkinson, H H Williams
- INFN, PISA & PISA, SCUOLA NORMALE SUPERIORE & PISA U - S R Amendolia, F Bedeschi, S Belforte, G Bellettini (✓ Spokesperson), S Bettelli, F Cervelli, G Chiarelli, M Cobal, E Cocca, M Dell'Orso, B Denby, S Donati, C Ferretti, G Gagliardi, S Galeotti, P Giannetti, M Incagli, N Labanca, S Lami, S Leone, M L Mangano, A Menzione, P Murat, R Paoletti, N Parashar, A Perazzo, G Punzi, L F Ristori, A Scribano, F Spinella, A Stefanini, G F Tartarelli, N Turini, G Velev, F Zetti
- PITTSBURGH U - J Boudreau, E Engels, Jr, T Huffman, P F Shepard, P P Singh, S van den Brink
- PURDUE U - V E Barnes, D Bortoletto, M Fahling, A F Garfinkel, A Hardman, K Hoffman, T Keaffaber, A T Laasanen, N M Shaw, Q Shen
- ROCHESTER U - S Blusk, A Bodek, H S Budd, J Cassada, P de Barbaro, Q Fan, B Kim, P Koehn, M Kruse, J Liu, M Pillai, W K Sakumoto, P Tipton, K Tollefson
- ROCKEFELLER U - A Akopian, G Apollinari, S Bagdasarov, A Bhatti, L Demortier, N D Giokaris, K Goulianos, D Khazins, A Maghakian, P Melese, C Mesropian, A Titov
- RUTGERS U - J Conway, T J Devlin, L Groer, C Hawk, V Jacobs, R D Kennedy, E W Kuns, C Loomis, Jr, M Walsh, T L Watts
- TAIWAN, INST PHYS - P Chang, P Chang, H Y Chao, M-T Cheng, C-N Chiou, R Guo, Y-C Liu, A Soumarokov, P K Teng, C-H Wang, M-J Wang, P Yeh
- TEXAS A AND M - J Done, T Kamon, P M McIntyre, B Tannenbaum, R C Webb
- TEXAS TECH - D Benjamin, M Frautschi, O Ganel, W Hao, Q Liu, V Papadimitriou, A Sill, R Wigmans
- TSUKUBA U - S Aota, T Asakawa, T Chikamatsu, S Funaki, K Hara, E Hayashi, H Ikeda, T Ino, T Kaneko, S Kim, K Kondo, T Kuwabara, H Minato, H Mitsushio, S Miyashita, H Nakada, I Nakano, M Ninomiya, S Ogawa, R Oishi, M Okabe, H Sato, Y Seiya, M Shimojima, J Suzuki, T Takada, M Takano, T Takano, K Takikawa, T Uchida, N Uemura, K Yasuoka, M Yokoyama
- TUFTS U - K Karr, K Sliwa, M Timko
- UCLA - Y Bonushkin, H Dahnke, L Dworkin, J Hauser, F Keyvan, M Lindgren, T Muller, R Neuberger
- WASEDA U - H Akimoto, T Arisawa, Y Fujimoto, S Hasegawa, J Iwai, K Terashi, S Uesaka, Y Yoda
- WISCONSIN U - J Bellinger, D L Carlsmith, W Chung, R M Handler, S Lusin, J Olsen, L G Pondrom, J Steele, L Zhang
- YALE U - R G Feild, H Kasha, K E Ohl, S Pappas, A Schaffer, M P Schmidt

### Accelerator FNAL-COLLIDER Detector CDF

#### Reactions

$\bar{p}p$  500-2000 GeV (Ecm)

Particles studied  $W^+$ ,  $W^-$ ,  $Z^0$ , higgs, top

Brief description The first physics results were obtained during

1987, in an engineering run, and in 1988/89, in a year-long run. Upgrades for the 1991 run are described in the FNAL-775 proposal, and another major improvement was proposed for the 1993 run. CDF is a general-purpose detector designed to study the physics of  $\bar{p}p$  collisions. It has both azimuthal and forward-backward symmetry. A superconducting solenoid of length 4.8 m and radius 1.5 m generates a 1.4 T magnetic field and contains tracking chambers used to detect charged particles and measure their momenta. Surrounding the solenoid are sampling calorimeters used to measure the electromagnetic and hadronic energy of jets and electrons. Outside the calorimeters are drift chambers used for muon detection. Surrounding the beam pipe is a 4-layer silicon microstrip vertex detector, and a vertex drift chamber, both installed in 1992. The Collider run ended in Spring 96 with a total luminosity of  $110 \text{ pb}^{-1}$  recorded on tape. The detector will be upgraded with new tracking, vertex detector, scintillating tile plug calorimeter, readout and trigger electronics, and extended muon coverage for the next Collider run with the Main Injector, now scheduled for April, 1999. Upgrade in progress (July 96).

Journal papers NIM 204 (1983) 351, NIM 204 (1983) 361, NIM

205 (1983) 113, NIM 216 (1983) 127, NIM A219 (1984) 472, JdeP 45 (1984) 333, NIM A238 (1985) 18, IEEE TNS 34 (1987) 865, NIM A263 (1988) 199, NIM A267 (1988) 249, NIM A267 (1988) 257, NIM A267 (1988) 272, NIM A267 (1988) 280, NIM A267 (1988) 301, NIM A267 (1988) 315, NIM A267 (1988) 330, NIM A267 (1988) 351, NIM A268 (1988) 24, NIM A268 (1988) 33, NIM A268 (1988) 41, NIM A268 (1988) 46, NIM A268 (1988) 50, NIM A268 (1988) 75, NIM A268 (1988) 92, NIM A269 (1988) 33, NIM A269 (1988) 40, NIM A269 (1988) 51, NIM A269 (1988) 63, NIM A269 (1988) 68, NIM A269 (1988) 82, NIM A269 (1988) 93, NIM A271 (1988) 387, PRL 61 (1988) 1819, PRL 62 (1989) 613, PRL 62 (1989) 1005, PRL 62 (1989) 1825, PRL 62 (1989) 3020, PRL 63 (1989) 720, PRL 63 (1989) 1447, NIM A274 (1989) 443, NIM A281 (1989) 485, PR D40 (1989) 3791, NP A498 (1989) 193c, IEEE TNS 36 (1989) 35, IEEE TNS 36 (1989) 347, IEEE TNS 36 (1989) 440, IEEE TNS 36 (1989) 765, NP (PROC SUPPL) 12 (1990) 18, NP (PROC SUPPL) 12 (1990) 254, PRL 64 (1990) 142, PRL 64 (1990) 147, PRL 64 (1990) 152, PRL 64 (1990) 157, PRL 64 (1990) 348, PRL 65 (1990) 968, PRL 65 (1990) 2243, PR D41 (1990) 1717, PR D41 (1990) 1722, PR D41 (1990) 2330, PRL 66 (1991) 2951, PRL 67 (1991) 1502, PRL 67 (1991) 2418, PRL 67 (1991) 2609, PRL 67 (1991) 2937, PRL 67 (1991) 3351, PR D43 (1991) 664, PR D43 (1991) 2070, PR D44 (1991) 29, PR D44 (1991) 601, NIM A315 (1992) 125, NP (PROC SUPPL) 25B (1992) 19, NP (PROC SUPPL) 27 (1992) 240, NP (PROC SUPPL) 27 (1992) 246, MPL A7 (1992) 2659, PRL 68 (1992) 447, PRL 68 (1992) 1458, PRL 68 (1992) 1463, PRL 68 (1992) 2734, PRL 68



## SUMMARIES OF FERMILAB EXPERIMENTS

(1992) 3398, PRL 68 (1992) 3403, PRL 69 (1992) 28, PRL 69 (1992) 2160, PRL 69 (1992) 2896, PRL 69 (1992) 3439, PRL 69 (1992) 3704, PR D45 (1992) 1448, PR D45 (1992) 2249, PR D45 (1992) 3921, PR D46 (1992) 1889, NIM A331 (1993) 57, NIM A333 (1993) 209, NP (PROC SUPPL) 31 (1993) 189, PRL 70 (1993) 713, PRL 70 (1993) 1376, PRL 70 (1993) 2232, PRL 70 (1993) 4042, PRL 71 (1993) 500, PRL 71 (1993) 679, PRL 71 (1993) 1685, PRL 71 (1993) 2396, PRL 71 (1993) 2537, PRL 71 (1993) 2542, PRL 71 (1993) 3421, PR D47 (1993) 2639, PR D47 (1993) 4857, PR D48 (1993) 998, PR D48 (1993) 2998, PR D48 (1993) 3939, NIM A350 (1994) 73, NIM A351 (1994) 59, NIM A351 (1994) 68, PRL 72 (1994) 1977, PRL 72 (1994) 3004, PRL 72 (1994) 3456, PRL 73 (1994) 220, PRL 73 (1994) 225, PRL 73 (1994) 2296, PRL 73 (1994) 2662 [erratum: PRL 74 (1995) 1891], PRL 73 (1994) 2667, NC 107A (1994) 2085, PR D49 (1994) 1, PR D50 (1994) 2966, PR D50 (1994) 4252, PR D50 (1994) 5518, PR D50 (1994) 5535, PR D50 (1994) 5550, PR D50 (1994) 5562, NP (PROC SUPPL) 39BC (1995) 348, NP (PROC SUPPL) 44 (1995) 20, NIM A368 (1995) 90, PRL 74 (1995) 341, PRL 74 (1995) 850, PRL 74 (1995) 855, PRL 74 (1995) 1936, PRL 74 (1995) 1941, PRL 74 (1995) 2626, PRL 74 (1995) 2900, PRL 74 (1995) 3538, PRL 74 (1995) 4988, PRL 75 (1995) 11, PRL 75 (1995) 608, PRL 75 (1995) 613, PRL 75 (1995) 1012, PRL 75 (1995) 1017, PRL 75 (1995) 1451, PRL 75 (1995) 3068, PRL 75 (1995) 3997, PRL 75 (1995) 4358, PR D51 (1995) 949, PR D51 (1995) 4623, PR D52 (1995) 2605, PR D52 (1995) 2624, PR D52 (1995) 4784, IJMP A11 (1996) 2045, IJMP A11 (1996) 2233, PRL 76 (1996) 2006, PRL 76 (1996) 2015, PRL 76 (1996) 2852, PRL 76 (1996) 3070, PRL 76 (1996) 4307, PRL 76 (1996) 4462, PRL 76 (1996) 4675, PR D53 (1996) 1051, and PR D53 (1996) 3496.

Related experiments FNAL-775, FNAL-830, FNAL-876

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WWW Home-page <http://www-cdf.fnal.gov/>

### FNAL-760

(Proposed Mar 1985, Approved Jun 1985, Began data-taking 1990, Completed data-taking Jan 1992)

#### INVESTIGATION OF THE FORMATION OF CHARMONIUM STATES USING THE $\bar{p}$ ACCUMULATOR RING

UC, IRVINE - D R Broemmelsiek, J E Fast, K E Gollwitzer, M A Mandelkern, J L Marques, J Schultz, A Smith, M F Weber, G Zioulas  
 FERMILAB - L Bartoszek, V K Bharadwaj, M D Church, A A Hahn, S Y Hsueh, W L Marsh, J Peoples, Jr, S H Pordes, P A Rapidis, S Werkema  
 FERRARA U - D Bettoni, R Calabrese, V Carassiti, P Dalpiaz, M Fabbri, P Ferretti-Dalpiaz, A Gianoli, E Luppi, M Martini, F Petrucci, M Savrie  
 INFN, GENOA - A Buzzo, M Macri, M M Marinelli, M Pallavicini, S Passaggio, C Patrignani, M G Pia, A Pozzo, A Santroni, A Scalisi, M Zito  
 NORTHWESTERN U - D A Dimitroyannis, C M Ginsburg, M Masuzawa, R E Ray, Jr, J L Rosen, M Sarmiento, K K Seth, S Trokenheim, J L J Zhao  
 PENN STATE U - T A Armstrong, M A Hasan, R A Lewis, A M Majewska, J Passaneau, J D Reid, G A Smith, Y Zhang  
 TURIN U - C Biino, G Borreani, A Ceccucci, R Cester (√ Spokesperson), R Dibenedetto, G Giraudo, F Marchetto, E A Menichetti, A Migliori, R Mussa, S Palestini, N M Pastrone, L Pesando, G Rinaudo, B Rocuzzo, M S Sozzi, L Tecchio

Accelerator FNAL Detector Tracking system, Calorimeter

#### Reactions

$\bar{p} p \rightarrow$ charm charm	3-7 GeV/c
$\bar{p} p \rightarrow e^+ e^-$	"
$\bar{p} p \rightarrow \gamma$ 's	"
$\bar{p} p \rightarrow \bar{p} p$	"

Particles studied charmonium

Brief description Studies charmonium states formed exclusively in  $\bar{p}p$  collisions, and their decays to electromagnetic final states. Uses a gas jet hydrogen target in the Fermilab  $\bar{p}$

source. The detector consists of a tracking system, hodoscopes, and Čerenkov counters surrounded by a central lead glass electromagnetic calorimeter, and a planar forward calorimeter. Data analysis completed.

Journal papers NIM A271 (1988) 417, NIM A277 (1989) 116, NIM A295 (1990) 73, NIM A301 (1991) 47, NIM A307 (1991) 254, NIM A317 (1992) 135, SJNP 55 (1992) 792, SJNP 55 (1992) 811, SJNP 55 (1992) 865, PRL 68 (1992) 1468, PRL 69 (1992) 2337, NP B373 (1992) 35, PL B307 (1993) 394, PL B307 (1993) 399, PRL 70 (1993) 1212, PRL 70 (1993) 2983, NP A558 (1993) 259c, PR D47 (1993) 772, PR D48 (1993) 3037, NC 107A (1994) 2013, PAN 57 (1994) 1513 = YF 57 (1994) 1587, PAN 57 (1994) 1722 = YF 57 (1994) 1793, NIM A355 (1995) 308, and PR D52 (1995) 4839.

Related experiments FNAL-835

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WWW Home-page <http://www-e835.fnal.gov/>

### FNAL-771

(Proposed Feb 1986, Approved Apr 1987, Began data-taking 1991, Completed data-taking Jan 1992)

#### BEAUTY PRODUCTION AND OTHER HEAVY QUARK PHYSICS ASSOCIATED WITH DIMUON PRODUCTION IN 800 (925) GeV/c $p$ Si INTERACTIONS

SOUTH ALABAMA U - R K Clark, C M Jenkins  
 UC, BERKELEY - H C Ballagh, Jr, H H Bingham, J E Lys, S Misawa  
 UCLA - A F Boden, D B Cline, S Ramachandran, J M Rhoades  
 DUKE U - L R Fortney, W R Kowald, C Wei, B T Zou  
 FERMILAB - P O Mazur, C T Murphy, R P Smith, L Spiegel, W Yang  
 HOUSTON U - K H Lau, G H Mo  
 DUBNA - J Budagov  
 LECCE U - P Creti, V Elia, E Gorini, F Grancagnolo, M Panareo  
 MCGILL U - J M Trischuk  
 NANJING U - T Y Chen, N G Yao  
 NORTHWESTERN U - M M Block  
 PAVIA U - L Antoniazzi, G Bonomi, G Introzzi, G Liguori, P Torre  
 PENN U - A J Blankman, W I Kononenko, W Selove  
 PRAIRIE VIEW A AND M - M L Haire, D J Judd, L Turnbull, D E Wagoner  
 SHINSHU U - M He, C H Shen, C Wang, C Wei, N Zhang  
 VANIER COLL - M S Cooper  
 VIRGINIA U - M W Arenton, Z L Cao, S Conetti (√ Spokesperson), G Corti, B B Cox (√ Spokesperson), E C Dukes, C M Durand, V Golovatyuk, K Hagan-Ingram, P M Hanlet, A A Ledovskoy, A P Mcmanus, K S Nelson, V S Pogosyan, M Recagni, J Segal, I Tzamouranis  
 WISCONSIN U - T Alexopoulos, A R Erwin, J R Jennings

Accelerator FNAL-TEV Detector Spectrometer

#### Reactions

$p$ Si $\rightarrow \mu^+ \mu^- X$	800 GeV/c
$p$ Si $\rightarrow$ muon X	"
$p$ Si $\rightarrow B \bar{B} X$	"
$p$ Si $\rightarrow J/\psi(1S) X$	"
$p$ Si $\rightarrow \chi_c(\text{unspec}) X$	"

Particles studied  $B^+$ ,  $B^0$ ,  $J/\psi(1S)$ ,  $\psi(2S)$ ,  $\chi_{c1}(1P)$ ,  $\chi_c(\text{unspec})$

Brief description Uses the FNAL-705 spectrometer augmented by a 10,000-channel silicon detector and a new single muon and dimuon trigger to select  $B\bar{B}$  events at a high rate ( $\sim 2 \times 10^6/s$ ). Data analysis in progress (July 96).

Journal papers NP (PROC SUPPL) 23B (1991) 249, NIM A314 (1992) 563, NIM A315 (1992) 92, NIM A333 (1993) 142, NIM A337 (1993) 350, NIM A340 (1994) 491, NIM A355 (1995) 320, NIM A360 (1995) 334, PL B374 (1996) 271, and PRL 77 (1996) (in press).

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WWW Home-page

<http://fermi.clas.virginia.edu/~aal2q/e771/e771hp.html>

## SUMMARIES OF FERMILAB EXPERIMENTS

### FNAL-773

(Proposed Mar 1986, Approved Jul 1986, Jun 1989, Began data-taking Jul 1991, Completed data-taking Sep 1991)

#### MEASUREMENT OF THE PHASE DIFFERENCE BETWEEN $\eta_{00}$ AND $\eta_{+-}$ TO A PRECISION OF 0.5°

CHICAGO U – A R Barker, R A Briere, E Cheu, L K Gibbons, D Harris, G D Makoff, K S Mcfarland, A Roodman, B Schwingenheuer, Y W Wah, B D Winstein, R Winston  
 ELMHURST COLL – E C Swallow  
 FERMILAB – G J Bock, R N Coleman, M Crisler, J Enagonio, R Ford, Y B Hsiung, D Jensen, E Ramberg, R S Tschirhart, T Yamanaka  
 ILLINOIS U, URBANA – E Collins, G D Gollin (✓ Spokesperson)  
 RUTGERS U – P Gu, P Haas, W P Hogan, S K Kim, J N Matthews, S S Myung, S R Schnetzer, S V Somalwar, G B Thomson, Y Zou

Accelerator FNAL-TEV Detector Spectrometer

#### Reactions

$K_L \rightarrow \pi^+ \pi^-$	50-150 GeV/c	
$K_L \rightarrow \pi^+ \pi^- \gamma$	"	
$K_L \rightarrow \pi^0 \pi^0$	"	
$K_S \rightarrow \pi^+ \pi^-$	"	
$K_S \rightarrow \pi^+ \pi^- \gamma$	"	
$K_S \rightarrow \pi^0 \pi^0$	"	

Particles studied  $K_L, K_S$

Brief description This experiment adds an additional regenerator to the FNAL-731 spectrometer. A double  $K_L$  beam is incident on the spectrometer, which has 804 lead glass blocks and four drift chambers. One beam passes through a thin regenerator at the start of the fiducial decay volume, the other traverses a thick regenerator 11 meters further upstream. The regenerators switch beams between machine pulses. Neutral beam is produced by 800 GeV protons on a 36-cm beryllium target. The experiment tests *CPT* invariance. Data analysis completed (July 96).

Journal papers PRL 74 (1995) 4376, and PRL 75 (1995) 2803.

Related experiments FNAL-731, FNAL-799

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### FNAL-781

(Proposed Mar 1987, Approved Oct 1988, In preparation)

#### SEGMENTED LARGE-X BARYON SPECTROMETER (SELEX)

BEIJING, IHEP – K L He, F F Lang, C Z Li, Y S Li, Z G Li, C S Mao, Z L Mao, F K Tang, D R Wang, Y G Xi, J Q Zhang, W H Zhao, S C Zheng  
 BOGAZICI U – E Gulmez  
 BRISTOL U – V J Smith  
 CARNEGIE MELLON U – R M Edelstein, D Gibaut, E E Gottschalk, A Kushnirenko, D Mao, P Mathew, M Mattson, D M Potter, M P Procario, J S Russ (Spokesperson), S Yang  
 RIO DE JANEIRO, CBPF – E C De Oliveira, A M F Endler, L C S Oliveira, M C Pommot Maia  
 FERMILAB – P S Cooper (Spokesperson), J Engelfried, J R Kilmer, S Kwan, J Lach, G A Oleynik, E J Ramberg, D D Skow, L G Stutte  
 HAWAII U – C J Kenney, S I Parker  
 IOWA U – N Akchurin, M Aykac, K R Barger, M Kaya, U Mallik, E R McCliment, J M Mcpherson, K D Nelson, C R Newsom, Y Onel, E Ozel, S Ozkorucuklu, L Pasquali  
 MUNICH, MAX PLANCK INST – U Dersch, I Eschrich, K Koenigsmann, I Konorov, H Krueger, S Masciocchi, S M Paul, B Povh, J Simon, K Vorwalter, R Werdning  
 MOSCOW STATE U – I Filimonov, E M Leikin, A Nemitkin, V Rud  
 MOSCOW, ITEP – M Balats, G Davidenko, A Dolgolenko, G Dzyubenko, V Evdokimov, P A Goritchev, V M Guzhavin, A Kamenski, V D Khovansky, M A Kubantsev, V S Lakaev, V Matveyev, A P Nilov, V A Prutskoi, V K Semyachkin, A L Sitnikov, V Verebryusov, V E Vishnyakov

PARAIBA U – M Luksys

ST PETERSBURG, INP – A Atamantchouk, N Bondar, A S Denisov, A Goliach, V L Golovtsov, V T Gratchev, A V Khanzadeev, V T Kim, L M Kotchenda, A G Krivshich, N P Kuropatkin, V Maleev, P V Neustroev, V M Samsonov, V A Schegelsky, N N Smirnov, V L Stepanov, M Svoiski, N K Terentiev, L N Uvarov, A P Vorobiev  
 SERPUKHOV – R Elochkin, Y Goncharenko, O A Grachov, V Koubarovski, A Kozhevnikov, N Kulyavtzev, V F Kurshetsov, L G Landsberg, V Moltchanov, B A Mukhin, V Mukhin, S B (S) Nurushev, A N Vasiliev, D V Vavilov, V A Victorov  
 ROCHESTER U – T Ferbel, G E Ginther, Jr, C Hammer, P F Slattery, M Zielinski  
 INFN, ROME – M Iori  
 SAN LUIS POTOSI U – A M Morelos-Pineda  
 SAO PAULO U – O P Eboli, L Emediato, C O Escobar, F Garcia, P Gouffon, T Lungov, R Soares, R Zukanovich-Funchal  
 TEL AVIV U – S Gerson, J Grunhaus, S Kananov, M A Moinester, A Ocherashvili, V Steiner  
 INFN, TRIESTE – A Bravar, D Dreossi, A Lamberto, A Penzo, G F Rappazzo, P P Schiavon  
 WASHINGTON U, SEATTLE – V Chaloupka, T Zhao

Accelerator FNAL-TEV Detector Spectrometer

Particles studied charmed-baryon

Brief description Studies both charmed baryon production and decays. Trigger is based on impact parameter. The spectrometer deploys a number of existing detectors as well as the new silicon strip and pixel devices and a ring imaging Cerenkov counter. Being installed (May 96).

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WWW Home-page <http://fn781a.fnal.gov/>

### FNAL-789

(Proposed Nov 1987, Approved Oct 1988, Began data-taking 1990, Completed data-taking Jan 1992)

#### MEASUREMENT OF THE PRODUCTION AND DECAY INTO TWO-BODY MODES OF *b*-QUARK MESONS AND BARYONS

ABILENE CHRISTIAN U – L D Isenhower, M E Sadler, R G Schnathorst  
 TAIWAN, INST PHYS – Y C Chen, G C Kiang, P K Teng  
 CHICAGO U – L M Lederman, M H Schub  
 FERMILAB – C N Brown, W E Cooper, H D Glass, K N Gounder, C S Mishra  
 LBL – G Gidal, P M Ho, M S Kowitt, K B Luk, D Pripstein  
 LOS ALAMOS – T A Carey, D M Jansen, R G Jeppesen, J S Kapustinsky, D W Lane, M J Leitch, J W Lillberg, P L McGaughy, J M Moss, J C Peng (✓ Spokesperson)  
 NORTHERN ILLINOIS U – D M Kaplan (✓ Spokesperson), W R Luebke, V M Martin, R S Preston, J J Sa, V Tanikella  
 SOUTH CAROLINA U – R L Childers, C W Darden, J R Wilson

Accelerator FNAL-TEV Detector Spectrometer

#### Reactions

$p$  nucleus 800 GeV/c ( $P_{lab}$ )

Particles studied bottom, charm

Brief description Studies low multiplicity decays of *b*- and *c*-quark hadrons. Essential to evaluating the suitability of dihadronic beauty decays for the study of *CP* violation in the *B* system. Sensitive also to dileptonic modes, allowing limits to be set on their branching ratios. Uses the existing FNAL-605/772 spectrometer with suitably upgraded trigger processor system. Data analysis in progress (July 96).

Journal papers IEEE TNS 38 (1991) 461, IEEE TNS 39 (1992) 758, NP A544 (1992) 197c, PRL 72 (1994) 1318, PRL 72 (1994) 2542, PR D50 (1994) 9, PRL 74 (1995) 3118, PR D52 (1995) 1307, and PR D52 (1995) 4251.

Related experiments FNAL-771, DESY-HERA-B

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WWW Home-page <http://p2hp2.lanl.gov/e789/e789.html>

## SUMMARIES OF FERMILAB EXPERIMENTS

### FNAL-791

(Proposed Nov 1987, Approved Jun 1988, Began data-taking 1991, Completed data-taking Jan 1992)

#### HADROPRODUCTION OF HEAVY FLAVORS AT THE TAGGED PHOTON LABORATORY

##### E791 COLLABORATION

RIO DE JANEIRO, CBPF - S F Amato, I Bediaga, I Costa, J M De Miranda, J C Dos Anjos, J Mello, Neto, H Motta, Filho, A Reis, A Santoro, J Solano, M H G Souza  
 UC, SANTA CRUZ - G Blaylock, P Gagnon, J Leslie, K O'Shaughnessy, K Sugano  
 CINCINNATI U - S Devmal, B Meadows, L P Perera, A K Santha, M D Sokoloff  
 FERMILAB - J A Appel (✓ Spokesperson), S Banerjee, S B Bracker, T G Carter, L Chen-Tokarek, K Denisenko, A M Halling, C C James, S Kwan, B G Lundberg, K A Thorne  
 ILLINOIS TECH - R A Burnstein, P A Kasper, K C Peng, H A Rubin  
 KANSAS STATE U - M Aryal, A Nguyen, N W Reay, R A Sidwell, N R Stanton, A Tripathi, N Witchev, S Yoshida, C Zhang  
 MEXICO, IPN - A Gago, G Herrera-Corral  
 MISSISSIPPI U - E M Aitala, L M Cremaldi, K N Gounder, A Rafatian, J J Reidy, D J Summers, D Y Yi  
 OHIO STATE U - K Reibel  
 PRINCETON U - D Langs, A Schwartz, J Wiener  
 PUEBLA U, MEXICO - E Cantoral, A B D'Oliveira, A Fernandez  
 RIO DE JANEIRO U - H D S Carvalho, A J Ramalho  
 SOUTH CAROLINA U - N Coptly, M V Purohit (✓ Spokesperson)  
 STANFORD U - P R Burchat, R Zaliznyak  
 TEL AVIV U - D Ashery, S Gerzon, G Hurvits, J Lichtenstadt, S Maytal-Beck, R Weiss-Babai  
 TUFTS U - R H Milburn, A Napier  
 WISCONSIN U - S A Radeztsky, M C Sheaff, K Stenson, S Watanabe  
 YALE U - C L Darling, A J Slaughter, S F Takach, E J Wolin

Accelerator FNAL-TEV Detector TPS

##### Reactions

$\pi^-$  nucleus  $\rightarrow$  charm X 500 GeV ( $E_{lab}$ )  
 $\pi^-$  nucleus  $\rightarrow$  bottom X "

Particles studied charm, bottom

Brief description Continues studies of FNAL-769. Emphasizes charm physics and a first look at bottom hadroproduction. Targets are Pt, and C foils. Some 20 billion events are collected. More than 200,000 charm decays are fully reconstructed. Data analysis in progress (July 96).

Journal papers NIM A324 (1993) 535, PL B371 (1996) 157, PL B379 (1996) 292, and PRL 76 (1996) 364. More publications expected.

Related experiments FNAL-653, FNAL-687, FNAL-691, FNAL-769, CERN-WA-082, CERN-WA-089

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WWW Home-page

<http://fnphyx-www.fnal.gov/experiments/e791/welcome.html>

### FNAL-799

(Proposed Jan 1989, Approved Jun 1989, Began data-taking Oct 1991, In progress)

#### SEARCH FOR THE DECAY $K_L \rightarrow \pi^0 e^+ e^-$

UCLA - K Arisaka, D Chen, S M Field, J R Jennings, J Kubie, D Roberts, W E Slater, M Weaver  
 UC, SAN DIEGO - H G E Kobrak, E Potter, R A Swanson, G A White  
 CHICAGO U - E C Blucher, G C Bown, R A Briere, S Bright, E Cheu, G E Graham, J Graham, D Harris, R S Kessler, G D Makoff, K Mcfarland, V Prasad, G B Quinn, A J Roodman, B Schwingenheuer, P S Shawhan, N Solomey, Y W Wah (✓ Spokesperson), B D Winstein, R Winston, E D Zimmerman

COLORADO U - A R Barker, D Fillmore, P L Mikelsons, U Nauenberg, J-Y Wu  
 ELMHURST COLL - E C Swallow  
 FERMILAB - R Ben-David, G J Bock, S R Childress, R N Coleman, M B Crisler, J Enagonio, R L Ford, Y B Hsiung, D A Jensen, T Kobilarcik, H Nguyen, V O'Dell, R Pordes, S A Pordes, D R Pushka, E J Ramberg, R E Ray, Jr, A I Ronzhin, K C Stanfield, R S Tschirhart, K Vaziri, H B White, J Whitmore  
 ILLINOIS U, URBANA - E Collins, G D Gollin  
 OSAKA U - K Hanagaki, M Hazumi, T Hazumi, S Hidaka, F Kato, T Nakaya, M Sadamoto, M Sogo, M Yagi, T Yamanaka (✓ Spokesperson)  
 RICE U - J Barnes, II, M D Corcoran, B P Padley  
 RUTGERS U - I F M Albuquerque, J W Belz, P M Haas, E Halkiadakis, W P Hogan, S K Kim, A Lath, J N Matthews, S S Myung, G Ping, S R Schnetzer, S V Somalwar, R L Stone, R Tesarek, G B Thomson, Y Zou  
 VIRGINIA U - M W Arenton, B B Cox, H Duan, K Hagan-Ingram, V Jejer, S Ledovsky, A P Mcmanus, K S Nelson  
 WISCONSIN U - A Alavi-Harati, T Alexopoulos, A R Erwin

Accelerator FNAL-TEV Detector Spectrometer, Calorimeter

##### Reactions

$p$ nucleon $\rightarrow \Lambda X$	800 GeV/c
$p$ nucleon $\rightarrow \bar{\Lambda} X$	"
$K_L \rightarrow \pi^0 e^+ e^-$	50-150 GeV/c
$K_L \rightarrow \pi^0 \mu^+ \mu^-$	"
$K_L \rightarrow \pi^0 \nu_e \bar{\nu}_e$	"
$K_L \rightarrow e^+ e^- e^+ e^-$	"
$K_L \rightarrow e^+ e^- \gamma \gamma$	"
$K_L \rightarrow \mu^+ \mu^- \gamma$	"
$K_L \rightarrow \pi^0 \pi^0 \gamma$	"
$\pi^0 \rightarrow e^+ e^-$	"
$\pi^0 \rightarrow e^+ \mu^-$	"
$\pi^0 \rightarrow e^- \mu^+$	"

Particles studied  $K_L, \pi^0, \Lambda$

Brief description The goal is to use rare  $K_L$  decays as a probe for the CP violation. Phase-I modifies the existing apparatus of FNAL-731 to handle increased  $K_L$  flux and an extended decay region, and to provide a better muon identification. Studies various multibody rare  $K_L$  decays, and  $\pi^0$  decays. Phase-I completed data taking in January 92. Phase-II uses a new beamline and a new detector including a new CsI calorimeter to improve the rejection of  $K_L \rightarrow e^+ e^- \gamma \gamma$  background from the  $K_L \rightarrow \pi^0 e^+ e^-$  signal. It also uses a new transition radiation detector (TRD) to achieve a better  $\pi/e$  rejection. The sensitivity is expected to approach the  $10^{-11}$  level for many rare  $K_L$  decays. See also the closely related FNAL-832 experiment. Phase-II is now taking data (July 96).

Journal papers PRL 71 (1993) 31, PRL 71 (1993) 3914, PRL 71 (1993) 3918, PL B320 (1994) 407, PL B338 (1994) 403, PRL 72 (1994) 3000, PRL 72 (1994) 3758, PRL 73 (1994) 2169, PR D50 (1994) 1874, and PRL 74 (1995) 3323.

Related experiments FNAL-731, FNAL-773, FNAL-832

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### FNAL-800

(Proposed Mar 1988, Approved Oct 1988, Completed data-taking Jan 1992)

#### MEASUREMENT OF THE MAGNETIC MOMENT OF THE $\Omega^-$ HYPERON

ARIZONA U - D K Fein, E B James, K A Johns (Spokesperson)  
 DEPAUW U - V A Decarlo, P M Tynan  
 FERMILAB - G Allan, R A Rameika (Spokesperson)  
 MICHIGAN U - Y T Gao, M J Longo  
 MINNESOTA U - J A Ayala-Mercado, P M Border, D P Ciampa, G M Guglielmo, K J Heller, J Jililian-Marian, N B Wallace, D M Woods

Accelerator FNAL-TEV Detector Spectrometer

# SUMMARIES OF FERMILAB EXPERIMENTS

## Reactions

$p \text{ Be} \rightarrow \Omega^- X$	800 GeV/c
$\Lambda \text{ Cu} \rightarrow \Omega^- X$	300-500 GeV/c
$\Lambda \text{ Cu} \rightarrow \Xi^- X$	"
$\Xi^0 \text{ Cu} \rightarrow \Omega^- X$	"
$\Xi^0 \text{ Cu} \rightarrow \Xi^- X$	"

## Particles studied

$\Omega^-, \Xi^-$

**Brief description** An extension of FNAL-756. Uses two methods to produce polarized  $\Omega$ 's. The spin transfer method uses 800-GeV protons to produce a secondary neutral beam of polarized  $\Lambda$ 's and  $\Xi^0$ 's, which is then used to produce a tertiary beam of polarized  $\Omega$ 's at 0 mr. The neutral production method uses a secondary beam of unpolarized  $\Lambda$ 's and  $\Xi^0$ 's incident at a production angle to produce polarized  $\Omega$ 's. The spectrometer consists of a set of silicon strip detectors and a set of multiwire proportional chambers.

**Journal papers** PRL 74 (1985) 3732.

**Related experiments** FNAL-756

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## FNAL-803

(Proposed 1990, 1993, Approved Nov 1993, In preparation)

### $\nu_\mu$ TO $\nu_\tau$ OSCILLATIONS

#### COSMOS COLLABORATION

AICHI U OF EDUCATION - K Kodama, N Ushida  
 ATHENS U - G S Tzanakos  
 UC, DAVIS - V Paolone, P M Yager  
 CHANGWON NATIONAL U - C H Hahn  
 CHONNAM NATIONAL U - J Y Kim  
 COLUMBIA U - J M Conrad, M H Shaevitz, E G Stern  
 FERMILAB - V D Bogert, T G Carter, G M Koizumi,  
 B G Lundberg, A J Malensek, J G Morfin, R A Rameika  
 GIFU U - K Nakazawa, S Tasaka  
 GYEONGSANG NATIONAL U - I G Park, J S Song  
 HIROSAKI U - S Kuramata  
 ILLINOIS TECH - R A Burnstein, H A Rubin  
 INDIANA U - C Bower, R M Heinz, L Miller, S Mufson, J Musser  
 KANSAS STATE U - T A Bolton, S McPeck, D L Naples,  
 N W Reay (✓ Spokesperson), R A Sidwell, E Smith,  
 N R Stanton, D M Woods, S Yoshida  
 KINKI U, OSAKA - M Chikawa  
 KOBE U - S Aoki, T Hara  
 KOREA INST SCI - J K Kim  
 KOREA U - J S Kang, C O Kim  
 MICHIGAN U - R C Ball, S Coutu, K Green, D Levin,  
 J Matthews, S McKee, D F Nitz, S Nutter, J K Riles, B P Roe,  
 G Tarle, R P Thun, J C Vander Velde, C Weaverdyck  
 MINNESOTA U - J K Nelson, R W Rusack, V M Singh  
 MOSCOW, ITEP - A Asratyan, M Balats, G Davidenko,  
 A Dolgolenko, G Dzyubenko, A Evdokimov, A Gerasimov,  
 V S Kaftanov, M A Kubantsev, V K Semyachkin, A L Sitnikov,  
 V Verebryusov, V E Vishnyakov  
 NAGOYA INST TECH - Y Isokane, Y Tsuneoka  
 NAGOYA U - K Hoshino, H Kitamura, M Kobayashi,  
 M Miyanishi, M Nakamura, Y Nakamura, S Nakanishi, K Niu,  
 K Niwa, M Nomura, K Saito, H Tajima, K Teraoka  
 OKAYAMA U - K Moriyama, H Shibata  
 OSAKA CITY U - T Okusawa, M Teranaka, T Tominaga,  
 T Watanabe, T Yoshida  
 OSAKA PREFECTURE U - H Okabe, J Yokota  
 OSAKA U OF COMMERCE - G Fujioka, Y Takahashi  
 SEOUL NATIONAL U - J W Kim  
 SOAI U - O Kusumoto  
 SOUTH CAROLINA U - F T Avignone, A Kulik, C Rosenfeld  
 TECHNION - J Goldberg  
 TOHO U - M Adachi, M Kazuno, Y Kobayashi, E Niu, S Ono,  
 H Shibuya, Y Umezawa  
 TUFTS U - T Kafka, A Napier, W P Oliver, J Schneps  
 UCLA - M Atac, D B Cline, W Hong, J Park, J M Rhoades,  
 J K Woo  
 UTSUNOMIYA U - Y Sato, I Tezuka  
 YOKOHAMA NATIONAL U - Y Maeda

**Accelerator** FNAL **Detector** Emulsion, Spectrometer

## Reactions

$\nu_\tau$  nucleon  $\rightarrow \tau X$  —

**Particles studied**  $\nu_\mu, \nu_\tau$

**Brief description** This is a short-baseline neutrino oscillation experiment which searches for the  $\nu_\mu \rightarrow \nu_\tau, \nu_e \rightarrow \nu_\tau$ , and  $\nu_\mu \rightarrow \nu_e$  transitions. Uses the COSMOS detector, a hybrid emulsion - electronic spectrometer sensitive to ultra-small mixing angles for neutrino mass differences in the range larger than 0.1 eV<sup>2</sup>. Resides on a wide band, 10-70 GeV, neutrino beam from Fermilab's new Main Injector. In preparation (July 96).

**Related experiments** FNAL-531, CERN-WA-095, CERN-WA-096

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**WWW Home-page**

<http://roo.physics.lsa.umich.edu/www/e803/e803.html>

## FNAL-811

(Proposed Mar 1991, Approved Jul 1992, Began data-taking Jan 1996, Completed data-taking Feb 1996)

### $\bar{p}p$ ELASTIC SCATTERING

CERN - R DeSalvo, M R Mondardini  
 CORNELL U - C Avila, C M Guss, J Orear (✓ Spokesperson)  
 FERMILAB - W F Baker, D P Eartly, H Jostlein, S M Pruss,  
 R Rubinstein, F Turkot

**Accelerator** FNAL-COLLIDER **Detector** Scintillator

## Reactions

$\bar{p} p \rightarrow \bar{p} p$  1800 GeV (E<sub>cm</sub>)

**Brief description** The detector is a solid bundle of scintillating fibers. The fibers are parallel to the beam, inside the beam pipe. Can be remotely moved close to the beam. Measures  $x$  and  $y$  coordinates of scattered protons to 50-micron accuracy. Scattering angles are small enough to observe Coulomb interference and to use the optical theorem to get total cross-section. Data analysis in progress (July 96).

**Journal papers** NIM A323 (1992) 419, NP (PROC SUPPL) 25B (1992) 261, and NP (PROC SUPPL) 25B (1992) 294.

**Related experiments** FNAL-710

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**WWW Home-page** <http://fne811.fnal.gov:8000/>

## FNAL-815

(Proposed Oct 1990, Approved Jul 1992, Began data-taking May 1996, In progress)

### PRECISION MEASUREMENTS OF NEUTRINO NEUTRAL CURRENT INTERACTIONS USING A SIGN-SELECTED BEAM

#### NUTEV COLLABORATION

ADELPHI U - R V Steiner  
 CINCINNATI U - R Johnson, L P Perera, G W Troha, M Vakili  
 COLUMBIA U - J M Conrad, R Gall, J H Kim, S Koutsoliotas,  
 S Lammers, C McNulty, A Romosan, P C Rowson,  
 M H Shaevitz (✓ Spokesperson), P Spentzouris, E G Stern,  
 A Vaitaitis  
 FERMILAB - R H Bernstein (✓ Spokesperson), L Bugel,  
 G Koizumi, M J Lamm, W L Marsh, K S McFarland, J Yu  
 KANSAS STATE U - T A Bolton, J Goldman, S McPeck,  
 D L Naples, J Norris  
 NORTHWESTERN U - D A Buchholz, L Debarbaro,  
 H M Schellman, G Zeller  
 OREGON U - J E Brau, R B Drucker, R E Frey, D Mason  
 ROCHESTER U - P S Auchincloss, S Avvakumov, A Bodek,  
 H S Budd, P Debarbaro, D Harris, W K Sakumoto, U K Yang  
 XAVIER U - P Nienaber

**Accelerator** FNAL-TEV **Detector** LAB-E

# SUMMARIES OF FERMILAB EXPERIMENTS

## Reactions

$\nu n \rightarrow \mu^- X$  250 GeV ( $E_{lab}$ )  
 $\nu n \rightarrow \nu X$  "

## Particles studied

**Brief description** The primary physics goal is to measure  $\sin^2 \theta_W$  to a precision of  $\pm(0.002-0.003)$ . The high precision is achieved by making use of a new high-intensity sign-selected neutrino beam. The new beam design permits clean separation of  $\nu$  from  $\bar{\nu}$  while providing enough intensity to maintain small statistical errors. Other goals include the study of the QCD scale parameter  $\Lambda$ , the charm mass, the CKM matrix element  $V_{cd}$ , and the effects of the strange quark sea and charm quark sea on proton. Approved for a two-year run. Taking data (July 96).

**Related experiments** FNAL-744, FNAL-770

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**WWW Home-page** <http://cordelia.fnal.gov/NuTeV.html>

## FNAL-831

(Proposed Oct 1990, Approved Dec 1992, In preparation)

### HIGH STATISTICS STUDY OF STATES CONTAINING HEAVY QUARKS USING THE WIDE BAND PHOTON BEAM

#### FOCUS COLLABORATION

UC, DAVIS - J Link, V Paolone, P M Yager  
 RIO DE JANEIRO, CBPF - A L Barbosa, I Bediaga,  
 J C Dos Anjos, C Gobel, G Guedes, I M Pepe, A Reis Correea,  
 F Simao  
 MEXICO, IPN - S Carrillo, E Casimiro, G Herrera-Corral,  
 H Mendez, C Uribe  
 COLORADO U - L Cinquini, J P Cumalat ( $\checkmark$  Spokesperson),  
 E S Erdos, B O'Reilly, E Vaandering  
 FERMILAB - J N Butler, H W K Cheung, S Cihangir, I Gaines,  
 P H Garbincius, L A Garren, S A Gourlay, D J Harding,  
 P H Kasper, A E Kreymer, P L G Lebrun, S Shukla  
 FRASCATI - S Bianco, F Fabbri, M Giardoni, L Passamonti,  
 V Russo, S Sarwar, A Zallo  
 ILLINOIS U, URBANA - C Cawfield, F D Cogswell, R Gardner,  
 K S Park, L Peak, A M Rahimi, J E Wiss  
 KOREA U - B G Cheon, Y S Chung, J S Kang, K Y Kim,  
 K B Lee, S S Myung  
 INFN, MILAN - M Boschini, P D'Angelo, P Inzani, S Malvezzi,  
 D Menasce, E Meroni, L Moroni ( $\checkmark$  Spokesperson), D Pedrini,  
 L Perasso, F P Prelz, A Sala-Grabar, S Sala  
 MILAN U - G Alimonti, G Bellini, B Caccianiga, M Dicatorato,  
 P Dini, M G Giammarchi, F Leveraro, L Milazzo  
 NORTH CAROLINA U - T F Davenport, III  
 NOTRE DAME U - J M Bishop, N M Cason, J M Losecco,  
 W D Shephard  
 PAVIA U - V Arena, O Barnaba, G Boca, G Bonomi, S Eriola,  
 C Casella, E D'Uscio, G Gianini, E Imbres, G Juvino, G Liquori,  
 T Locatelli, M Marchesotti, S P Ratti, C M Riccardi, P Torre,  
 F Vercellati, L Viola, P Vitulo  
 PUEBLA U, MEXICO - E Cantoral, A Fernandez, S Hernandez,  
 G Munoz, J Ramirez  
 PUERTO RICO U, MAYAGUEZ - J Alemar, A M Lopez,  
 L Mendez, A Mirles, E Montiel, H Mourad, J Ramirez,  
 C Rivera, W Rolke, Y L Zhang  
 SOUTH CAROLINA U - N Copty, W Johns, M V Purohit,  
 J R Wilson  
 TENNESSEE U - G T Condo, K Danyo-Blackett, T Handler  
 VANDERBILT U - J W Cao, M Hosack, M Nehring, P D Sheldon,  
 M S Webster  
 WISCONSIN U - M C Sheaff, K Stenson

**Accelerator** FNAL-TEV **Detector** Spectrometer

## Reactions

$\gamma$  nucleus  $\rightarrow$  charm meson X < 250 GeV/c ( $P_{lab}$ )  
 $\gamma$  nucleus  $\rightarrow$  charm baryon X "

**Particles studied**  $\psi$  (unspec), charm

**Brief description** Continues studies of FNAL-687. Uses bremsstrahlung photons from a wide band 250 GeV ( $\pm 15\%$ )

electron beam, a new large-aperture multiparticle spectrometer, a beryllium target, and a silicon microstrip decay-vertex detector. Studies the photoproduction and decay of heavy quarks. Being installed (July 96).

**Related experiments** FNAL-687

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**WWW Home-page** <http://da831.fnal.gov/>

## FNAL-832

(Proposed Oct 1990, Approved Jun 1992, Began data-taking Jul 1996, In progress)

### SEARCH FOR DIRECT CP VIOLATION IN THE $2\pi$ DECAYS OF THE NEUTRAL KAON

#### KTEV COLLABORATION

UCLA - K Arisaka, S M Field, J R Jennings, J Kubicek, W E Slater  
 UC, SAN DIEGO - H G E Kobrak, E Potter, R A Swanson,  
 G A White  
 CHICAGO U - E C Blucher, G C Bown, S Bright, E Cheu,  
 G E Graham, J Graham, R S Kessler, V Prasad, G B Quinn,  
 A J Roodman, P S Shawhan, N Solomey, Y W Wah,  
 B D Winstein ( $\checkmark$  Spokesperson), R Winston, E D Zimmerman  
 COLORADO U - A R Barker, D Fillmore, P L Mikelsons,  
 U Nauenberg, J Y Wu  
 ELMHURST COLL - E C Swallow  
 FERMILAB - L Bellantoni, R Ben-David, G J Bock,  
 S R Childress, R N Coleman, M B Crisler, R L Ford,  
 Y B Hsiung ( $\checkmark$  Spokesperson), D Jensen, T Kobilarcik,  
 T Nakaya, H Nguyen, V O'Dell, M Pang, R Pordes, S A Pordes,  
 D R Pushka, E J Ramberg, R E Ray, Jr, A I Ronzhin,  
 P Shanahan, K C Stanfield, R S Tschirhart, K Vaziri,  
 H B White, J Whitmore  
 OSAKA U - K Hanagaki, M Hazumi, T Hazumi, S Hidaka,  
 F Kato, Y Matsumiya, M Sadamoto, M Sogo, M Takita,  
 T Tsuji, M Yagi, T Yamanaka  
 RICE U - A Bellanvance, M D Corcoran, B P Padley  
 RUTGERS U - I F M Albuquerque, S Averitte, J W Belz,  
 E Halkiadakis, A Lath, S R Schnetzer, S V Somalwar,  
 R L Stone, R Tesarek, G B Thomson  
 VIRGINIA U - M W Arenton, B B Cox, K Hagan-Ingram,  
 V Jejer, S Ledovskoy, A P Mcmanus, K S Nelson  
 WISCONSIN U - A Alavi-Harati, T Alexopoulos, A R Erwin

**Accelerator** FNAL-TEV **Detector** Spectrometer, Calorimeter

## Reactions

$K_L \rightarrow \pi^+ \pi^-$  30-160 GeV/c ( $P_{lab}$ )  
 $K_L \rightarrow \pi^0 \pi^0$  "  
 $K_L \rightarrow \pi^+ \pi^- \gamma$  "  
 $K_L \rightarrow \pi^0 \gamma \gamma$  "  
 $K_L \rightarrow \pi^0 \nu \bar{\nu}$  "  
 $K_S \rightarrow \pi^+ \pi^-$  "  
 $K_S \rightarrow \pi^0 \pi^0$  "  
 $K_S \rightarrow \pi^+ \pi^- \gamma$  "

**Particles studied**  $K_L, K_S$

**Brief description** Measures the direct CP violation parameter

$Re(\epsilon'/\epsilon)$  to the precision of  $10^{-4}$ . The new neutral kaon beam facility, KTeV, is constructed to give five times more flux, with reduced muon background and accidental rate. The apparatus gives twice as long a decay region, higher rate capability, and more hermetic photon veto coverage against the  $3\pi^0$  background. The position and energy resolution of the electromagnetic calorimeter (CsI) for electron and photon are improved. Uses a beryllium target. Taking data (July 96).

**Journal papers** NIM A367 (1995) 252, and NIM A368 (1996) 653

**Related experiments** FNAL-731, -773, -799, CERN-NA-048

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 hsiung@fnal.gov

**WWW Home-page** <http://fnphyx-www.fnal.gov/experiments/ktev/ktev.html>

## SUMMARIES OF FERMILAB EXPERIMENTS

### FNAL-835

(Proposed 1992, Approved Dec 1993, In preparation)

#### STUDY OF CHARMONIUM SPECTROSCOPY IN PROTON-ANTIPROTON ANNIHILATION

##### CHARMONIUM COLLABORATION

UC, IRVINE - K E Gollwitzer, M A Mandelkern, J Schultz, M Thompson, G Zioulas  
 FERMILAB - M D Church, A A Hahn, W L Marsh, J Peoples, Jr, S A Pordes, P A Rapisdi, J Streets, S Werkema  
 FERRARA U - M Ambrogiani, W Baldini, D Bettoni, M Bombanoti, D Bonsi, R Calabrese, P Dalpiaz, E Luppi, R Mussa, M Savrie, G Stancari  
 INFN, GENOA - A Buzzo, M Lovetere, M Macri, M M Marinelli, M Pallavicini, C Patrignani, M G Pia, E Robutti, A Santroni  
 NORTHWESTERN U - X L Fan, S Jin, P Maas, T K Pedlar, J L Rosen, K K Seth  
 TURIN U - G Borreani, R Cester (✓ Spokesperson), F Marchetto, E A Menichetti, N M Pastrone

Accelerator FNAL Detector Tracking system, Calorimeter

##### Reactions

$\bar{p} p \rightarrow$ charm charm	3-7 GeV/c (P <sub>lab</sub> )
$\bar{p} p \rightarrow e^+ e^-$	"
$\bar{p} p \rightarrow \gamma$ 's	"
$\bar{p} p \rightarrow \bar{p} p$	"
$\bar{p} p \rightarrow \phi \phi$	"

Particles studied  $\eta_c(1S)$ ,  $\eta_c(2S)$ ,  $h_c(1P)$ ,  $\chi_{c0}(1P)$ ,  $D$

Brief description Continues the program of the FNAL-760 experiment in order to complete the study of the masses, widths and branching fractions of charmonium states. Adds a search for cryptoexotics and a study of  $J/\psi$  formation in nuclear matter. Improvements in the apparatus include: increased density of the internal target, better charged particle detection, an upgrade in the central calorimetry and a new data acquisition architecture. This is an Accumulator Ring experiment. Being installed (July 96).

Related experiments FNAL-760

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WWW Home-page <http://www-e835.fnal.gov/>

### FNAL-866

(Proposed Sep 1992, Approved Dec 1992, In preparation)

#### MEASUREMENT OF THE RATIO OF ANTIQUARK DISTRIBUTIONS $\bar{d}(x)/\bar{u}(x)$ IN THE PROTON

##### NUSEA COLLABORATION

ABILENE CHRISTIAN U - L D Isenhower, M E Sadler, R S Towell, D Wise  
 ARGONNE - K G Bailey, D F Geesaman, H E Jackson, Jr, C Jones, S Kaufman, R Kowalczyk, N Makins, T O'Neill, D H Potterveld, J Reinhold, B Zeidman, A Zeuli  
 FERMILAB - C N Brown, W E Cooper, C S Mishra  
 GEORGIA STATE U - X C He, W M Lee, G Pettitt  
 ILLINOIS TECH - D M Kaplan  
 LOS ALAMOS - M L Brooks, T A Carey, F Federspeil, G T Garvey, D M Jansen, D M Lee, M J Leitch, J B McClelland, P L McGaughey (✓ Spokesperson), C L Morris, J M Moss, B K Park, J C Peng, W Sondheim, T Thompson  
 LOUISIANA STATE U - P N Kirk, Y C Wang, Z F Wang  
 NEW MEXICO STATE U - M Beddo, G Bureson, T H Chang, J Haas, G S Kyle, V Papavassilio, Z M Wang  
 OAK RIDGE - T Awes, H Kim, F Obenshain, F Plasil, S Saini, P Stankus, G R Young  
 TEXAS A AND M - C A Gagliardi, E Hawker, R E Tribble  
 VALPARAISO U, INDIANA - D D Koetke, P Nord, S Stanislaus

Accelerator FNAL-TEV Detector Spectrometer

##### Reactions

$p$ nucleon	800 GeV (T <sub>lab</sub> )
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Particles studied  $p$

Brief description The experiment is a precision measurement of Drell-Yan yields from hydrogen and deuterium. The ratio of these yields can be used to infer the ratio  $\bar{u}(x)/\bar{d}(x)$  in the proton, over the  $x$  interval between 0.03 and 0.3. Measures also the  $J/\psi$ ,  $\psi'$ ,  $\Upsilon$ ,  $\Upsilon'$ , and  $\Upsilon''$  yields from both targets. Uses the Magnetic Dilepton Spectrometer, with 3 dipoles, 3 stations of wire chambers, 1 station with prop-tubes, 4 hodoscope stations, and high rate capability with better than 100 MeV resolution at the  $J/\psi$ . Beam produces  $10^{12}$  protons/spill. Targets are LH and LD. Being installed (July 96).

Related experiments FNAL-772, CERN-NA-051

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WWW Home-page <http://p2hp2.lanl.gov/e866/e866.html>

### FNAL-868

(Proposed Sep 1992, Approved Mar 1993, Began data-taking Apr 1995, Completed data-taking Jul 1995)

#### SEARCH FOR ANTIPROTON DECAY AT THE ANTI-PROTON ACCUMULATOR

##### APEX COLLABORATION

UCLA - C D Buchanan, B Corbin, M A Lindgren, T Muller  
 FERMILAB - S Geer (✓ Spokesperson), J P Marriner, M Martens, R E Ray, Jr, J Streets, W C Wester  
 MICHIGAN U - H R Gustafson  
 NEBRASKA U - M J Hu, G R Snow  
 PENN STATE U - T A Armstrong

Accelerator FNAL-TEV Detector Calorimeter

##### Reactions

$\bar{p} \rightarrow e^- X$	8.9 GeV/c (P <sub>lab</sub> )
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Particles studied  $\bar{p}$

Brief description The detector consists of a calorimeter, fiber tracker, pre-radiator, DEDX, and vetos. Uses the Antiproton Accumulator facility. Data analysis in progress (July 96).

Related experiments FNAL-861

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WWW Home-page <http://fnapx1.fnal.gov/>

### FNAL-871

(Proposed Oct 1993, Approved Jul 1994, In preparation)

#### SEARCH FOR $CP$ VIOLATION IN THE DECAYS OF $\Xi^- / \Xi^+$ AND $\Lambda / \bar{\Lambda}$ HYPERONS

##### HYPERCP COLLABORATION

TAIWAN, INST PHYS - A Chan, Y C Chen, K C Cheng, C L Ho, M Huang, S C Lee, P K Teng  
 SOUTH ALABAMA U - R K Clark, C M Jenkins  
 LBL & UC, BERKELEY - W S Choong, R Fuzesy, G Gidal, P Gu, K B Luk (✓ Spokesperson), B Turko  
 FERMILAB - T Carter, M Crisler, C C James, J T Volk  
 GUANAJUATO U - J Felix-Valdez, G Moreno, M A Sosa Aquino  
 ILLINOIS TECH - S Biedron, R A Burnstein, J A Drapala, D M Kaplan, L M Lederman, W Luebke, A Ozturk, H A Rubin, D Sowinski, C White, S White  
 LAUSANNE U - N Leros, J-P Perroud  
 MICHIGAN U - H R Gustafson, M J Longo  
 VIRGINIA U - K Bodoor, S Conetti, E C Dukas (✓ Spokesperson), C Durandet, K S Nelson, D Rajaram, N Saleh, H-G Zhu

Accelerator FNAL-TEV Detector Spectrometer, Spectrometer

##### Reactions

$p$ nucleon $\rightarrow \Xi^- X$	150 GeV/c
$p$ nucleon $\rightarrow \Xi^+ X$	"

Particles studied  $\Xi^-, \Xi^+, \Omega^-, \bar{\Omega}^+$

Brief description Unpolarized  $\Xi^-$  and  $\Xi^+$  hyperons are produced by protons and momentum selected by a magnetic

## SUMMARIES OF FERMILAB EXPERIMENTS

channel. The decay sequences  $\Xi^- \rightarrow \Lambda\pi^-$ ,  $\Lambda \rightarrow p\pi^-$ , and  $\Xi^+ \rightarrow \bar{\Lambda}\pi^+$ ,  $\bar{\Lambda} \rightarrow \bar{p}\pi^+$ , are detected with a wire chamber spectrometer with high-rate capability. By studying the angular distribution of  $p$  ( $\bar{p}$ ) with respect to the helicity axis in the  $\Lambda$  ( $\bar{\Lambda}$ ) rest frame, the decay parameter  $\alpha$  ( $\alpha$ -bar) can be extracted. The  $CP$  symmetry is violated if there is any difference between the products ( $\alpha_\Lambda\alpha_\Xi$ ), and ( $\alpha_{\bar{\Lambda}}\alpha_{\bar{\Xi}}$ ). The apparatus, 60 m long, consists of a hyperon magnet, nine wire chamber stations, a momentum analyzing magnet, two planes of hodoscopes for timing and triggering purposes, and a hadronic calorimeter for triggering. A muon detection system at the rear of the spectrometer allows searches for rare and forbidden hyperon decays. Under construction (July 96).

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*WWW Home-page* <http://beauty1.lbl.gov/e871.html>

### FNAL-872

(Proposed Jan 1994, Approved Jun 1994, In preparation)

#### MEASUREMENT OF $\tau$ LEPTON PRODUCTION FROM THE PROCESS $\nu_\tau + N \rightarrow \tau + X$

##### E872 COLLABORATION

AICHI U OF EDUCATION - K Kodama, N Ushida  
 ATHENS U - N Giokaris, G S Tzanakos  
 UC, DAVIS - V Paolone ( $\checkmark$  Spokesperson), P M Yager  
 KANGWEON NATIONAL U - C H Hahn  
 CHONNAM NATIONAL U - J-Y Kim  
 FERMILAB - B R Baller, D Boehnlien, W S Freeman,  
 B G Lundberg ( $\checkmark$  Spokesperson), J G Morfin, R A Rameika  
 GYEONGSANG NATIONAL U - S H Chung, I G Park, J-S Song  
 KOBE U - S Aoki, T Hara  
 KON-KUK U - J T Rhee  
 KOREAN NATIONAL EDUCATION U - S N Kim  
 MINNESOTA U - P M Border, D P Ciampa, K J Heller,  
 R W Rusack, J Sielaff, J J Trammell, J O Wilcox  
 NAGOYA U - N Hashizume, K Hoshino, H Iinuma, K Ito,  
 M Kobayashi, M Miyaniishi, K Nakajima, M Nakamura, K Niwa,  
 N Nonaka, K Okada, K Saito, K Yamamori  
 OSAKA PREFECTURE U - H Okabe  
 PUSAN NATIONAL U - W H Chung  
 SOUTH CAROLINA U - A Kulik, C Rosenfeld  
 TOHO U - M Adachi, M Kazuno, Y Kobayashi, E Niu, S Ono,  
 H Shibuya, Y Umezawa  
 TUFTS U - T Kafka, A Napier, W P Oliver, J Schneps,  
 M Skender  
 UTSUNOMIYA U - Y Sato, I Tezuka  
 WONKWANG U - S Y Bahk

*Accelerator* FNAL-TEV *Detector* Spectrometer

*Brief description* Measures the production of  $\tau$  leptons in the charged-current interactions of  $\tau$  neutrinos. The neutrinos are produced in a beam dump by the 800 GeV proton beam, and interact in an emulsion target. The resulting  $\tau$  leptons are subsequently detected in a high resolution hybrid emulsion spectrometer, providing a direct confirmation of the existence of the  $\tau$  neutrino. Under construction (July 96).

*Related experiments* FNAL-803, CERN-WA-095

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*WWW Home-page* <http://fn872.fnal.gov/>

### FNAL-875

(Proposed Jan 1995, Approved May 1995, In preparation)

#### LONG BASELINE NEUTRINO OSCILLATION EXPERIMENT

##### MINOS COLLABORATION

ARGONNE - I Ambats, D S Ayres ( $\checkmark$  Deputy Spokesperson),  
 L J Balka, R E Blair, D A Crane, J W Dawson, T H Fields,  
 M C Goodman, V J Guarino, N F Hill, D J Jankowski,  
 E N May, S Mrenna, L E Price, P Schoessow, R V Seidlein,  
 R Talaga, K M Thompson, J Thron, L R Turner

BOSTON COLL - T E Toohig  
 CAL TECH - B C Barish, D L Burke, J Hanson, N P Longley,  
 D G Michael, C W Peck  
 COLUMBIA U - Y Ho, W Lee  
 FERMILAB - R H Bernstein, V D Bogert, D Coissart,  
 W S Freeman, J Hylen, D E Johnson, G M Koizumi,  
 G Mitselmakher, J G Morfin, F A Nezzrick, S C O'Day,  
 R A Rameika, A L Read, W Smart, A Wehman, S Werkema,  
 C P Yun  
 BEIJING, IHEP - J Guo, T Hu, Y Lai, H Mao, B Shen, M Wang,  
 X Xia, Y Xie, W Yan  
 INDIANA U - C Bower, M Gebhard, R W Hatcher, R M Heinz,  
 L Miller, S Mufson, J A Musser  
 DUBNA - S Afanasjev, G D Alexeev, S Borodin, V Brudanin,  
 G Chelkov, Y A Gornushkia, M Ignatankio, N Khovanski,  
 Z V Krumstein, S Olshevski, A B Sadovski, A Sisakian,  
 V Timofeev, L Tkatchev, A I Zinchenko  
 LIVERMORE - E Ables, R Bionta, R Carney, E P Hartouni,  
 T Ladran, M Libkind, H Olsan, L Ott, E Parker, J Swan,  
 D Wright, C Wuest, T Yokota  
 LEBEDEV INST - V A Chechin, E P Kuznetsov, V A Tsarev  
 MINNESOTA U - T Berg, P M Border, T Chase, D P Ciampa,  
 H W J Courant, P Cushman, K J Heller, M L Marshak,  
 D E Maxam, J Meier, B Miller, J K Nelson, E A Peterson,  
 K Ruddick, R W Rusack, M H Schub  
 MOSCOW, ITEP - V Smotriaev, I Trostin  
 OAK RIDGE - C L Britton, W Bryan, U Jagadish  
 OXFORD U - W W M Allison, C B Brooks, J H Cobb, S Cooper,  
 H Gallagher, A R Holmes, D H Perkins, D A Petyt, P D Shield,  
 J Thomas, R L Wastie, N West  
 RUTHERFORD - G J Alner, R J Cotton, R Edgecock, G Grayer,  
 P J Litchfield, G F Pearce  
 STANFORD U - G Irwin, S G Wojcicki ( $\checkmark$  Spokesperson)  
 SUSSEX U - J Byrne, P G Dawber, K Green, P G Harris,  
 D White  
 TEXAS U - K Lang  
 INDIANA U AND M - A D David, N Diaczenko, M Drew, H-  
 J Trost, R C Webb  
 TUFTS U - T Kafka, W A Mann, R H Milburn, A Napier,  
 W P Oliver, J Schneps  
 WESTERN WASHINGTON U - W L Barrett

*Accelerator* FNAL *Detector* Calorimeter

*Particles studied*  $\nu$

*Brief description* The MINOS (Main Injector Neutrino Oscillation Search) collaboration proposes to conduct a search for  $\nu_\mu \rightarrow \nu_\tau$  and  $\nu_\mu \rightarrow \nu_e$  oscillations using a new wide band (15 GeV)  $\nu_\mu$  beam from the Main Injector with energies well above the  $\tau$  production threshold. The oscillations will be detected by the comparison of signals in a 'near' detector at Fermilab and a 'far' detector situated 730 km away in the Soudan underground laboratory. A new 10 kton detector will be built at Soudan to allow the study of the oscillation parameters down to  $\Delta(m^2) = 0.002 \text{ eV}^2$  and  $\sin^2(2\theta) = 0.01$ . The existing, much finer grained but smaller, SOUDAN-2 detector (see the UNDERGROUND-SOUDAN-2 experiment) will provide an independent check of any potential signal with  $\sin^2(2\theta) > 1/30$ . In preparation (July 96).

*Related experiments* UNDERGROUND-ICARUS, KEK-362

*E-mail contact* sgweg@slac.stanford.edu, mcg@hep.anl.gov

*WWW Home-page*

<http://www.hep.anl.gov/NDK/Hypertext/numi.html>

### FNAL-876

(Proposed Jan 1995, Approved Aug 1995, Began data-taking Dec 1995, Completed data-taking Feb 1996)

#### CDF HARD DIFFRACTION STUDIES

##### CDF COLLABORATION

*Accelerator* FNAL-COLLIDER *Detector* CDF, Other

*Reactions*

$\bar{p} p \rightarrow \bar{p} X$

## SUMMARIES OF FERMILAB EXPERIMENTS

**Brief description** Studies hard and high mass diffraction as a part of the CDF QCD program. The physics goal is a better understanding of the nature of the pomeron's constituents. Detects quasielastically scattered (anti)protons with the precision track detectors (scintillating fiber hodoscopes backed up by a trigger counter), inserted in movable Roman Pots. The track measurement together with the vertex information from the CDF vertex detector can be used to select the high-mass diffractive events. The experiment is carried out in parallel with the other CDF studies, and with the participation of the full CDF Collaboration. Data analysis in progress (July 96). To learn more about the program, please contact the Spokesperson for the Hard Diffraction Group, Dr. Michael Albrow [Fermilab]

**Related experiments** CERN-UA-008, FNAL-741

**E-mail contact** albrow@fnal.gov

**FNAL-853** (Completed data-taking Feb 1996)

### TEST OF LOW INTENSITY EXTRACTION FROM THE TEVATRON USING CHANNELING IN A BENT CRYSTAL

Spokespersons: Gerry P. Jackson, C.Thornton Murphy [Fermilab]

**E-mail contact** thornton@fnal.gov, gpj@fnal.gov

**WWW Home-page** <http://calvin.fnal.gov/~sathyade/cex.html>

**FNAL-855** (Completed data-taking Dec 1991)

### TEST BEAM REQUEST TO DIRECTLY MEASURE $dE/dx$ OF HIGH ENERGY MUONS FROM 150 TO 650 GeV/c IN THE MUON LABORATORY

Spokesperson: George R. Kalbfleisch [Oklahoma U.]

**E-mail contact** grk@fnal.gov

**FNAL-861** (Completed data-taking Oct 1992)

### SEARCHING FOR ANTIPROTON DECAY AT THE FERMILAB ANTIPROTON SOURCE

By APEX Collaboration

Spokesperson: Steve Geer [Fermilab]

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**WWW Home-page** <http://fnapx1.fnal.gov/>

**FNAL-862** (In preparation)

### DETECTION OF RELATIVISTIC ANTI-HYDROGEN ATOMS PRODUCED BY PAIR PRODUCTION WITH POSITRON CAPTURE

By ANTIHYDROGEN Collaboration

Spokesperson: David C. Christian [Fermilab]

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**WWW Home-page** <http://fnphyx-www.fnal.gov/experiments/e862/e862.html>

**FNAL-864** (Completed data-taking Feb 1996)

### MINIMAX: A TEST / EXPERIMENT FOR THE FERMILAB COLLIDER

Spokespersons: Cyrus C. Taylor [Case Western Reserve U.], James D. Bjorken [SLAC]

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**WWW Home-page** <http://fnmine.fnal.gov/>

## Other FNAL Experiments

Listed here are some other Fermilab experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also a detailed description of the ongoing projects at the Lab in the annual report 'Fermilab Research Program - Workbook', or visit the Web site [http://www.fnal.gov/faw/fermilab\\_at\\_work.html](http://www.fnal.gov/faw/fermilab_at_work.html)

**FNAL-683** (Completed data-taking Jan 1992)

### PHOTOPRODUCTION OF HIGH $p_{\perp}$ JETS

Spokesperson: Marjorie D. Corcoran [Rice U.]

**E-mail contact** corcoran@physics.rice.edu, corcoran@fnal.gov

**FNAL-706** (Completed data-taking Jan 1992)

### A COMPREHENSIVE STUDY OF DIRECT PHOTON PRODUCTION IN HADRON INDUCED COLLISIONS

By E706 Collaboration

Spokesperson: Paul F. Slattery [Rochester U.]

**E-mail contact** slattery@urhep.pas.rochester.edu

**FNAL-793** (In preparation)

### EMULSION EXPOSURE TO 1000 GeV, OR HIGHEST ENERGY PROTONS

Spokesperson: Jere J. Lord [Washington U., Seattle]

**E-mail contact** lord@phys.washington.edu

**FNAL-802** (Completed data-taking Dec 1991)

### DEEP INELASTIC MUON INTERACTIONS WITH NUCLEAR TARGETS USING THE EMULSION TELESCOPE TECHNIQUE

Spokespersons: Lali Chatterjee, Dipak Ghosh [Jadavpur U.]

**E-mail contact** thornton@fnal.gov

**FNAL-843** (Completed data-taking Jul 1991)

### INTERACTIONS OF 50, 100, AND 490 GeV MUONS WITH EMULSION NUCLEI

Spokesperson: C.O. Kim [Korea U.]

## FNAL Future Plans

The 800-GeV fixed target run will continue until early 1998. Typical intensities of  $2.5 \times 10^{13}$  per Tevatron cycle are anticipated, with the experimental program including  $\epsilon'/\epsilon$ , rare kaon decays, charm physics,  $\sin^2 \theta_W$  from neutrino scattering, and observation of  $\nu_{\tau}$ . Completion of commissioning of the Main Injector and Recycler is expected by mid 1999, when the upgraded CDF and D0 detectors will start a run. The goal of the run is to deliver at least  $2 \text{ fb}^{-1}$  to each of the detectors by 2003. The peak luminosity goal is  $2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ . Construction of the NuMI facilities at Fermilab and Soudan (Minnesota) should begin in 1999, and the two neutrino oscillation experiments will start data taking upon completion. Slow spill 120 GeV protons from the Main Injector will be used for fixed target experiments concurrently with the Tevatron collider program.



## Selected DAPHNE Experiments

**FRASCATI-DAPHNE-KLOE**

(Proposed 1992, Approved Mar 1993, In preparation)

**A LARGE GENERAL PURPOSE DETECTOR FOR  $CP$  VIOLATION STUDIES IN  $e^+e^-$  ANNIHILATIONS AT  $\phi$** 

## KLOE COLLABORATION

BARI U & INFN, BARI - O Enriquez, A Farilla, F Ruggieri  
 FRASCATI - A Andryakov, A Antonelli, M Antonelli, D Babusci,  
 R Baldini-Ferroli, S Bellucci, G Bencivenni, S Bertolucci,  
 C Bloise, F Bossi, A Calcaterra, P Campana, G Capon,  
 M Carboni, M Cordelli, R De Sangro, P De Simone, F Donno,  
 G Felici, M L Ferrer, G Finocchiaro, A Gaddi, E Gero,  
 W Grandegger, R Haydar, L Keeble, P Laurelli, A Martini,  
 S Miscetti, S Moccia, F Murtas, G P Murtas, E Pace, V Patera,  
 F Pelucchi, M Piccolo, P Santantonio, M Spinetti, P Valente,  
 X L Wang, S Wolffe, A Zallo

FRASCATI & SUNY, STONY BROOK - J Lee-Franzini  
 KARLSRUHE U - K Barth, A Denig, M Imhof, C Joram,  
 W Kluge, U von Hagel, S Weseler, R Wieser

LECCE U & INFN, LECCE - G Cataldi, P Creti, V Elia,  
 E Gorini, F Grancagnolo, G F Palama, M Panareo,  
 M Primavera, S Spagnolo

NAPLES U, IFS & INFN, NAPLES - A Aloisio, V Baturin,  
 N Cavallo, F Cevenini, G Chiefari, E Drago, D Fiore, C Gatto,  
 L Merola, M Napolitano, A Smilzo

COLUMBIA U - P M Tufts

PISA U & INFN, PISA - V Bolognesi, F Cervelli, A Ferrari,  
 M Incagli, M M Massai, G Venanzoni

ROME U & INFN, ROME - F Anulli, C Bacci, M Barone,  
 H Beker, C Bini, L Bucci, R Caloi, M Ceru, G De Zorzi,  
 G Di Cosimo, A Di Domenico, **P Franzini** ( $\checkmark$  Spokesperson),  
 P Gauzzi, S Giovanella, F Lacava, G Lanfranchi, A Michetti,  
 A Parri, M Passaseo, E Petrolo, M C Petrucci, L Pontecorvo,  
 E Valente, S Veneziano

ROME U, TORVERGATA - V Bocci, L Cerrito, S D'Angelo,  
 R Messi, L Paoluzi, E Pasqualucci

ROME, ISS - P Branchini, E Graziani, A Passeri, E Spiriti,  
 C Stanescu, L Tortora

SUNY, STONY BROOK - W Kim, M Pollack, R D Schamberger

TRIESTE U, IST FIS & INFN, TRIESTE - G Barbiellini,  
 A Martinis, F Scuri

Accelerator FRASCATI-DAPHNE Detector KLOEParticles studied  $K_S, K_L$ Brief description Studies rare kaon decays, measures  $Re(\epsilon'/\epsilon)$ 

to the precision of  $10^{-4}$ , analyzes other  $CP$  violating parameters in the  $KK$  system. KLOE consists of a 2-m diameter, 3.5-m long helium-filled central drift chamber, a  $4\pi$  electromagnetic calorimeter, and a 2.3-m diameter, 4-m long, 0.6 T superconducting coil. The beam pipe is made of 0.5 mm thick beryllium to minimize multiple scattering and energy loss for charged kaons. In preparation. Expected to run in 1997.

Journal papers PL B287 (1992) 259, NP (PROC SUPPL) 37A (1994) 43, NIM A360 (1995) 48, NIM A360 (1995) 201, NIM A367 (1995) 104, NIM A367 (1995) 108, NIM A354 (1995) 352, and NIM A368 (1996) 628.

E-mail contact paolo@lnf.infn.itWWW Home-page <http://www.lnf.infn.it/kloe/kloedef.html>

## Other DAPHNE Experiments

Listed here is another interesting DAPHNE experiment. Find more details about this projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokesperson.

**FRASCATI-DAPHNE-FINUDA** (In preparation)**FINUDA: A DETECTOR FOR NUCLEAR PHYSICS AT  $DA\Phi NE$** 

By FINUDA Collaboration

Spokesperson: Tullio Bressani [Turin U.]

E-mail contact bressani@to.infn.itWWW Home-page<http://www.lnf.infn.it/esperimenti/finuda/finuda.html>

## SUMMARIES OF ITEP (MOSCOW) EXPERIMENTS

### Selected ITEP Experiments

#### ITEP-895

(Proposed 1989, Approved 1989, Began data-taking 1991, In progress)

#### DETAILED STUDY OF SPECTRA OF $\Lambda$ PARTICLES AND OF THE POLARIZATION IN THE NUCLEAR FRAGMENTATION REGION IN HADRON-NUCLEON INTERACTIONS

##### LAMBDA-III COLLABORATION

MOSCOW, ITEP – V A Akimov, Y D Bayukov, I M Belyaev, M P Bezuglov, B M Bobchenko, E A Doroshkevich, S V Frolov, Y G Grishuk, Y V Kantserov, M M Katz, S M Kiselev, Y V Korchagin, S V Kuleshov, L N Kuleshova, A I Kurzenkov, A A Lebedev, G A Leksin ( $\checkmark$  Spokesperson), N A Pivnyuk, N K Sergeev, V S Serov, S M Shuvalov, A V Smirnitsky ( $\checkmark$  Spokesperson), A V Stavinsky, V P Surin, A V Vlasov, K G Voloshin, L S Vorobyev, A V Yumashev, B V Zagreev, V V Zhurkin  
 KURCHATOV INST, MOSCOW – S L Fokin, M S Ippolitov, A L Lebedev, V I Manko, G M Mgebrishvili, P I Scherbachev, M A Vasilyev

Accelerator ITEP Detector LAMBDA-METER

##### Reactions

$p \text{ Al} \rightarrow \Lambda \text{ X}$                       7.5 GeV/c  
 $p \text{ Pb} \rightarrow \Lambda \text{ X}$                                 "

Brief description The kinetic energy range of the detector is 10–300 MeV. Taking data.

E-mail contact leksin@vitep2.itep.ru, asmirnitsky@vxitep.itep.ru

#### ITEP-913

(Proposed 1990, Approved 1990, Began data-taking 1990, Completed data-taking 1993)

#### STUDY OF THE INTERACTION OF LOW-ENERGY ANTIPROTONS WITH NUCLEI USING THE XENON BUBBLE CHAMBER DIANA

##### DIANA COLLABORATION

MOSCOW, ITEP – V V Barmin, V G Barylov, G V Davidenko, A G Dolgolenko ( $\checkmark$  Spokesperson), V E Lukhmanov, V A Matveev, G S Mirosidei, V A Shebanov, N N Shishov, B S Volkov, N K Zombkovskaya  
 OSLO U – K M Danielsen, T Jacobsen  
 FRASCATI & BUCHAREST, IAP – F Nichitiu, C Petruscu  
 MOSCOW, INR – E S Golubeva, A S Ilyinov, I A Pshenichnov  
 BERGEN U – K Myklebost, J M Olsen  
 FRASCATI – C Guaraldo

Accelerator ITEP Detector HLBC-DIANA

##### Reactions

$\bar{p} \text{ Xe} \rightarrow K_S \text{ X}$                                 < 1 GeV/c ( $P_{\text{lab}}$ )  
 $\bar{p} \text{ Xe} \rightarrow \Lambda (\Sigma^0) \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow \Sigma^0 \text{ X}$                                         "  
 $\bar{p} \text{ Xe} \rightarrow K_S K_S \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K_S \Lambda (\Sigma^0) \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K^+ \Lambda (\Sigma^0) \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K^+ \Sigma^+ \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K^+ \Sigma^- \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K^+ K^+ \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K_S K^- \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K^+ K^- \text{ X}$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K_S \Sigma^+$                                 "  
 $\bar{p} \text{ Xe} \rightarrow K_S \Sigma^-$                                 "  
 $\bar{p} \text{ Xe} \rightarrow \omega \text{ X}$                                         "  
 $\bar{p} \text{ Xe} \rightarrow \eta \text{ X}$                                         "

Brief description Uses the 700-liter Xenon bubble chamber DIANA. Studies the production of strange particles and  $\eta, \omega$  mesons in low-energy  $\bar{p}$  Xe annihilations.

Journal papers YF 55 (1992) 1253 = SJNP 55 (1992) 698, YF 55 (1992) 1268 = SJNP 55 (1992) 705, NP A556 (1993) 409, NP A558 (1993) 361c, YF 57 (1994) 1724 = PAN 57 (1994) 1656, YF 57 (1994) 1905 = PAN 57 (1994) 1835, and PL B370 (1996) 233.

E-mail contact dolgolenko@vxitep.itep.ru

#### ITEP-922

(Proposed 1992, Approved 1992, Began data-taking 1996, In progress)

#### SEARCH FOR H-PARTICLE AND RESONANT STATES IN $\Lambda\Lambda$ SYSTEM

MOSCOW, ITEP – E G Bogdanov, V S Demidov ( $\checkmark$  Spokesperson), N D Galanina, K E Gusev, N A Khaldeeva, V N Markisov, A A Nedosekin, V A Sadykov, M E Vishnevsky, M O Vlasova

Accelerator ITEP Detector Spectrometer

##### Reactions

$n \text{ nucleus} \rightarrow \Lambda \Lambda \text{ X}$                                 4–9 GeV/c ( $P_{\text{lab}}$ )  
 $n \text{ nucleus} \rightarrow \text{dibaryon}(S = -2) \text{ X}$                                 "

Brief description Search for the H-dibaryon through the  $\pi^- p\Lambda$  decay channel. Taking data (July 96).

E-mail contact demidov@vxitep.itep.ru

### Other ITEP Experiments

Listed here are some other ITEP experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

#### ITEP-832 (Taking data)

#### A TRACKING EXPERIMENT FOR STUDY OF DOUBLE BETA DECAY IN $^{136}\text{Xe}$ and $^{150}\text{Nd}$

Spokespersons: V.A. Lyubimov, O.Ya. Zeldovich [Moscow, ITEP]

E-mail contact lubimov@vxitep.itep.ru, zeldovich@vxitep.itep.ru

#### ITEP-853 (Completed data-taking 1991)

#### STUDY OF PIONIC NUCLEAR DEGREES OF FREEDOM IN $(\pi, \pi\pi)$ REACTIONS

Spokespersons: M.V. Kossov, G.A. Leksin [Moscow, ITEP]

E-mail contact kossov@cebaf.gov, leksin@vitep2.itep.ru

#### ITEP-861 (Completed data-taking 1991)

#### SEARCH FOR $^{76}\text{Ge}$ DOUBLE BETA DECAY

Spokesperson: I.V. Kirpichnikov [Moscow, ITEP]

E-mail contact kirpichnikov@vxitep.itep.ru

#### ITEP-865 (Completed data-taking 1992)

#### ANTIPROTON-NUCLEI ANNIHILATION CROSS-SECTIONS WITH Be, C, Al, Fe, Cd, Cu, AND Pb TARGETS AT 0.70, 0.95, 1.26, 1.53, 1.76 AND 2.50 GeV/c

Spokesperson: Yu.B. Lepikhin [Moscow, ITEP]

E-mail contact smirnitsky@vxitep.itep.ru

## SUMMARIES OF ITEP (MOSCOW) EXPERIMENTS

**ITEP-873** (Completed data-taking 1991)

**HIGH-ENERGY CUMULATIVE PARTICLE PRODUCTION AT 10 GeV**

Spokespersons: Yu.T. Kiselev, Yu.V. Terekhov [Moscow, ITEP]  
*E-mail contact* yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

**ITEP-876** (Completed data-taking 1992)

**SEARCH FOR  $^{94}\text{Zr}$  AND  $^{96}\text{Zr}$  DOUBLE BETA DECAYS IN PHOTOGRAPHIC EMULSION**

Spokesperson: A.S. Barabash [Moscow, ITEP]  
*E-mail contact* barabash@vxitep.itep.ru

**ITEP-892** (Completed data-taking 1994)

**STUDY OF  $^4\text{He}$   $p$  INTERACTIONS**

Spokesperson: V.E. Grechko [Moscow, ITEP]  
*E-mail contact* grechko@vitep1.itep.ru

**ITEP-894** (Completed data-taking 1991)

**QUASIPARTICLE VELOCITY MEASUREMENTS**

Spokespersons: G.A. Leksin, A.V. Vlassov [Moscow, ITEP]  
*E-mail contact* leksin@vitep2.itep.ru, vlassov@vxitep.itep.ru

**ITEP-896** (Taking data)

**TWO-NEUTRINO DOUBLE BETA DECAY OF  $^{100}\text{Mo}$  TO THE FIRST EXCITED  $0^+$  STATE IN  $^{100}\text{Ru}$**

Spokespersons: A.S. Barabash [Moscow, ITEP], F.T. Avignone [South Carolina U.]  
*E-mail contact* barabash@vxitep.itep.ru

**ITEP-897** (Completed data-taking 1991)

**STUDY OF  $^4\text{He}$   $\pi^-$  INTERACTIONS**

Spokesperson: V.E. Grechko [Moscow, ITEP]  
*E-mail contact* grechko@vitep5.itep.ru

**ITEP-901** (Taking data)

**QUASIELASTIC ( $\pi^-$ ,  $d$ ) BACKWARD SCATTERING ON NUCLEI AT 0.7–1.3 GeV**

Spokesperson: A.P. Krutenkova [Moscow, ITEP]  
*E-mail contact* krutenkova@vxitep.itep.ru

**ITEP-911** (Completed data-taking 1994)

**FORWARD DIRECTION CUMULATIVE PARTICLE PRODUCTION AT 10 GeV**

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]  
*E-mail contact* yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

**ITEP-912** (Taking data)

**SEARCH FOR NEUTRINOLESS DOUBLE BETA DECAY OF  $^{76}\text{Ge}$**

Spokespersons: I.V. Kirpichnikov [Moscow, ITEP], R.L. Brodzinski [Battelle Memorial Inst., Northwest], F.T. Avignone [South Carolina U.], A. Morales [Zaragoza U.]  
*E-mail contact* kirpichnikov@vxitep.itep.ru, amorales@gae.unizar.es

**ITEP-914** (Taking data)

**MEASUREMENT OF SPIN ROTATION PARAMETERS  $R$  AND  $A$  IN ELASTIC  $\pi p$  SCATTERING**

By ITEP-PNPI Collaboration  
 Spokespersons: V.P. Kanavets [Moscow, ITEP], S.P. Kruglov [St. Petersburg, INP]  
*E-mail contact* alekseev@vitep3.itep.ru, kruglov@lnpi.spb.su

**ITEP-921** (Taking data)

**INVESTIGATION OF QUASICOHERENT AND DEEP INELASTIC INTERACTIONS OF PIONS AND PROTONS WITH NUCLEI**

Spokespersons: V.S. Demidov, I.V. Kirpichnikov [Moscow, ITEP]  
*E-mail contact* demidov@vxitep.itep.ru, kirpichnikov@vxitep.itep.ru

**ITEP-923** (Completed data-taking 1994)

**INCLUSIVE PION DOUBLE CHARGE EXCHANGE ON LIGHT NUCLEI AT 0.7–1.3 GeV/c**

Spokesperson: A.P. Krutenkova [Moscow, ITEP]  
*E-mail contact* krutenkova@vxitep.itep.ru, kulikov@vxitep.itep.ru

**ITEP-941** (Taking data)

**SUBTHRESHOLD  $K^+$  PRODUCTION IN PROTON–NUCLEUS COLLISIONS**

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]  
*E-mail contact* yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

**ITEP-942** (Taking data)

**SEARCH FOR  $D'$  DIBARYON IN  $pp$  INTERACTIONS**

Spokesperson: A.I. Sutormin [Moscow, ITEP]  
*E-mail contact* khanov@vitep5.itep.ru, kulikov@vxitep.itep.ru

**ITEP-951** (Taking data)

**SUBTHRESHOLD  $K^-$  PRODUCTION IN PROTON–NUCLEUS COLLISIONS**

Spokespersons: Yu.T. Kiselev, V.A. Sheinkman [Moscow, ITEP]  
*E-mail contact* yurikis@vxitep.itep.ru, yurikis@vxcern.cern.ch

**NEMO-2** (Taking data)

**DOUBLE BETA DECAY EXPERIMENTS WITH THE TRACKING DETECTOR NEMO-2**

By NEMO Collaboration  
 Spokesperson: S. Jullian [Orsay, LAL]  
*E-mail contact* jullian@lalcls.in2p3.fr, barabash@vxitep.itep.ru

## ITEP Future Plans

The ITEP's U-10 proton synchrotron will continue investigations of particle interactions with nuclei. The program includes experiments on the subthreshold production of particles, studies of cumulative effects, and a search for multi-quark states in nuclei. The synchrotron will also be used to continue polarization experiments in the resonance region, and in a search for exotic resonances. Test beams will be utilized in a development and testing of equipment for experiments at CERN, DESY, FNAL and other facilities. A special proton beam will be devoted to the medical treatment of cancer patients. The study of double beta decays and other rare processes remains another important topic in the ITEP's experimental program.

## SUMMARIES OF JINR (DUBNA) EXPERIMENTS

### Selected JINR Experiments

#### JINR-LHE-0941-1B

(Proposed Sep 1992, Approved Nov 1992, Began data-taking Sep 1993, In progress)

**STUDIES OF POLARIZATION CHARACTERISTICS OF INELASTIC SCATTERING AND BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS ON PROTONS AND COMPARISON WITH DATA OBTAINED WITH NUCLEAR TARGETS**

DUBNA - L S Azhgirey, Y T Borzunov, E V Chernykh,  
L B Golovanov, A D Kirillov, V P Ladygin, L V Malinina,  
P K Manyakov, N M Piskunov (✓ Spokesperson),  
P A Rukoyatkin, I M Sitnik, G D Stoletov, E A Strokovsky  
(✓ Spokesperson), A L Svetov, A P Tsvinev, S A Zaporozhets  
SAMARA AIRSPACE U - P P Korovin  
WILLIAM AND MARY COLL - C F Perdrisat  
SOFIYA, INST CHEM TECH - S Nedev  
KIEV, ITF - A P Kobushkin, A I Syamtomov  
NORFOLK STATE U - V Punjabi

Accelerator JINR Detector ALPHA

Reactions

deut  $p \rightarrow$  deut X 4.5 - 9 GeV/c  
deut  $p \rightarrow$   $p$  X "  
deut nucleus  $\rightarrow$  deut X "

Particles studied  $N(1440 P_{11})$

Brief description One of the goals of the experiment is to study the mechanism of the reaction  $p(N, N')X$  with excitation of  $\Delta$  and  $N^*(1440)$  resonances. The  $p(d, d')X$  reaction is chosen because the excitation of the Roper resonance is enhanced due to the isospin selection rules. A study of the expected interference effects between  $\Delta$  and  $N^*(1440)$  resonances in polarization observables of this reaction is planned. The data will provide valuable information about properties of the Roper resonance and also help resolve the existing theoretical uncertainties. It also measures the tensor analyzing power  $T_{20}$  in inclusive deuteron breakup at 9 GeV/c and  $0^\circ$  on hydrogen and carbon targets.

Journal papers NIM A357 (1995) 386, and PL B361 (1995) 21.

Related experiments JINR-LHE-0941-1C, SATURNE-250, SATURNE-278

E-mail contact piskunov@sunhe.jinr.dubna.su,  
strok@sunhe.jinr.dubna.su

### Other JINR Experiments

Listed here are some other Dubna experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. For a complete description of the current Lab's experimental research program, visit the JINR experiments' Web page at: <http://sunhe.jinr.dubna.su/~strok/explist.html>

#### JINR-LHE-0936-3 (Taking data)

**SEARCH FOR NARROW HADRONIC RESONANCES PRODUCED IN NEUTRON-PROTON INTERACTIONS**

Spokesperson: Yu.A. Troyan [Dubna, JINR]

E-mail contact troyan@lhe09.jinr.dubna.su,  
troyan@sunhe.jinr.dubna.su

#### JINR-LHE-0941-1A (Completed data-taking 1994)

**MEASUREMENTS OF TENSOR ANALYSING POWER IN BACKWARD ELASTIC  $dp$  SCATTERING AND BREAKUP AT  $180^\circ$  (CM) BETWEEN 3.5 - 6.5 GeV/c**

Spokespersons: N.M. Piskunov, I.M. Sitnik, E.A. Strokovsky [Dubna, JINR]

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sitnik@sunhe.jinr.dubna.su, strok@sunhe.jinr.dubna.su

#### JINR-LHE-0941-1C (Taking data)

**SEARCH FOR  $\Delta\Delta$  DIBARYON PRODUCTION USING SPIN DEPENDENT INELASTIC DEUTERON-DEUTERON SCATTERING**

Spokespersons: N.M. Piskunov [Dubna, JINR], F.W. Hersman [New Hampshire U.]

E-mail contact piskunov@sunhe.jinr.dubna.su, hersman@unh.edu

#### JINR-LHE-0941-1D (Completed data-taking Oct 1993)

**MEASUREMENTS OF THE POLARIZATION TRANSFER COEFFICIENT IN BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS INTO PROTONS EMITTED AT  $0^\circ$**

Spokespersons: N.M. Piskunov, I.M. Sitnik [Dubna, JINR]

E-mail contact piskunov@sunhe.jinr.dubna.su,  
sitnik@sunhe.jinr.dubna.su

#### JINR-LHE-0941-1E (Completed data-taking Nov 1994)

**MEASUREMENTS OF THE POLARIZATION TRANSFER COEFFICIENT AND TENSOR ANALYSING POWER IN BREAKUP OF RELATIVISTIC POLARIZED DEUTERONS INTO PROTONS EMITTED AT  $0^\circ$**

Spokespersons: L.N. Strunov, A.V. Zarubin [Dubna, JINR]

E-mail contact strunov@sunhe.jinr.dubna.su

#### JINR-LHE-0941-3 (In preparation)

**STUDIES OF SPIN-SPIN CORRELATIONS IN BACKWARD ELASTIC DEUTERON-PROTON SCATTERING**

Spokespersons: L.S. Azhgirey, I.M. Sitnik [Dubna, JINR], M.P. Rekalov [Kharkov, FTI]

E-mail contact sitnik@sunhe.jinr.dubna.su,  
azhgirey@cv.jinr.dubna.su

#### JINR-LHE-0941-4 (Taking data)

**SPIN DEPENDENT TOTAL CROSS-SECTION DIFFERENCES IN  $np$  SCATTERING**

Spokespersons: B.A. Khachaturov, N.M. Piskunov, V.I. Sharov, L.N. Strunov [Dubna, JINR], H.M. Spinka [Argonne], F. Lehar [Saclay]

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strunov@sunhe.jinr.dubna.su, lehar@frcpn11.in2p3.fr,  
hms@hep.anl.gov

#### JINR-LHE-0941-5 (Completed data-taking 1992)

**INVESTIGATION OF FSI AND INTERMEDIATE ISOBAR EFFECTS IN  $4\pi$  GEOMETRY  $dp$  INTERACTIONS**

Spokespersons: V.V. Glagolev [Dubna, JINR], G. Martinska [Kosice U.], M.S. Nioradze [Tbilisi State U.], T. Siemiarczuk [Warsaw, INR]

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martinov@kosice.upjs.sk

## SUMMARIES OF JINR (DUBNA) EXPERIMENTS

JINR-LHE-0969 (Taking data)

### INVESTIGATION OF PION-NUCLEON AND NUCLEON-NUCLEON INTERACTIONS

Spokesperson: A.B. Kurepin [Moscow, INR]

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JINR-LHE-0971-1 (Taking data)

### MEASUREMENTS OF INCLUSIVE, QUASIELASTIC AND INELASTIC ANALYZING POWERS IN PROTON-CARBON SCATTERING

Spokespersons: L.I. Sarycheva [Moscow State U.], A.I. Malakhov [Dubna, JINR]

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malakhov@lhe32.jinr.dubna.su

JINR-LHE-0971-2 (In preparation)

### MEASUREMENTS OF THE A DEPENDENCE OF THE LEADING PARTICLES YIELD FROM NUCLEI

Spokespersons: L.I. Sarycheva [Moscow State U.], A.I. Malakhov [Dubna, JINR]

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JINR-LHE-0983-4 (Taking data)

### THE STUDY OF THE TENSOR ANALYZING POWER IN CUMULATIVE PARTICLES PRODUCTION ON A POLARIZED DEUTERON BEAM AT THE DUBNA SYNCHROPHASOTRON

Spokespersons: A. Litvinenko, L. Zolin [Dubna, JINR]

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JINR-LHE-1010 (In preparation)

### INVESTIGATION OF SPIN PHENOMENA IN THE ENERGY RANGE CORRESPONDING TO TRANSITION FROM NUCLEON TO QUARK-GLUON DEGREES OF FREEDOM IN NUCLEI

Spokespersons: A.A. Baldin, A.S. Vodopianov [Dubna, JINR]

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vodopian@sunhe.jinr.dubna.su

JINR-LHE-1011-1 (Taking data)

### MEASUREMENTS OF INCLUSIVE AND CORRELATION CHARACTERISTICS IN CUMULATIVE KINEMATICAL REGION IN $dp$ AND $dd$ INTERACTION WITH POLARIZED DEUTERON BEAM

Spokespersons: Yu.A. Panebratsev, S.S. Shimanskiy [Dubna, JINR]

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shimansk@sunhe.jinr.dubna.su

JINR-LNP-09 (Taking data)

### SEARCH FOR NARROW DIBARYON RESONANCES IN THE DOUBLE PROTON-PROTON BREMSSTRAHLUNG REACTION AT THE ENERGY BELOW THE PION THRESHOLD

Spokesperson: A.S. Khrykin [Dubna, JINR]

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JINR-LNP-23 (Taking data)

### THE EXPERIMENTAL STUDY OF $np$ ELASTIC SCATTERING AMPLITUDES AT 16 MeV

Spokespersons: Yu.A. Usov [Dubna, JINR], I. Wilhelm [Charles U.]

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## JINR Future Plans

The 1996-98 JINR Scientific Program shows a clear commitment to continuation of both the theoretical (particularly related to phenomenology), and the experimental research. The experimental groups will be working at Dubna and at other institutions (IHEP, CERN, DESY, BNL, ...). The at-home experiments include (i) the studies of polarization phenomena using beams of polarized deuterons and nucleons from the LHE acceleration complex, and (ii) investigations of the color degrees of freedom in the nuclear matter with the Nuclotron relativistic nuclei beams, at the transition energies region where the non-perturbative QCD effects are considered significant. The priorities in the machine physics are the completion of the slow extraction system for the Nuclotron, and further development of the extracted beam infrastructure at the LHE complex. [Nuclotron is a new superconductive synchrotron, built for acceleration of protons up to the kinetic energy of 12.8 GeV, and deuterons and other nuclei, including uranium, up to 6 GeV/A (for  $Z/A = 1/2$ )].

# SUMMARIES OF KEK EXPERIMENTS

## Selected KEK Experiments

### KEK-TE-001

(Approved Mar 1983, Began data-taking Nov 1986, Completed data-taking May 1995)

#### TRISTAN $e^+e^-$ EXPERIMENTS BY THE VENUS COLLABORATION

##### VENUS COLLABORATION

TOKYO METROPOLITAN U - M Chiba, T Hirose, N Hosoda, T Oyama, F Yabuki

TOHOKU U - K Abe, J MacNaughton

KEK - K Amako, Y Arai, M Fukawa, Y Fukushima, F Hinode, N Ishihara, N Kanematsu, J Kanzaki, T Kondo, T Matsui (Spokesperson), S Odaka, K Ogawa, T Ohama, M Sakuda, N Sato, J Shirai, T Sumiyoshi, F Takasaki, T Tsuboyama, S Uehara, Y Unno, M Utsumi, Y Watase, Y Yamada

TSUKUBA U, INST APPL PHYS - T Arima, Y Asano (Spokesperson), H Hamasaki, M Miura, S Mori, M Shirakata, Y Takada, K Yusa

YASUDA WOMENS JR COLL - Y Chiba

WAKAYAMA MEDICAL COLL - M Daigo

OSAKA U - J Haba, H Hanai, N Kanda, A Kruger, Y Nagashima,

A Suzuki, H Takaki, M Takita, D Tatsumi, Y Yamamoto

KYOTO U - Y Hemmi, R Kikuchi, H Kurashige, K Miyake,

A Okamoto, H Sakamoto

TOHOKU GAKUIN U - M Higuchi, Y Hoshi, M Sato

KOBE U - Y Homma, A Ono

HIROSHIMA U - Y Iwata, T Ohsugi, H Ohyama

KEK & HELSINKI U - T T Korhonen

OKAYAMA U - E K Matsuda, K Okabe, N Tamura

TOKYO, INTERNATIONAL CHRISTIAN U - Y Nakagawa,

T Yamagata

MIYAZAKI U - T Nakamura

TSUKUBA U - I Nakano

IBARAKI COLL TECH - M Shioden

KOGAKUIN U - K Tobimatsu, T Watanabe

TSUKUBA COLL TECH - Y Yonezawa

NARUTO U OF EDUCATION - H Yoshida

Accelerator KEK-TRISTAN Detector VENUS

##### Reactions

$e^+ e^-$  < 70 GeV (Ecm)

Brief description Physics topics include a reevaluation of the electroweak processes with higher precision and studies of QCD through quark-pair production in photon-photon collisions. The integrated luminosity for the experiment reached 400 inverse picobarns. Data analysis in progress (June 96).

Journal papers NIM 217 (1983) 181, JJAP 23 (1984) 897, NIM

A228 (1985) 309, NIM A238 (1985) 328, NIM A243 (1986) 58, NIM A253 (1986) 27, IEEE TNS 33 (1986) 73, JJAP 25 (1986) 1049, NIM A254 (1987) 35, NIM A254 (1987) 317, NIM A259 (1987) 430, NIM A259 (1987) 438, JJAP 26 (1987) 982, JPSJ 56 (1987) 3763, JPSJ 56 (1987) 3767, PL B198 (1987) 570, PRL 59 (1987) 2915, NIM A265 (1988) 457, NIM A269 (1988) 171, NIM A269 (1988) 522, NIM A270 (1988) 319, NIM A271 (1988) 432, NIM A272 (1988) 687, IEEE TNS 35 (1988) 300, PL B207 (1988) 355, PL B213 (1988) 400, PRL 61 (1988) 915, NIM A274 (1989) 183, NIM A281 (1989) 462, IEEE TNS 36 (1989) 665, IEEE TNS 36 (1989) 670, JJAP 28 (1989) 1981, JPSJ 58 (1989) 3037, PL B232 (1989) 425, PL B232 (1989) 431, PRL 63 (1989) 1776, ZPHY C45 (1989) 175, PR D39 (1989) 3524, PL B234 (1990) 202, PL B234 (1990) 382, PL B240 (1990) 232, PL B246 (1990) 297, ZPHY C48 (1990) 13, NIM A301 (1991) 497, NIM A303 (1991) 346, NIM A305 (1991) 71, PL B264 (1991) 212, PL B266 (1991) 188, PL B267 (1991) 309, PRL 66 (1991) 280, NIM A311 (1992) 57, NIM A322 (1992) 211, NIM A323 (1992) 471, PL B278 (1992) 393, PL B278 (1992) 499, NIM A330 (1993) 64, PL B302 (1993) 119, PL B313 (1993) 245, PL B313 (1993) 288, PRL 71 (1993) 38, NIM A340 (1994) 501, PL B331 (1994) 211, PRL 72 (1994) 3313, ZPHY C63 (1994) 213, JPSJ 64 (1995) 435, and ZPHY C69 (1996) 597.

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WWW Home-page <http://venusu1.kek.jp/>

### KEK-TE-002

(Approved Mar 1983, Began data-taking Nov 1986, Completed data-taking May 1995)

#### STUDY OF $e^+e^-$ ANNIHILATION PHENOMENA BY A DETECTOR WITH PARTICLE IDENTIFICATION

##### TOPAZ COLLABORATION

NARA WOMENS U - K Adachi, S Awa, N Fujiwara, H Hayashii, H Ikeda, M Iwasaki, Y Kayahara, K Miyabayashi, K Muramatsu, T Nagira, M Nakajima, H Nishioka, N Nishiwaki, S Noguchi, M Ohkura, E Sakai, M Takemoto, N Toomi, A Yamaguchi, Y Yoake

TOKYO U OF AGRIC TECH - K Emi, N Fujio, K Harigae, H Hirano, S Hori, K Iwashiro, H Mamada, O Nitoh, S Onodera, T Shinohara, K Takahashi, O Tsumura, J Yoshizawa

NAGOYA U - K Abe, T Abe, M Aoki, R Kajikawa (Spokesperson), K Kurata, H Masuda, K Matsushita, K Nakabayashi, N Ohishi, T Ohshima, N Sasayama, K Shimozawa, A Sugiyama, S Suzuki, H Takamura, F Teramae, M Tomoto, T Toyama

KEK - I Adachi, R Belušević, H B Dijkstra, M Doser, R Enomoto, H Fujii, K Fujii, J Fujimoto, N Iida, H Ikeda, R Itoh, H Iwasaki, S Iwata, S Kawabata (Spokesperson), H Kichimi, M Kobayashi, S Kuroda, T Matsuda, A Miyamoto, K Nakamura, Y Ohnishi, H Ozaki, T Sato, R Sugahara, T Swarda, T Tauchi, T Tsukamoto, S Uno, O Yamakawa, A Yamamoto, M Yamauchi, Y Yoshimura, M Yoshioka

TOKYO U - H Aihara, T Kamae, T Kishida, N Kusuki, F Sai, A Shirahashi, S Yamamoto, S Yamashita

OSAKA CITY U - K Fujita, S Higashi, Y Inoue, Y Kato,

A Maruyama, M Nakamura, E Nakano, M Nakayama,

T Okusawa, T Sato, A Shimonaka, T Takahashi, T Tanaka,

Y Teramoto

PURDUE U - B Howell, D Koltick, I Levine, E Shibata

TOKYO INST TECH - M Aoki, K Kaneyuki, S Minami, N Nakagawa, A Ochi, Y Ohshima, N Sugiyama, T Tachibana, T Tanimori, K Watanabe, Y Watanabe

TOKYO U, INS - A Imanishi, T Ishii, S Kato, K Maruyama, T Morimoto, H Okuno

KOBE U - T Fujii, K Fujiwara, K Nagai

TEZUKAYAMA U - F Ochiai

Accelerator KEK-TRISTAN Detector TOPAZ

##### Reactions

$e^+ e^-$  < 70 GeV (Ecm)

Brief description Searches for new particles such as heavy

quarks, heavy leptons, and various supersymmetric particles,

and studies in detail electroweak as well as QCD phenomena.

The detector has large solid angle coverage with very good

particle identification and 3-dimensional tracking capabilities.

The total integrated luminosity for the experiment is about 330

inverse picobarns. Data analysis in progress (June 96).

Journal papers NIM A225 (1984) 23, NIM A236 (1985) 55, NIM

A252 (1986) 423, NIM A256 (1987) 449, NIM A269 (1988) 507, NIM A269 (1988) 513, NIM A270 (1988) 11, NIM A271 (1988) 404, PL B200 (1988) 391, PL B208 (1988) 319, PRL 60 (1988) 97, PR D37 (1988) 1339, PL B218 (1989) 105, PL B227 (1989) 495, PL B228 (1989) 553, PL B229 (1989) 427, NIM A297 (1990) 148, PL B234 (1990) 185, PL B234 (1990) 197, PL B234 (1990) 525, PL B240 (1990) 513, PL B244 (1990) 352, PL B249 (1990) 336, NIM A300 (1991) 575, PL B255 (1991) 613, PL B268 (1991) 457, NIM A312 (1992) 440, NIM A316 (1992) 202, PL B278 (1992) 506, PL B279 (1992) 422, PL B284 (1992) 144, PL B291 (1992) 206, NIM A334 (1993) 367, PL B304 (1993) 373, PL B313 (1993) 475, PL B314 (1993) 149, PL B314 (1993) 471, PL B328 (1994) 535, PL B332 (1994) 477, PL B340 (1994) 135, PL B341 (1994) 99, PL B341 (1994) 238, PR D50 (1994) 1879, PL B345 (1995) 335, PL B347 (1995) 171, PL B347 (1995) 179, PL B361 (1995) 199, and PL B368 (1996) 299.

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## SUMMARIES OF KEK EXPERIMENTS

### KEK-TE-003

(Proposed 1983, Approved Nov 1983, Began data-taking Nov 1986, Completed data-taking Jun 1994)

#### AMY — A HIGH RESOLUTION LEPTON DETECTOR FOR TRISTAN

##### AMY COLLABORATION

ROCHESTER U - A Bodek, B J Kim, T Kumita, Y K Li, C Velissaris  
 SOUTH CAROLINA U - C Rosenfeld, S Wilson  
 KOREA U - J S Kang, D Y Kim  
 LOUISIANA STATE U - P Kirk  
 BEIJING, IHEP - M H Ye, Z P Zheng  
 VIRGINIA TECH - A Abashian, K Gotow, D Haim, M E Mattson, L Piilonen  
 UC, DAVIS - R E Breedon, W Ko, R L Lander, J Rowe, J R Smith, D Stuart  
 HAWAII U - S Kanda, S L Olsen (Spokesperson), K Ueno  
 KEK - K Abe (Spokesperson), Y Fujii, Y Kurihara, F Liu, A Maki, T Nozaki, T Omori, H Sagawa, Y Sakai, T Sasaki, Y Sugimoto, Y Takaiwa, S Terada  
 GYEONGSANG NATIONAL U - S K Choi  
 KONAN U - F Kajino  
 MINNESOTA U - T Thomas  
 NIIGATA U - T Aso, K Miyano, H Miyata, N Takashimizu  
 NIHON DENTAL COLL - Y Yamashita  
 RUTGERS U - F Sannes, S Schnetzer, R Stone, J Vinson  
 SAGA U, JAPAN - S Behari, S Kobayashi, A Murakami, K S Saroj  
 SEOUL NATIONAL U - S K Kim, M H Lee, S S Myung  
 KYUNGPOOK NATIONAL U - D Son  
 CHUO U, TOKYO - S Matsumoto  
 SAITAMA U - T Ishizuka

Accelerator KEK-TRISTAN Detector AMY

##### Reactions

$e^+ e^- < 70 \text{ GeV (Ecm)}$

Brief description Data analysis in progress (June 96).

Journal papers IEEE TNS 23 (1987) 520, NIM A260 (1987) 361, NIM A265 (1988) 141, PRL 60 (1988) 93, PRL 60 (1988) 2359, PRL 61 (1988) 911, NIM A274 (1989) 95, NIM A283 (1989) 665, PL B218 (1989) 112, PL B218 (1989) 499, PL B223 (1989) 476, PL B228 (1989) 548, PRL 62 (1989) 1713, PRL 63 (1989) 1342, PRL 63 (1989) 1772, PRL 63 (1989) 1910, PRL 63 (1989) 2341, PL B234 (1990) 534, PL B240 (1990) 243, PL B244 (1990) 573, PL B252 (1990) 491, PRL 64 (1990) 984, PR D41 (1990) 2675, PR D42 (1990) 737, PR D42 (1990) 949, PR D42 (1990) 1339, IJMP A6 (1991) 2583, NIM A307 (1991) 52, NIM A317 (1992) 75, NIM A323 (1992) 601, PL B277 (1992) 215, PL B303 (1993) 385, PL B313 (1993) 469, PL B325 (1994) 248, and PL B346 (1995) 208.

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### KEK-162

(Proposed 1987, Approved Oct 1987, Began data-taking 1996, In progress)

#### MEASUREMENT OF THE CP-VIOLATING DIRECT AMPLITUDE IN $K_L^0 \rightarrow \pi^0 e^+ e^-$ DECAY

KYOTO U - H Kurashige, T T Nakamura, T Nomura, H Sakamoto, N Sasao (Spokesperson), M Suehiro  
 KEK - Y Fukushima, M Noumachi, O Sasaki, T Taniguchi

Accelerator KEK-PS Detector TOKIWA

##### Reactions

$K_L \rightarrow \pi^0 e^+ e^-$

Particles studied  $K_L$

Brief description The apparatus consists of large drift chambers, a UV-sensitive Čerenkov counter for detection of electrons, and an electromagnetic CsI calorimeter with a good energy

resolution. The drift chambers use argon and  $\text{CF}_4$  gas. Sensitive to branching ratios smaller than  $10^{-10}$ . Taking data (July 96).

Journal papers NIM A270 (1988) 106, NIM A283 (1989) 709, and NIM A317 (1992) 213.

E-mail contact sasao@kekvox.kek.jp

### KEK-231

(Proposed 1990, Approved Jul 1990, Began data-taking 1994, Completed data-taking 1994)

#### STUDY OF VIOLATION OF TIME REVERSAL INVARIANCE IN NEUTRON REACTIONS

KEK - T Adachi, S Ishimoto, Y Masuda (Spokesperson), Y Mori, K Morimoto, H M Shimizu  
 KYOTO U - M Iinuma, A Masaike, Y Matsuda  
 TOKYO INST TECH - K Asahi, M Harada, H Sato  
 TOHOKU U - K Sakai, S Tanaka, A Yamaguchi

Accelerator KEK-PS Detector Counter

Reactions Polarized beam and target

$n^{139}\text{La} \rightarrow n X$

$n^{81}\text{Br} \rightarrow n X$

Journal papers NIM A264 (1987) 169, NP A504 (1989) 269, and HFI 74 (1992) 149.

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### KEK-246

(Approved Jul 1991, In progress)

#### SEARCH FOR T-VIOLATING MUON POLARIZATION IN $K^+ \rightarrow \pi^0 \mu^+ \nu$ DECAY USING STOPPED KAONS

##### E246 COLLABORATION

KEK - J Imazato (Spokesperson), Y Kuno, H M Shimizu, K H Tanaka  
 TOKYO U, INS - M Aoki, Y Fujita, H Outa, S Sugimoto, T Yamazaki  
 TOKYO U - R S Hayano, T Ishikawa, H Tamura  
 MOSCOW, INR - D V Dementyev, M Grigorev, A P Ivashkin, M M Khabibullin, Y G Kudenko, V M Lobashev, O V Mineev, V Popov  
 TSUKUBA U - I Arai, Y Igarashi, T Ikeda, M Ise, K Shibata  
 TSUKUBA U, INST APPL PHYS - M Abe, Y Asano  
 IBARAKI U, HITACHI - T Yokoi  
 TOKYO INST TECH - S Shimizu  
 SASKATCHEWAN U - T Baker, C Rangacharyulu, Y M B Shin  
 YONSEI U - E J Kim, J M Lee, Y H Shin  
 KYUNGSUNG U - Y M Park  
 BRITISH COLUMBIA U - P Gumplinger, M Hasinoff, E Saettler  
 TRIUMF - J Doornbos, R Henderson, J A Macdonald, N Stevenson  
 MONTREAL U - P Depommier  
 VIRGINIA TECH - M Blecher  
 KANAGAWA U - A Kaga

Accelerator KEK-PS Detector Spectrometer

##### Reactions

$K^+ \rightarrow \pi^0 \mu^+ \nu$  0 GeV/c ( $P_{\text{lab}}$ )

Particles studied  $K^+$

Brief description Uses the Superconducting Toroidal Spectrometer. Approved for 450 shifts. Taking data (July 96).

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## SUMMARIES OF KEK EXPERIMENTS

### KEK-304

(Approved 1995, Began data-taking 1996, In progress)

#### STUDY OF $K^+ \rightarrow \pi^0 e^+ \nu$

Accelerator KEK-PS Detector ?

Particles studied  $K^+$

Brief description A collaboration of KEK, Tokyo Inst. Tech., and Tokyo U. Taking data (July 96). For further information, please contact the Spokesperson, Dr. Takayoshi Ohshima [KEK].

E-mail contact ohshima@kekvax.kek.jp

### KEK-362

(Approved 1995, In preparation)

#### A LONG BASELINE NEUTRINO OSCILLATION EXPERIMENT USING KEK-PS AND SUPER-KAMIOKANDE

Accelerator KEK-PS Detector ?

Particles studied  $\nu$

Brief description An international collaboration of scientists from Japan and USA. In preparation (July 96). For further information, please contact the Spokesperson, Dr. Koichiro Nishikawa [KEK].

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WWW Home-page <http://pnahep.kek.jp/>

### KEK-BF-BELLE

(Proposed 1994, Approved Mar 1994, In preparation)

#### A STUDY OF $CP$ VIOLATION IN $B$ MESON DECAYS

BELLE COLLABORATION

Accelerator KEK-B-FACTORY Detector BELLE

Brief description KEK B-factory is expected to be capable of producing more than ten million  $B$  meson pairs each year. When the facility becomes operational, the proposed experiment will study various aspects of  $B$  meson physics, including the long-standing puzzle of the violation of  $CP$  symmetry. The collaboration consists of physicists from six countries and more than 36 institutions. The Letter of Intent has been accepted in March 94. Expected to begin data taking in FY 1998/99. For more information, please contact the Spokespersons, Dr. Shiro Suzuki [Nagoya U.], Dr. Stephen L. Olsen [Hawaii U.], or Dr. Fumihiko Takasaki [KEK].

E-mail contact [suzuki@hepl.phys.nagoya-u.ac.jp](mailto:suzuki@hepl.phys.nagoya-u.ac.jp),  
[solsen@uhhepg.phys.hawaii.edu](mailto:solsen@uhhepg.phys.hawaii.edu), [fumihiko@kekvax.kek.jp](mailto:fumihiko@kekvax.kek.jp)

WWW Home-page <http://bsunsv1.kek.jp/>

## Other KEK Experiments

Listed here are some other KEK experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the KEK's yearly publication 'Annual Report' for a complete list of active experiments.

### KEK-140A (Completed data-taking Mar 1993)

#### STUDY OF HEAVY HYPERNUCLEI VIA THE $(\pi, K)$ REACTION USING THE SKS DETECTOR

Spokesperson: O. Hashimoto [Tokyo U., INS]

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### KEK-218 (Completed data-taking Feb 1993)

#### STUDY OF THE FORMATION OF ${}^4_{\Lambda}H$ BY USING $\pi\pi$ COINCIDENCE

Spokesperson: H. Tamura [Tokyo U.]

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[tkyvax::tamura](mailto:tkyvax::tamura)

### KEK-224 (Completed data-taking Jan 1992)

#### SEARCH FOR THE $H$ -DIBARYON WITH A SCINTILLATING FIBER TRACK DETECTOR

Spokesperson: K. Imai [Kyoto U.]

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### KEK-228 (Completed data-taking 1995)

#### PRECISE MEASUREMENT OF THE STRONG INTERACTION SHIFTS OF KAONIC HYDROGEN X-RAYS

Spokesperson: M. Iwasaki [Tokyo U., INS]

### KEK-235 (Completed data-taking Apr 1993)

#### DIFFERENTIAL CROSS-SECTION FOR $p(n, \gamma)d$

Spokesperson: M.A. Kovash [Kentucky U.]

E-mail contact [kovash@ie.pa.uky.edu](mailto:kovash@ie.pa.uky.edu)

### KEK-248 (Taking data)

#### SEARCH FOR $H$ PARTICLES IN THE $pp \rightarrow K^+K^+$ REACTION

Spokesperson: H. Kawai [Chiba U.]

### KEK-251 (Completed data-taking Dec 1992)

#### HYPERON-NUCLEON SCATTERING EXPERIMENT I: $\Sigma^+p$ SCATTERING

Spokesperson: M. Ieiri [KEK, Tsukuba]

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### KEK-257 (Completed data-taking May 1992)

#### SUBTHRESHOLD ANTIPROTON PRODUCTION IN $d$ A REACTIONS

Spokesperson: J. Chiba [KEK, Tsukuba]

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### KEK-262 (Completed data-taking Nov 1993)

#### BEHAVIOR OF PIONIC HYDROGEN ATOMS. PART II

Spokesperson: A. Shinohara [Nagoya U.]

### KEK-269 (Completed data-taking 1995)

#### DIFFERENTIAL $\pi$ C CROSS-SECTION ABOVE THE $\Delta$ RESONANCE REGION

Spokesperson: Harutaka Sakaguchi [Kyoto U.]

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### KEK-278 (Completed data-taking Dec 1993)

#### ASYMMETRY OF NON-MESONIC WEAK DECAY OF POLARIZED ${}^5_{\Lambda}He$

Spokesperson: Tadafumi Kishimoto [Osaka U.]

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## SUMMARIES OF KEK EXPERIMENTS

**KEK-287** (Completed data-taking Jul 1993)

### STUDY OF AN SPIN-SPIN INTERACTION USING $\gamma$ SPECTROSCOPY OF HYPERFRAGMENTS

Spokesperson: Hiro Tamura [Tokyo U.]

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tkyvax::tamura

**KEK-289** (Taking data)

### HYPRON-NUCLEON SCATTERING EXPERIMENT: $\Sigma^- p$ AND $\Lambda p$ SCATTERING

Spokesperson: Masaharu Ieiri [KEK, Tsukuba]

*E-mail contact* ieiri@kekpsb.kek.jp

**KEK-307** (Completed data-taking 1995)

### LIFETIMES AND WEAK DECAY WIDTHS OF LIGHT AND MEDIUM HEAVY $\Lambda$ HYPERNUCLEI

Spokesperson: H.C. Bhang [Seoul National U.]

*E-mail contact* bhang@kekvox.kek.jp

**KEK-325** (Taking data)

### NUCLEAR MATTER EFFECT ON MESON MASS IN $\phi$ DECAY

Spokesperson: Hideto Enyo [Kyoto U.]

*E-mail contact* enyo@kekvox.kek.jp,  
enyo@pn.scphys.kyoto-u.ac.jp

**KEK-326** (Completed data-taking 1994)

### STUDY OF HYPERFRAGMENT PRODUCTION IN ABSORPTION OF STOPPED $K^-$

Spokesperson: H. Tamura [Tokyo U.]

*E-mail contact* tamura@tkyvax.phys.s.u-tokyo.ac.jp,  
tkyvax::tamura

**KEK-336** (Taking data)

### SPECTROSCOPIC INVESTIGATION OF LIGHT $\Lambda$ HYPERNUCLEI BY THE $(\pi^+, K^+)$ REACTION

Spokesperson: O. Hashimoto [Kyoto U.]

*E-mail contact* hashimot@ins.u-tokyo.ac.jp

**KEK-352** (Taking data)

### QUASIELASTIC $\pi$ SCATTERING

Spokesperson: Roy J. Peterson [Colorado U.]

*E-mail contact* peterson@spectr.colorado.edu

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## KEK Future Plans

The interdisciplinary research with the 12-GeV Proton Synchrotron will continue utilizing the proton and light ion beams. The particle physics studies will focus on the long baseline neutrino oscillation experiment with the SuperKamiokande detector, and the time-reversal invariance experiment on the kaon system. Both experiments will need twice (or more) intenser proton beams than presently available, and an accelerator study group is being formed to deal with the new requirements. The TRISTAN collider has been closed, and its tunnel is now used for two rings of the KEK-B (*B* Factory) asymmetric electron-positron collider ( $8 \times 3.5$  GeV). The machine is scheduled to be commissioned in FY 1998-99, and the design luminosity is  $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ .

# SUMMARIES OF LOS ALAMOS EXPERIMENTS

## Selected LAMPF Experiments

### LAMPF-969

(Proposed Jul 1985, Approved Aug 1985, Began data-taking Jun 1992, Completed data-taking 1995)

#### MEGA — SEARCH FOR THE RARE DECAY $\mu^+ \rightarrow e^+ \gamma$

##### MEGA COLLABORATION

UCLA - D Barlow, B M K Nefkens, B Tippens  
 CHICAGO U - J Crocker, S C Wright  
 FERMILAB - P S Cooper  
 HAMPTON U - L Tang  
 HOUSTON U - M Barakat, Y Chen, M Dziedzic, A Empl,  
 J Flick, E V Hungerford, K Johnston, K Lan, B W Mayes,  
 R Phelps, L Pinsky, W von Witsch  
 INDIANA U - J Knott, K M Stantz, J Szymanski  
 LOS ALAMOS - J F Amann, K Black, R D Bolton, M Brooks,  
 S Carius, M D Cooper ( $\checkmark$  Spokesperson), W Foreman,  
 C M Hoffman, G E Hogan, T Kozlowski, M Kroupa, D Lee,  
 G Mills, R E Mischke, F J Naivar, M A Oothoudt, C Pillai,  
 R D Werbeck, D Whitehouse, C Wilkinson  
 QUEENS U, KINGSTON - A Hallin  
 STANFORD U - E B Hughes, C Jui, J N Otis, M W Ritter  
 TEXAS A AND M - C Gagliardi, G Kim, F Liu, R E Tribble,  
 X Tu, L Van Ausdeln, X Zhou  
 VALPARAISO U, INDIANA - R Fisk, D D Koetke,  
 R W Manweiler, S Stanislaus  
 VIRGINIA U - R Marshall, B Wright, K O H Zioc  
 VIRGINIA TECH - D Haim, F Lee, L E Piilonen, Y Zhang,  
 W Zhou  
 WYOMING U - A R Kunselman  
 YALE U - K Hahn, J Markey

Accelerator LAMPF Detector MEGA

Reactions Polarized beam

$$\mu^+ \rightarrow e^+ \gamma \quad 0 \text{ MeV}/c (P_{\text{lab}})$$

Particles studied  $\mu^+$

Brief description Also searches for a  $V+A$  contribution to radiative decay. Approved for 4000 hours. Looks for  $\mu^+ \rightarrow e^+ \gamma$  at a level of  $6 \times 10^{-13}$ , a factor of 80 better than the Crystal Box detector. Took data in 1992/93 and in 1994/95. Data analysis in progress (July 96).

Journal papers NIM A303 (1991) 298, NIM A323 (1992) 198, NIM A349 (1994) 118, and NIM A372 (1996) 195.

Related experiments PSI-R-87-03

E-mail contact mcooper@lanl.gov

### LAMPF-1054

(Proposed Dec 1986, Approved Feb 1987, Began data-taking 1991, Completed data-taking 1996)

#### ULTRAHIGH PRECISION MEASUREMENTS ON THE MUONIUM GROUND STATE: HYPERFINE STRUCTURE AND MUON MAGNETIC MOMENT

LOS ALAMOS - C Pillai, O van Dyck  
 HEIDELBERG U, PHYS INST - K Jungmann, I Reinhard,  
 G zu Putlitz ( $\checkmark$  Spokesperson)  
 YALE U - M G Boshier, S Dhawan, X Fei, V W Hughes  
 ( $\checkmark$  Spokesperson), D Kawall, W Liu  
 YALE U & PSI, VILLIGEN - M Janousch  
 BROOKHAVEN - F Mariam, K Woodie  
 LIVERMORE - P Egan

Accelerator LAMPF Detector Other

Particles studied muonium

Brief description An ultrahigh precision measurement of the muonium hyperfine structure interval  $\Delta\nu$  and of the microwave magnetic moment ratio  $\mu_\mu/\mu_p$  with the goal of determining  $\Delta\nu$  to 10 ppb and  $\mu_\mu/\mu_p$  to 60 ppb. Uses the microwave magnetic resonance spectroscopy method with an intense and

pure subsurface  $\mu^+$  beam, a large superconducting homogeneous solenoid, and a line-narrowing method involving a chopped  $\mu^+$  beam. Data analysis in progress (July 96).

Journal papers NIM A333 (1993) 260, and PR A52 (1995) 1948.

Related experiments BNL-821

E-mail contact vernon.hughes@yale.edu

### LAMPF-1173 (LSND)

(Proposed Jul 1989, Approved Jan 1990, Began data-taking Sep 1993, In progress)

#### SEARCH FOR $\bar{\nu}_\mu \leftrightarrow \bar{\nu}_e$ OSCILLATIONS WITH HIGH SENSITIVITY

##### LSND COLLABORATION

UC, RIVERSIDE - R M Gunasingha, K McIlhany, I Stancu,  
 W Strossman, G J VanDalen  
 UC, SAN DIEGO - W Vernon  
 UC, SANTA BARBARA - D O Caldwell, M Gray, S Yellin  
 EMBRY-RIDDLE AERONAUTICAL U - D Smith, J Waltz  
 UCIRPA, SLAC - A Eisner, Y Wang  
 LINFIELD COLL, OREGON - I Cohen  
 LOS ALAMOS - R Burman, J Donahue, F J Federspiel,  
 G T Garvey, W C Louis ( $\checkmark$  Spokesperson), G B Mills,  
 V Sandberg, R Tayloe, D H White  
 LOUISIANA STATE U - R Imlay, H J Kim, W Metcalf, N Wadia  
 LOUISIANA TECH U - K Johnston  
 NEW MEXICO U - B B Dieterle, R Reeder  
 SOUTHERN U - A Fazely  
 TEMPLE U - C Athanassopoulos, L B Auerbach, R Majkic,  
 J Margulies, D Works, Y Xiao

Accelerator LAMPF Detector LSND

Reactions

$\bar{\nu}_\mu \rightarrow \bar{\nu}_e$	< 53 MeV ( $T_{\text{lab}}$ )
$\nu_\mu \rightarrow \nu_e$	< 250 MeV ( $T_{\text{lab}}$ )
$\nu_e \text{ C} \rightarrow e^- \text{ nucleon}$	< 53 MeV ( $T_{\text{lab}}$ )
$\nu_\mu \text{ C} \rightarrow \mu^- \text{ nucleon}$	< 250 MeV ( $T_{\text{lab}}$ )
$\nu \text{ C} \rightarrow \nu \text{ C}^*$	"
$\nu_\mu \text{ p} \rightarrow \nu_\mu \text{ p}$	"
$\nu_e e^- \rightarrow \nu_e e^-$	< 53 MeV ( $T_{\text{lab}}$ )

Particles studied  $\nu$

Brief description A search for neutrino oscillations to the level  $\sin^2 \theta = 3 \times 10^{-4}$ , where  $\theta$  represents the mixing angle if there were a two-generation mixing. Uses neutrinos produced by both at-rest and in-flight decaying pions. Neutrinos then interact in a mineral oil ( $\text{CH}_2$ ) target. The detector consists of a tank with 167 tons of liquid scintillator and with 1220 photomultiplier tubes mounted on the inside tank surface. Other physics goals include measurements of neutrino elastic, charged-current, and neutral-current scattering. Taking data (July 96). Will continue the data taking for at least one more year, and possibly for another 5-10 years.

Journal papers NIM A334 (1993) 353, PR C51 (1995) 1065, and PRL 75 (1995) 2650.

Related experiments ISIS-KARMEN

E-mail contact louis@lanl.gov

WWW Home-page

<http://darkmatter.linfield.edu/research/neutrino/neutrino.html>

### LAMPF-1188

(Proposed 1987, Approved 1987, Began data-taking Oct 1987, In progress)

#### SEARCH FOR TIME REVERSAL SYMMETRY VIOLATION AND PARITY VIOLATION AT THE PROTON STORAGE RING

LOS ALAMOS - J D Bowman (Spokesperson), C M Frankle,  
 J N Knudson, S Penttila, S J Seestrom, V Yuan

## SUMMARIES OF LOS ALAMOS EXPERIMENTS

DUKE U - B Crawford, N R Roberson  
 TRIUMF - P P J Delheij  
 NORTH CAROLINA STATE U - C R Gould, D G Haase,  
 G E Mitchell, S Patterson  
 DUBNA - Y Popov, E Sharapov

Accelerator LAMPF Detector Counter

Reactions Polarized beam and target  
 $n$  nucleus

Brief description Searches for time reversal and parity violation in low-lying nuclear states. Preliminary results have detected parity violation in states of  $^{139}\text{La}$ ,  $^{165}\text{Ho}$ ,  $^{232}\text{Th}$ ,  $^{235}\text{U}$ , and  $^{238}\text{U}$ . The neutron beam is 57% polarized from 1 eV to 20 keV. Continues taking data (June 96).

Journal papers PR C39 (1989) 1721, PRL 65 (1990) 1192, PRL 67 (1991) 564, PR C44 (1991) 2187, PR C45 (1992) 2143, PR C46 (1992) 768, PR C46 (1992) 778, PR C46 (1992) 1542, PR C48 (1993) 1116, and PR C48 (1993) 1601.

E-mail contact bowman@lanl.gov

### LAMPF-1240

(Proposed Jul 1991, Approved Aug 1991, Began data-taking Aug 1992, Completed data-taking Aug 1993)

#### MEASUREMENT OF THE MICHEL PARAMETER $\rho$ WITH THE MEGA POSITRON SPECTROMETER

MEGA COLLABORATION

CHICAGO U - S C Wright

FERMILAB - P S Cooper

HOUSTON U - Y Chen, M Dzemidzic, E V Hungerford, K Lan,

B W Mayes, L Pinsky, W von Witsch

INDIANA U - J Knott, K M Stantz, J J Szymanski

LOS ALAMOS - J F Amann, R D Bolton, M D Cooper

( $\checkmark$  Spokesperson), W Foreman, R Harrison, G Hart, G E Hogan,

T Kozlowski, M A Kroupa, R E Mischke ( $\checkmark$  Spokesperson),

C Pillai, S Schilling, D Whitehouse

TEXAS A AND M - C Gagliardi, F Liu, R E Tribble, X L Tu,

L A Van Ausdell

VALPARAISO U, INDIANA - D D Koetke, R W Manweiler,

S Stanislaus

VIRGINIA U - B Wright, K O H Zioc

VIRGINIA TECH - D Haim, F Lee, L E Piilonen

( $\checkmark$  Spokesperson), Y Zhang, W Zhou

Accelerator LAMPF Detector MEGA

Reactions Polarized beam

$\mu^+ \rightarrow e^+ \nu_e \bar{\nu}_\mu$  28 MeV/c

Brief description An improved measurement of the Michel parameter  $\rho$ . Ran for 336 hours. Data analysis in progress (July 96).

Related experiments LAMPF-969

E-mail contact mcooper@lanl.gov, mismchke@lanl.gov, piilonen@amy.phys.vt.edu

### LAMPF-1268

(Proposed Nov 1992, Approved Jan 1993, Began data-taking Jun 1993, Completed data-taking Sep 1993)

#### $\pi^- p \rightarrow \pi^0 n$ CROSS-SECTIONS IN THE REGION OF THE $\Delta$ RESONANCE

ABILENE CHRISTIAN U - L D Isenhower, J Redmon,

M E Sadler ( $\checkmark$  Spokesperson)

ARIZONA STATE U - J R Comfort, C Gaulard

BOŠKOVIĆ INST, ZAGREB - A Marušić, I Supek

CATHOLIC U - H Crannell, L Nguyen

GEORGE WASHINGTON U - W J Briscoe, J Connelley,

S Matthews

LOS ALAMOS - J Amann, R Boudrie, J Knudson, C Morris,

B Park, M Rawool, R M Whitton

PENN U - P P Hui, D Smith

Accelerator LAMPF Detector NMS

#### Reactions

$\pi^- p \rightarrow \pi^0 n$  138, 166, 190, 215, 237, 263 MeV  
 ( $T_{\text{lab}}$ )

Particles studied  $\Delta(1232 P_{33})$

Brief description Measures the differential cross-sections in the region of the  $\Delta(1232)$  resonance. Uses elements of the Neutral Meson Spectrometer (NMS) to measure the two  $\gamma$ -rays from the  $\pi^0$  decay, eliminating the difficulty of determining the efficiency of neutron counters. The goals are to provide accurate data for input to charge-dependent partial wave analyses, and to study the charge splitting of the  $\Delta$ .

Related experiments LAMPF-1178

E-mail contact sadler@physics.acu.edu

## Other LAMPF Experiments

Listed here are some other LAMPF experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

**LAMPF-876** (Completed data-taking Oct 1992)

#### SPIN TRANSFER MEASUREMENTS FOR NEUTRON-PROTON ELASTIC SCATTERING

Spokesperson: Michael W. McNaughton [Los Alamos]

E-mail contact mcnaught@lanl.gov

**LAMPF-1178** (Completed data-taking Nov 1995)

#### POLARIZATION ASYMMETRY MEASUREMENTS FOR $^1\text{H}(\pi^-, \pi^0)n$ BETWEEN 45 AND 100 MeV

Spokespersons: Joseph R. Comfort [Arizona State U.], George R. Bureson [New Mexico State U.]

E-mail contact comfort@phyast.la.asu.edu, bureson@nmsu.edu

**LAMPF-1179** (Completed data-taking Jul 1992)

#### REACTION $\pi^+ p \rightarrow \pi^+ \pi^0 p$ NEAR THRESHOLD

Spokesperson: Dinko Počanić [Virginia U.]

E-mail contact pocanic@virginia.edu

WWW Home-page

<http://helena.phys.virginia.edu/~pipin/E1179/E1179.html>

**LAMPF-1190** (Completed data-taking Jul 1992)

#### PION-PROTON INTEGRAL CROSS-SECTION MEASUREMENTS

Spokespersons: Robert A. Ristinen [Colorado U.], C.L. Morris [Los Alamos]

E-mail contact ristinen@spectr.colorado.edu

**LAMPF-1208** (Taking data)

#### NEUTRON-PROTON BREMSSTRAHLUNG

Spokesperson: Stephen A. Wender [Los Alamos]

E-mail contact wender@lanl.gov

**LAMPF-1213** (Completed data-taking Nov 1995)

#### MEASUREMENT OF THE NEUTRINO CAPTURE CROSS-SECTION IN $^{127}\text{I}$ WITH $\mu^+$ DECAY NEUTRINOS

Spokesperson: Kenneth Lande [Penn U.]

E-mail contact klande@mail.sas.upenn.edu

## SUMMARIES OF LOS ALAMOS EXPERIMENTS

### LAMPF-1231

#### LASER POLARIZED MUONIC ATOMS AND SPIN DEPENDENCE OF NUCLEAR MUON CAPTURE

Spokespersons: Gordon D. Cates [Princeton U.], Paul A. Souder [Syracuse U.]

*E-mail contact* cates@pucc.princeton.edu,  
souder@suhep.phy.syr.edu

### LAMPF-1234 (Completed data-taking Sep 1991)

#### $K_{LL}$ AND $P$ FOR $np$ ELASTIC SCATTERING

Spokesperson: Michael W. McNaughton [Los Alamos]

*E-mail contact* mcnaught@lanl.gov

### LAMPF-1256 (In preparation)

#### $\pi^\pm p$ ANALYZING POWERS AT 45 AND 67 MeV

Spokespersons: Joseph R. Comfort [Arizona State U.],  
George R. Burleson [New Mexico State U.]

*E-mail contact* comfort@phyast.la.asu.edu, burleson@nmsu.edu

### LAMPF-1267 (Completed data-taking Oct 1993)

#### ELASTIC SCATTERING OF $\pi^+$ FROM POLARIZED $^3\text{He}$ AT $T_\pi = 100, 142, 180, \text{ AND } 256$ MeV

Spokespersons: Dietrich Dehnhard [Minnesota U.],  
George R. Burleson [New Mexico State U.], Otto F. Haessler [TRIUMF and Simon Fraser U.]

*E-mail contact* dehnhard@physics.spa.umn.edu,  
burleson@nmsu.edu, haessler@triumf.ca

### LAMPF-1286 (Completed data-taking Sep 1993)

#### MEASURING THE NEUTRON-NEUTRON SCATTERING LENGTH AND EFFECTIVE RANGE USING THE $^2\text{H}(\pi^-, 2n)\gamma$ REACTION

Spokesperson: Ahmed H. Hussein [Northern British Columbia U.]

*E-mail contact* hussein@unbc.edu

### LAMPF-1293 (Completed data-taking Oct 1993)

#### $np$ ELASTIC ANALYZING POWER

Spokesperson: Michael W. McNaughton [Los Alamos]

*E-mail contact* mcnaught@lanl.gov

### LAMPF-1309 (Completed data-taking Oct 1993)

#### ANALYZING POWER AND SPIN TRANSFER MEASUREMENTS IN $np$ INELASTIC CHANNEL

Spokesperson: George Glass [Texas U.]

*E-mail contact* mp0gg@lampf.lanl.gov

### LAMPF-1310

#### MEASUREMENT OF THE DOUBLY DIFFERENTIAL CROSS-SECTION FOR $\pi^- p \rightarrow \pi^+ \pi^- n$ AT 190 AND 200 MeV AND SOFT PION THEORY

Spokespersons: Glen A. Rebka, Jr. [Wyoming U.], Peter A.M. Gram [Los Alamos], Donald A. Roberts [Michigan U.]

*E-mail contact* physeh@uwo.edu, gram@lampf.lanl.gov,  
droberts@mich1.physics.lsa.umich.edu

## LAMPF Future Plans

The LAMPF nuclear and particle physics user program has officially ended. The facility, now called LANSCE (Los Alamos Neutron Science Center) continues to operate with the purpose of providing pulsed neutrons to several research communities. However, particle physics retains its presence at Los Alamos. The LSND neutrino experiment will continue to run for at least several more years. A number of fundamental physics experiments using cold and ultracold neutrons are planned at LANSCE.

## SUMMARIES OF NOVOSIBIRSK EXPERIMENTS

### NOVOSIBIRSK Experiments

#### NOVOSIBIRSK-CMD-2

(Proposed 1984, Approved 1985, Began data-taking 1991, In progress)

#### THE CRYOGENIC MAGNETIC EXPERIMENT

NOVOSIBIRSK, IYF - R R Akhmetshin, G A Aksenov, E V Anashkin, V M Aulchenko, B O Baibusinov, V S Banzarov, L M Barkov, S E Baru, N S Bashtovoi, A E Bondar, D V Chernyak, S I Eidelman, G V Fedotovitch, N I Gabyshv, A A Grebeniuk, D N Grigoriev, B I Khazin (✓ Spokesperson), I A Koop, A S Kuzmin, I B Logashenko, P A Lukin, A V Maksimov, Y I Merzlyakov, V S Okhapkin, S G Pivovarov, E V Popkov, T A Purlats, S I Redin, N I Root, A A Ruban, N M Ryskulov, Y M Shatunov, A I Shekhtman, A E Sher, M A Shubin, B A Schwartz, V A Sidorov, A N Skrinsky, V P Smakhtin, I G Snopkov, E P Solodov, P Y Stepanov, A I Sukhanov, V M Titov, Y V Yudin, V G Zavarzin, S G Zverev

BOSTON U - D H Brown, L B Roberts, W Worstell

PITTSBURGH U - J A Thompson

YALE U - S K Dhawan, V W Hughes

Accelerator NOVO-VEPP-2M Detector CMD-2

#### Reactions

$e^+ e^- \rightarrow \text{charged}^+ \text{charged}^-$  0.36-1.4 GeV (E<sub>cm</sub>)  
(charged) (neutrals)

Particles studied  $\rho, \omega, \phi$

Brief description Measures the hadronic part of the anomalous magnetic moment of the muon. Studies the dynamics of multihadron production and rare decays of vector mesons. The magnetic detector consists of a 1.5 tesla superconducting solenoid, drift chamber, Z-chamber, muon identification system, CsI barrel calorimeter, and BGO endcap calorimeter.

Journal papers NIM A252 (1986) 299, NIM A265 (1988) 137, NIM A283 (1989) 752, NIM A323 (1992) 178, and PL B364 (1995) 199.

Related experiments BNL-821

E-mail contact khazin@inp.nsk.su

WWW Home-page <http://www.inp.nsk.su/cmd2/>

#### NOVOSIBIRSK-KEDR

(Proposed 1986, Approved 1987, In preparation)

#### THE MAGNETIC SPECTROMETER EXPERIMENT

NOVOSIBIRSK, IYF - S Z Akhmedaliev, V V Anashin, V M Aulchenko, B D Baibusinov, L M Barkov, A A Barladyan, S E Baru, I A Bedny, A E Blinov, G A Blinov, V E Blinov, A E Bondar, A D Bukin, A G Chilingarov, S I Eidelman, V R Groshev, G Y Kezerashvili, V A Kiselev, S G Klimenko, G M Kolachev, V N Kozlov, L M Kurdadze, A S Kuzmin, M Y Leithuk, V M Malyshev, A A Maslennikov, A A Milov, G D Minakov, S I Mishnev, N A Muchnoi, V P Nagaslaev, E I Nekhanevich, A B Nomerotsky, A P Onuchin, V S Panin, S V Peleganchuk, V V Petrov, G E Pospelov, Y V Pril, I Y Protopopov, T A Purlatz, V A Rodyakin, L V Romanov, N I Root, A V Rysin, G A Savinov, B A Schwartz, A G Shamov, M I Shubin, A I Shusharo, V A Sidorov, Y I Skovpen, A N Skrinsky, V P Smakhtin, A I Sokolov, V A Tayurski, V I Telnov, Y A Tikhonov (✓ Spokesperson), G M Tumaikin, A E Undrus, Y V Usov, A I Vorobiev, N I Yakovlev, I A Zagorodnikov, V N Zhilich, A A Zholents

BOLOGNA U & INFN, BOLOGNA - P L Frabetti

MILAN U & INFN, MILAN - F Palombo, A Sala

PAVIA U & INFN, PAVIA - P F Mafredi, V Re, V Speziali

Accelerator NOVO-VEPP-4M Detector KEDR

#### Reactions

$e^+ e^- \rightarrow \text{hadrons}$	<10.0 GeV (E <sub>cm</sub> )
$e^+ e^- \rightarrow \Upsilon(nS)$	"
$e^+ e^- \rightarrow e^+ e^- \gamma$	"
$e^+ e^- \rightarrow e^+ e^- \text{hadrons}$	"
$e^+ e^- \rightarrow e^+ e^- \pi^0$	"
$e^+ e^- \rightarrow e^- e^+ \eta$	"
$e^+ e^- \rightarrow e^- e^+ \eta'$	"
$e^+ e^- \rightarrow e^- e^+ \eta_c(1S)$	"
$e^+ e^- \rightarrow e^+ e^- a_2(1320)$	"
$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$	"
$e^+ e^- \rightarrow e^+ e^- f_2(1270)$	"

Particles studied  $\Upsilon(1S), \Upsilon(2S), \Upsilon(3S), \Upsilon(4S), \pi^0, \eta, \eta', \eta_c(1S), a_2(1320), f_2(1270)$

Brief description Studies spectroscopy of  $\Upsilon$  mesons. Particular attention is paid to a measurement of the two-photon widths of particles. The detector KEDR consists of a vertex detector, drift chambers, aerogel counter, TOF, barrel LKr calorimeter, endcap CSI calorimeter, 2-T superconducting coil, magnet yoke, muon system, and a tagging system for detection of  $e^+ e^-$  in the two-photon processes. Scheduled to run in 1997.

Journal papers NIM A289 (1990) 468, NIM A315 (1992) 491, and NIM A316 (1992) 8.

E-mail contact tikhonov@inp.nsk.su

WWW Home-page <http://www.inp.nsk.su/ke/dr/>

#### NOVOSIBIRSK-SND

(Proposed 1986, Approved 1987, Began data-taking 1995, In progress)

#### THE NEUTRAL-SPECTROMETER EXPERIMENT

NOVOSIBIRSK, IYF - M N Achasov, T V Baier, M G Beck, P M Beschastnov, A V Bozhenok, A D Bukin, D A Bukin, S V Burdin, V P Druzhinin, M S Dubrovin, I A Gaponenko, V B Golubev, A V Gritsan, V N Ivanchenko, A A Korol, S V Koshuba, E V Pakhtusova, A A Salnikov, S I Serebnyakov (✓ Spokesperson), V V Shary, Y M Shatunov, V A Sidorov, Z K Silagadze, A N Skrinsky, Y V Usov, Y S Velikzhanin

Accelerator NOVO-VEPP-2M Detector SND

#### Reactions

$e^+ e^- \rightarrow \pi^0 \gamma$	<1.4 GeV (E <sub>cm</sub> )
$e^+ e^- \rightarrow \eta \gamma$	"
$e^+ e^- \rightarrow \omega \pi^0$	"
$e^+ e^- \rightarrow \phi \pi^0$	"
$e^+ e^- \rightarrow \eta \pi^+ \pi^-$	"
$e^+ e^- \rightarrow 4\gamma$	"
$e^+ e^- \rightarrow 5\gamma$	"
$e^+ e^- \rightarrow e^- e^+ 2\gamma$	"
$e^+ e^- \rightarrow e^- e^+ 3\gamma$	"
$e^+ e^- \rightarrow 2e^- 2e^+$	"
$e^+ e^- \rightarrow 2e^- 2e^+ \gamma$	"
$e^+ e^- \rightarrow \text{pions}$	"
$e^+ e^- \rightarrow 2\text{pion } \gamma$	"
$e^+ e^- \rightarrow K^+ K^-, K_S K_L$	"

Particles studied  $K^+, K^-, K^0, \rho, \omega, f_0(975), a_0(980), \phi$

Brief description Studies radiative and rare decays of vector mesons, nonresonant hadronic production, and neutral kaon decays. Tests quantum electrodynamics. The Spherical Neutral Detector (SND) consists of 1680 NaI(Tl) counters and provides a good tool to study multiphoton events. The integrated luminosity reached  $2 \text{ pb}^{-1}$  in the  $\phi$  region as of June 96.

Journal papers YF 56-11 (1993) 75, NIM A342 (1994) 477, and NIM A361 (1995) 138.

Related experiments NOVOSIBIRSK-ND

E-mail contact serebnyakov@inp.nsk.su

WWW Home-page <http://www.inp.nsk.su/snd/>

## SUMMARIES OF ST. PETERSBURG EXPERIMENTS

### Selected PNPI Experiments

#### PNPI-SC-147

(Proposed Jun 1990, Approved Jun 1990, Began data-taking Nov 1992, In progress)

**STUDY OF BINARY  $\pi^-p$  REACTIONS WITH NEUTRAL PARTICLES IN THE FINAL STATE IN THE REGION OF  $N(1440 P_{11})$  AND  $N(1535 S_{11})$  RESONANCES**

PNPI-UCLA-ACU COLLABORATION

ST PETERSBURG, INP - V V Abaev, V S Bekrenev,  
E A Filimonov, A B Gridnev, M R Kan, N G Kozlenko,  
S P Kruglov, L V Lapochkina, I V Lopatin ( $\checkmark$  Spokesperson),  
D V Novinsky, A B Starostin, V V Sumachev

UCLA - R M Clajus, B M K Neffkens

ABILENE CHRISTIAN U - L D Isenhover, M E Sadler

Accelerator PNPI Detector Counter

#### Reactions

$\pi^- p \rightarrow n \eta$  665-715 MeV/c  
 $\pi^- p \rightarrow n \pi^0$  500-750 MeV/c

Brief description Measurements of DCS for the reaction  $\pi^-p \rightarrow \pi^0 n$  in the region of  $N(1440 P_{11})$  and  $N(1535 S_{11})$  resonances, and at the  $\eta$  production threshold are underway. Uses four neutron counters in coincidence with two total absorption  $\gamma$  detectors. The detectors are made of Čerenkov lead glass blocks and CsI(Na) crystals.

Journal papers PTE 1 (1995) 15, and FBS SUPPL 9 (1995) 241.

E-mail contact lopatin@lnpi.spb.su

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### Other PNPI Experiments

Listed here are some other PNPI experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

#### PNPI-SC-124 (Completed data-taking Aug 1991)

**MEASUREMENT OF THE SPIN ROTATION PARAMETERS  $R$  AND  $A$  IN  $\pi^-p$  ELASTIC SCATTERING IN THE REGION OF LOW-LYING PION-NUCLEON RESONANCES**

Spokesperson: S.P. Kruglov [St. Petersburg, INP]

E-mail contact kruglov@lnpi.spb.su

#### PNPI-SC-129 (Completed data-taking 1992)

**MEASUREMENT OF VECTOR ANALYZING POWER  $iT_{11}$  IN REACTION  $\pi^-d \rightarrow pp$  AT THE PION KINETIC ENERGY REGION 350-450 MeV**

Spokesperson: A.N. Prokofiev [St. Petersburg, INP]

E-mail contact prokan@lnpi.spb.su

## SUMMARIES OF VILLIGEN EXPERIMENTS

### Selected PSI Experiments

#### PSI-R-87-01

(Proposed Nov 1986, Approved Jan 1987, Began data-taking Dec 1988, Completed data-taking 1993)

#### PRECISION MEASUREMENT OF THE MUON MOMENTUM IN PION DECAY AT REST

PSI, VILLIGEN - M Daum, R Frosch (✓ Spokesperson), P Gheno, R Horisberger, M Janousch, P-R Kettle, C Wigger  
 VIRGINIA U - K Assamagan  
 ZURICH, ETH - H Forrer  
 ZURICH U - C Broennimann, T Spirig

Accelerator PSI Detector Spectrometer

#### Reactions

$$\pi^+ \rightarrow \mu^+ \nu_\mu \quad 0 \text{ MeV}/c$$

Particles studied  $\nu_\mu, \pi^+$

Brief description Uses a surface muon beam and a magnetic spectrometer. Ran for approximately 10 weeks and measured the muon momentum to better than 4 ppm. The measurement gives an upper limit on the  $\nu_\mu$  mass and determines the  $\pi^+$  mass.

Journal papers PL B265 (1991) 425, PL B335 (1994) 231, and PR D53 (1996) 6065.

E-mail contact manfred.daum@psi.ch

#### PSI-R-87-03

(Proposed Nov 1986, Approved Jan 1987, Began data-taking 1989, In progress)

#### SEARCH FOR $\mu^- \rightarrow e^-$ CONVERSION WITH SINDRUM II

##### SINDRUM-II COLLABORATION

AACHEN, TECH HOCHSCH, III PHYS INST - G Cahsor, J Kaulard, J Kuth, G Otter, A Schnengel  
 PSI, VILLIGEN - W Bertl, J Egger, D Renker, J Zichy  
 SWIERK, INST ATOMIC ENERGY - T Kozlowski  
 ZURICH U - R Engfer, E A Hermes, H S Pruys, F Riepenhausen, M Rutsche, A van der Schaaf (✓ Spokesperson), P Wintz

Accelerator PSI Detector SINDRUM-II

#### Reactions

$$\mu^- \text{ nucleus} \rightarrow e^- \text{ nucleus} \quad 0 \text{ MeV}/c (P_{\text{lab}})$$

Particles studied  $\mu^-$

Brief description The goal is to study the neutrinoless  $\mu^- \rightarrow e^-$  conversion in a muonic atom, which is a test of lepton flavor conservation. Data were taken on Ti in 1989 (results are published), on Pb in 1992, and on Ti again in 1993. With the new beamline which will become available by 1997, the sensitivity is expected to reach  $10^{-14}$ . Active (July 96).

Journal papers NIM A327 (1993) 378, PL B317 (1993) 631, and PRL 76 (1996) 200.

Related experiments LAMPF-969

E-mail contact vanderschaaaf@psi.ch

WWW Home-page

[http://www1.psi.ch/www\\_sindrum2\\_hn/sindrum2.html](http://www1.psi.ch/www_sindrum2_hn/sindrum2.html)

#### PSI-R-89-01

(Proposed Jan 1989, May 1991, Approved Jan 1992, In preparation)

#### A PRECISE MEASUREMENT OF THE $\pi^+ \rightarrow \pi^0 e^+ \nu$ DECAY RATE

PIBETA COLLABORATION

VIRGINIA U - E Frlež, J E Koglin, J S McCarthy, R C Minehart, B E Norum, D Počanić (✓ Spokesperson), S Ritt, P L Slocum, L C Smith, W A Stephens, B K Wright, K O H Ziock  
 PSI, VILLIGEN - M Daum, T Flugel, R Frosch, R Horisberger, B R Krause, D Renker, R Schnyder  
 PSI, VILLIGEN & ZURICH U - C Broennimann  
 SOLTAN INST, SWIERK - T Kozlowski  
 ARIZONA STATE U - D W Lawrence, B G Ritchie  
 DUBNA - V A Baranov, V V Karpukhin, N V Khomutov, I V Kisel, A S Korenchenko, S M Korenchenko, N P Kravchuk, N A Kuchinsky, A Moiseenko  
 TBILISI STATE U - Y Bagaturia, D Mzhavia, T Sachelashvili, Z Tsamalaidze  
 BOŠKOVIĆ INST, ZAGREB - N Soić, I Supek

Accelerator PSI Detector Calorimeter, Wire chamber, Counter

#### Reactions

$$\begin{aligned} \pi^+ &\rightarrow \pi^0 e^+ \nu && 0 \text{ MeV}/c \\ \pi^+ &\rightarrow e^+ \nu && \text{"} \\ \pi^+ &\rightarrow e^+ \nu \gamma && \text{"} \end{aligned}$$

Particles studied  $\pi^+$

Brief description The aim is to determine the branching

ratio for the  $\pi^+ \rightarrow \pi^0 e^+ \nu$  decay to about 0.5% accuracy. The apparatus is a stopped-pion detector system designed to observe the two  $\gamma$ 's from the  $\pi^0$  decay, as well as the  $e^+$ . Uses a  $0.75 \times 4\pi$  pure-CsI calorimeter (consisting of 240 crystals) with a good energy resolution, MWPC's, and counters. Target is active and consists of 77 plastic scintillation fibers  $3 \times 3 \text{ mm}^2$ . Development runs are scheduled for 1996. Data taking is expected in late 1997.

Related experiments LAMPF-032

E-mail contact pocanic@virginia.edu, ritt@psi.ch

WWW Home-page <http://pibeta.psi.ch/>

#### PSI-R-89-06

(Proposed Mar 1990, Approved Apr 1990, Began data-taking Jul 1992, In progress)

#### SEARCH FOR SPONTANEOUS CONVERSION OF MUONIUM TO ANTIMUONIUM

HEIDELBERG U, PHYS INST - A Grossmann, D Hubl, K Jungmann (✓ Spokesperson), J Merkel, V Meyer, I Reinhard, P V Schmidt, K Trager, L Willmann, G zu Putlitz  
 ZURICH U - R Engfer  
 PSI, VILLIGEN - R Abela, D Renker, H K Walter  
 DUBNA - V Baranov, V Karpuchin, I Kisel, A S Korenchenko, S M Korenchenko, N P Kravchuk, N Kuchinsky, A Moiseenko  
 TBILISI STATE U - J Bagaturia, D Mzavia, T Sakelashvili  
 YALE U - V W Hughes

Accelerator PSI Detector SINDRUM

#### Reactions

$$\mu^+ e^- \rightarrow \mu^- e^+ \quad 25 \text{ MeV}/c (P_{\text{lab}})$$

Particles studied  $\mu^+$ , muonium

Brief description Studies lepton number violation. The  $\mu^-$  meson is detected by its decay electron, the atomic  $e^+$  is directly detected after acceleration by 8 kV. The reaction  $\mu^+ \rightarrow e^+ e^- e^+ \nu \bar{\nu}$  is also studied. Target is the SiO<sub>2</sub> powder. First data were taken in 1992/93. Expected to run till the end of 1996.

Related experiments LAMPF-1073

E-mail contact jungmann@physi.uni-heidelberg.de

WWW Home-page

[http://www1.psi.ch/www\\_mmbar\\_hn/mmbar.html](http://www1.psi.ch/www_mmbar_hn/mmbar.html)

#### PSI-R-94-01

(Proposed Dec 1993, Approved Dec 1993, Began data-taking Jun 1994, In progress)

#### FEASIBILITY STUDY TO DETERMINE THE $\pi - \mu$ MASS RATIO

## SUMMARIES OF VILLIGEN EXPERIMENTS

IOANNINA U - D F Anagnostopoulos  
 JULICH, FORSCHUNGSZENTRUM - G Borchert, H Gorke,  
 D Gotta (✓ Spokesperson), S Lenz, O W B Schult  
 PARIS, CURIE UNIV VI, LPAN - P El Khoury, P Indelicato  
 PSI, VILLIGEN - M Daum, R Frosch, P Hauser, K Kirch,  
 L M Simons  
 NEUCHATEL U - M Augsburg, D Chatellard, J P Egger,  
 E Jeannot

Accelerator PSI Detector Spectrometer

Particles studied  $\pi^-$ ,  $\mu^-$

Brief description Studies X-rays from muonic nitrogen, muonic oxygen, and pionic nitrogen. Uses a bent crystal spectrometer. Aims to determine the  $\pi^-$  mass to  $\pm 1$  ppm. Taking data (July 96).

E-mail contact gotta@ikpd01.ikp.kfa-juelich.de

### PSI-R-94-10

(Proposed May 1995, Approved Jun 1995, In preparation)

#### MEASUREMENT OF THE TRANSVERSE POLARIZATION OF POSITRONS FROM THE DECAY OF POLARIZED MUONS

ZURICH, ETH - I Barnett, C Bee, D Conti, W Fetscher (✓ Spokesperson), M Hadri, S Kistryn, J Lang, O Naviliat, J Stromicki, E Stephan  
 JAGELLONIAN U - K Bodek, L Jarczyk, J Smyrski, A Strzalkowski, J Zejma

Accelerator PSI Detector Drift chamber, Counter

Reactions Polarized beam

$\mu^+ \rightarrow e^+ \nu_e \bar{\nu}_\mu$  125 MeV/c ( $P_{lab}$ )

Particles studied  $e^+$

Brief description Measures two transverse polarization components,  $P_{T1}$  and  $P_{T2}$  of the positron, as a function of the  $e^+$  energy, with an expected precision of  $3 \times 10^{-3}$ . This could improve by an order of magnitude the results of a previous PSI measurement of the two components, and provide a tighter limit both for the violation of time reversal and on the value of the low-energy parameter  $\eta$  which is used in the determination of the Fermi coupling constant  $G_F$ . Uses a high-intensity polarized muon beam, and a set of drift chambers, plastic counters, and a BGO array.

E-mail contact wulf.fetscher@psi.ch

### PSI-R-95-03

(Proposed Nov 1994, Approved Dec 1994, Began data-taking Sep 1995, In progress)

#### KINETIC ENERGY OF ( $\pi^- p$ ) ATOMS IN LIQUID AND GASEOUS HYDROGEN

PSI, VILLIGEN - M Daum (✓ Spokesperson), W Hajdas, P-R Kettle, V Markushin, J Schottmueller  
 ZURICH, ETH - R Badertscher, P F A Goudsmit, M Janousch, Z G Zhao

Accelerator PSI Detector Counter, Calorimeter

Reactions

$\pi^- p \rightarrow \pi^0 n$  0 MeV/c ( $P_{lab}$ )  
 $\pi^- p \rightarrow \gamma n$  "

Brief description Measures the time-of-flight of neutrons over various flight-path lengths (from 1 to 12 m, and possibly more) to determine the kinetic energy distribution of pionic atoms under varying pressure conditions. The same data will also be used to determine the mass difference between  $\pi^-$  and  $\pi^0$  with improved precision. The detection apparatus consists of counters and a NaI calorimeter.

E-mail contact manfred.daum@psi.ch

### PSI-R-96-05

(Proposed Apr 1996, Approved Jun 1996, Began data-taking 1996, In progress)

#### SEARCH FOR A NEUTRAL PARTICLE OF MASS = 33.9 MeV IN PION DECAY

PSI, VILLIGEN - M Daum (✓ Spokesperson), P-R Kettle, B Krause, J Schottmueller, O Wilhelm  
 PSI, VILLIGEN & VIRGINIA U - S Ritt  
 TUBINGEN U - K Foehl  
 ZURICH, ETH - M Janousch, Z G Zhao

Accelerator PSI Detector Scintillator

Reactions

$\pi^+ \rightarrow \mu^+ X$  100-150 MeV/c ( $P_{lab}$ )

Brief description Measures the muon momentum distribution in charged pion decay in flight, in order to search for a small branching fraction  $\eta$  of pion decays  $\pi^+ \rightarrow \mu^+ X$ , in which a heavy neutral particle  $X$ , with a mass of 33.9 MeV would be emitted. Such a particle may have been observed recently by the KARMEN Collaboration.

Journal papers PL B361 (1995) 179.

Related experiments ISIS-KARMEN

E-mail contact manfred.daum@psi.ch

## Other PSI Experiments

Listed here are some other PSI experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the yearly publication 'PSI Annual Report - Annex I'.

### PSI-R-85-13-3 (Completed data-taking Aug 1994)

#### MEASUREMENT OF ELASTIC $\pi^\pm p$ SCATTERING BELOW 100 MeV

By LEPS Collaboration

Spokespersons: W. Kluge [Karlsruhe U., IEKP], H. Clement [Tubingen U.]

E-mail contact wolfgang.kluge@physik.uni-karlsruhe.de

### PSI-R-86-05 (Completed data-taking Aug 1994)

#### CRYSTAL DIFFRACTION OF PIONIC HYDROGEN AND DEUTERIUM X-RAYS

Spokespersons: J.P. Egger [Neuchatel U.], A. Badertscher [Zurich, ETH]

E-mail contact jean-pierre.egger@iph.unine.ch,  
 andreas.badertscher@psi.ch

### PSI-R-87-12 (Completed data-taking 1995)

#### $n p$ ELASTIC SCATTERING: AN EXPERIMENT WITH POLARIZED NEUTRONS

Spokesperson: H. Schmitt [Freiburg U.]

E-mail contact hschmitt@uni-freiburg.de

### PSI-R-89-03 (Taking data)

#### PIONIC DOUBLE CHARGE EXCHANGE AT LOW ENERGIES

Spokesperson: H. Clement [Tubingen U.]

E-mail contact clement@pit.physik.uni-tuebingen.de



## SUMMARIES OF VILLIGEN EXPERIMENTS

**PSI-R-91-08** (Completed data-taking Jul 1993)

**MEASUREMENT OF THE STOPPING POWER FOR MUONS ( $\mu^-$ ,  $\mu^+$ ) AT ENERGIES BETWEEN 2 AND 40 keV**

Spokespersons: F.J. Hartmann [Munich, Tech. U.], D. Taqqu [PSI, Villigen]

*E-mail contact* taqqu@cvax.psi.ch

**PSI-R-92-08** (Completed data-taking Sep 1992)

**MEASUREMENT OF THE PRODUCTION OF THERMAL MUONIUM IN VACUUM FROM SILICA AEROGELS**

Spokespersons: K. Jungmann, B. Matthias [Heidelberg U., Phys. Inst.]

**PSI-R-93-06** (In preparation)

**MEASUREMENT OF THE  $3d - 3p$  TRANSITION IN MUONIC HYDROGEN WITH A COMPACT WAVEGUIDE FREE-ELECTRON LASER**

By MUH Collaboration

Spokesperson: E. Zavattini [Trieste U.]

*E-mail contact* milotti@dfists.ts.infn.it

**PSI-R-95-08** (Taking data)

**SPIN DEPENDENCE OF PION PRODUCTION IN NEUTRON-PROTON COLLISIONS**

Spokespersons: H. Schmitt [Freiburg U.], M. Finger [Charles U. and Dubna, JINR]

*E-mail contact* hschmitt@uni-freiburg.de

**PSI-R-95-09**

**MEASUREMENT OF THE DESTRUCTIVE INTERFERENCE OF  $s$  AND  $p$  WAVE IN  $\pi^-p$  ELASTIC SCATTERING AT  $180^\circ$**

Spokesperson: M. Janousch [Zurich, ETH]

*E-mail contact* markus.janousch@psi.ch

**PSI-Z-89-02** (Completed data-taking Jun 1991)

**NEUTRON MAGNETIC FORM-FACTOR**

Spokesperson: Juerg Jourdan [Basel U.]

*E-mail contact* jourdan@urz.unibas.ch

**PSI-Z-89-06** (Completed data-taking 1991)

**SPIN DEPENDENT TOTAL CROSS-SECTION  $\Delta\sigma_L$  IN  $np$  SCATTERING**

Spokesperson: P. Haffter [Basel U.]

*E-mail contact* jourdan@urz.unibas.ch

**PSI-Z-89-07** (Completed data-taking 1991)

**$\bar{n}p$  RADIATIVE CAPTURE**

Spokesperson: G.S. Masson [Basel U.]

*E-mail contact* masson@urz.unibas.ch

**PSI-Z-90-07** (Taking data)

**SEARCH FOR EXTENSIONS OF THE STANDARD MODEL BY A RELATIVE  $\beta$ -POLARIZATION MEASUREMENT FROM POLARIZED NUCLEI**

Spokesperson: Oscar Naviliat-Cuncic [Zurich, ETH]

*E-mail contact* naviliat@imp.phys.ethz.ch

**PSI-Z-90-12** (Taking data)

**DEVELOPMENT OF A SUPERCONDUCTING NEUTRINO AND DARK MATTER DETECTOR**

Spokesperson: Klaus Pretzl [Bern U.]

*E-mail contact* pretzl@cernvm.cern.ch

**PSI-Z-91-02** (Completed data-taking 1992)

**MEASUREMENT OF THE NEUTRON-PROTON SPIN CORRELATION PARAMETER AT FORWARD ANGLES**

Spokesperson: Benny Zihlmann [Basel U.]

*E-mail contact* zihlmann@urz.unibas.ch

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## PSI Future Plans

PSI plans to continue its development and operation of large, complex accelerator facilities. The Spallation Neutron Source (SINQ) will begin operations shortly, and other facilities, *e.g.*, the Swiss Light Source (SLS) are in the planning stage. Although the emphasis placed earlier on nuclear and particle physics has shifted more towards solid state physics and materials sciences over the last few years, the nuclear/particle physics programs can benefit largely from the diversification of accelerator usage. Accordingly, new large particle physics experiments (*e.g.*, the rare decay experiments such as  $\mu \rightarrow e\gamma$ ), are envisaged in the long term plans at PSI. The near-future plans include a continuing study of rare decays and exotic atoms, the  $\mu$ SR experiments, as well as the exploitation of very slow muons.

## SUMMARIES OF SACLAY EXPERIMENTS

### Selected SATURNE Experiments

#### SATURNE-186

(Proposed Oct 1987, Approved Dec 1987, Began data-taking 1988, Completed data-taking 1993)

#### STUDY OF HEAVY MESON PRODUCTION IN REACTIONS $pd \rightarrow {}^3\text{He}X$ AND $dd \rightarrow {}^4\text{He}X$

STRASBOURG, CRN - O Bing, F Hibou  
 SACLAY - J Arvieux, M Boivin, J M Durand, F Plouin  
 ORSAY, IPN - L Bimbot, M P Comets, P Courtat, Y Le Bornec (Spokesperson), E Loireleux, F Reide, B Tatischeff, N Willis

Accelerator SATURNE-II Detector SPES-III

#### Reactions

$p \text{ deut} \rightarrow {}^3\text{He} X$  900 - 2700 MeV ( $T_{\text{lab}}$ )  
 $\text{deut deut} \rightarrow {}^4\text{He} X$  1150 - 2150 MeV ( $T_{\text{lab}}$ )

Particles studied deut,  ${}^3\text{He}$ ,  ${}^4\text{He}$ , meson

Brief description Studies the heavy meson production at proton energies between 900 and 2700 MeV, and deuteron energies 1150 and 2150 MeV. Measures the angular distribution.

Journal papers Paper to be published soon.

Related experiments SATURNE-253

E-mail contact le\_bornec@ipncl.in2p3.fr

#### SATURNE-198

(Proposed Mar 1988, Approved Dec 1988, Began data-taking Nov 1990, Completed data-taking 1991)

#### MEASUREMENTS OF SOME RARE DECAY MODES OF THE $\eta$

SACLAY - A Baldissieri, A Boudard, B Fabbro, M Garcon, W Jacobs, C Kerboul, B Mayer (✓ Spokesperson), J Poitou, J Saudinos, E Tomasi, S Vigdor, F Wellers  
 UCLA - R Kessler, B M K Nefkens (✓ Spokesperson), B Tippens, M Wang  
 ZURICH U - E A Hermes, C Niebuhr, A van der Schaaf  
 GEORGE WASHINGTON U - W Briscoe, A Petrov  
 TRIUMF - R Abegg, W T H van Oers  
 DUBNA - L Lytkin

Accelerator SATURNE-II Detector SPES-II

#### Reactions

$p \text{ deut} \rightarrow {}^3\text{He} \eta$  > 896 MeV ( $T_{\text{lab}}$ )

Particles studied  $\eta$

Brief description Measures the  $\eta$  branching ratio to  $\mu^+\mu^-$  with 12% accuracy. The muons are detected by a two-range telescope. Events are identified by using constraints like coplanarity, angular correlation, total energy conservation, and the invariant mass of the two muons.

Journal papers PRL 70 (1993) 892, PR D50 (1994) 92, PR C53 (1996) 2068, and PR D53 (1996) 6658.

Related experiments SATURNE-258

E-mail contact mayer@phnx7.saclay cea.fr, bnefkens@uclapp.physics.ucla.edu

#### SATURNE-209

(Proposed Mar 1989, Approved 1989, Began data-taking 1990, Completed data-taking Nov 1991)

#### CROSS-SECTION AND ASYMMETRIES FOR THE $pp \rightarrow pp\pi^0$ REACTION FROM THRESHOLD TO 1 GeV

BONN U - G Anton, J Arends, M Breuer, K Buchler, P Hoffmann-Rothe, G Noeldeke

SOUTH CAROLINA U - G Blanpied (✓ Spokesperson), B Freedom

ORSAY, IPN - G Berrier-Ronsin, J P Didelez (✓ Spokesperson), A Elayi, R Frascaria, E Hourani (✓ Spokesperson), G Rappenecker, M Rigney, L Rosier

SACLAY - J M Laget, B Saghai

Accelerator SATURNE-II Detector SPES-0

Reactions Polarized beam

$p p \rightarrow p p \pi^0$  325-1000 MeV ( $T_{\text{lab}}$ )

Brief description Measures the differential, total cross-sections and beam asymmetries for the  $\pi^0$  emitted in the reaction, from threshold to 1000 MeV. Uses the SPES0-2 $\pi$  Neutral Meson Spectrometer and a liquid H<sub>2</sub> target with polarized protons as projectiles.

Journal papers NP A590 (1995) 763.

Related experiments SATURNE-129, SATURNE-132, SATURNE-134, SATURNE-155

E-mail contact didelez@ipncl.in2p3.fr

#### SATURNE-213

(Proposed 1989, Approved 1989, Began data-taking 1994, In progress)

#### MEASUREMENT OF SPIN DEPENDENT OBSERVABLES IN THE REACTION $pp \rightarrow pK^+Y^*$

DISTO COLLABORATION

INDIANA U - L C Bland, S Choi, M Dziedzic, W W Jacobs, S E Vigdor

TURIN U & INFN, TURIN - F Balestra, S Bossolasco, M P Bussa, L Fava, L Ferrero, R Garfagnini, A Grasso, A Maggiora, D Panzieri, G Piragino, F Tosello, G Zosi

DUBNA - I Falomkin, V Frolov, V Ivanov, G B Pontecorvo, A Popov, V Tchalyshov, B Zalikhonov

SACLAY - Y Bedfer, R Bertini (✓ Spokesperson), F Brochard, J C Faivre, A Manara

DARMSTADT, GSI - M Debowski, P Senger

CRACOW & JAGELLONIAN U - J Foryciarz, P Salabura

GIESSEN U - A Brenschede, W Kuhn, H Pfaff

FRANKFURT U - J Stroth

ROSSENDORF, FORSCHUNGSZENTRUM - E Grosse

TRIUMF - D Gil

Accelerator SATURNE-II Detector DISTO

Reactions Polarized beam

$p p \rightarrow p K^+ \Lambda$  2.0, 2.5, 2.85 GeV ( $T_{\text{lab}}$ )

$p p \rightarrow p K^+ \Sigma^0$  "

$p p \rightarrow p K^+ Y^*(\text{unspec})$  2.85 GeV ( $T_{\text{lab}}$ )

$p p \rightarrow p p K^+ K^-$  "

$p p \rightarrow p p K^+ K^- \phi$  "

Brief description The experiment measures differential cross-sections and spin-dependent observables (analyzing power, polarization and depolarization) between the threshold and the highest energy available at SATURNE-II. Studies a correlation between the measured observables and  $N^*$  and  $Y^*$  resonances. Uses a liquid hydrogen target. The detector, DISTO, consists of a magnet, scintillating fiber detectors, MWPC's, scintillation hodoscope and a water Cerenkov hodoscope. In the next year's run, a replacement of the liquid hydrogen target by a nuclear target is envisaged in order to study the interaction of  $Y$  and  $Y^*$  with nuclear matter. Taking data (July 96).

Journal papers NP A585 (1995) 265c.

E-mail contact bertini@frcpn11.in2p3.fr

WWW Home-page

<http://www.to.infn.it/esperimenti/disto/disto.html>

## SUMMARIES OF SACLAY EXPERIMENTS

### SATURNE-220

(Proposed Jun 1990, Approved Dec 1990, Began data-taking Mar 1991, Completed data-taking 1991)

#### SEARCH FOR THE EXCITATION OF THE ROPER RESONANCE (1440) BY INELASTIC SCATTERING OF $\alpha$ PARTICLES

SACLAY - M Boivin, H P Morsch (Spokesperson), F Plouin, B Saghai, J Yonnet, P Zupranski  
 ORSAY, IPN - J P Didelez, R Frascaria (Spokesperson), M Morlet, R Siebert, E Warde  
 JULICH, FORSCHUNGSZENTRUM & STOCKHOLM U - P E Tegner

Accelerator SATURNE-II Detector SPES-IV

#### Reactions

$^4\text{He } p \rightarrow ^4\text{He } X$  4.2 GeV ( $T_{\text{lab}}$ )

Particles studied  $N^*$ (unspec),  $N(1440 P_{11})$

Brief description Studies the baryon excitation in the  $\alpha p$  system, from the pion threshold up to the Roper resonance. Uses the  $\alpha$  beam up to 7 GeV/c. Inelastically scattered alpha particles are detected by the SPES-IV spectrometer. Uses LH2 target.

Journal papers PRL 69 (1992) 1336, and ZPHY A348 (1994) 45.

Related experiments SATURNE-251

E-mail contact morsch@frcpn11.in2p3.fr, frascaria@ipncl.in2p3.fr

### SATURNE-222

(Proposed Nov 1989, Approved 1989, Began data-taking 1990, Completed data-taking 1993)

#### MESON PRODUCTION NEAR THRESHOLD FROM THE $\phi$ TO THE $f_1(1285)$

ORSAY, IPN - J P Didelez, M A Duval, R Frascaria, M Morlet, R Siebert (Spokesperson), E Warde  
 SACLAY - J Arvieux, F Plouin  
 BONN U - J Bisplinghoff, J Ernst, F Hinterberger, R Jahn (Spokesperson), R Joosten, U Lahr, C Lippert, A Marx, R Wurzinger

Accelerator SATURNE-II Detector SPES-IV

#### Reactions

$p \text{ deut} \rightarrow ^3\text{He } X$

Particles studied  $\phi$ ,  $f_1(1285)$

Brief description Extends and refines existing measurements of the threshold excitation curve of meson production. An increasing degree of exclusivity is achieved by adding scintillator arrays to the SPES-IV detector. In the second phase, during 1992/93, the regions around the  $K^+K^0$  threshold, and above 1.9 GeV, are explored in 100-MeV steps.

Journal papers PR C51 (1995) 443.

E-mail contact siebert@ipncl.in2p3.fr

### SATURNE-225

(Proposed Dec 1989, Approved Jun 1991, Began data-taking Nov 1991, Completed data-taking Apr 1995)

#### DETERMINATION OF THE NUCLEON-NUCLEON SCATTERING AMPLITUDES IN THE ENERGY REGION FROM 1.1 TO 2.7 GeV AND A SEARCH FOR A STRUCTURE AROUND $T_{\text{kin}} = 2.1$ GeV

#### NUCLEON-NUCLEON COLLABORATION

SACLAY - J Arvieux, J Ball ( $\checkmark$  Spokesperson), J Bystricky, P A Chamouard, M Combet, A de Lesquen, M de Mali, J M Fontaine ( $\checkmark$  Spokesperson), R Kunne, J M Lagniel, F Lehar, J L Lemaire, J L Sans

GENEVA U - P Demierre, R Hess, Z F Janout, Jr, D Rapin ( $\checkmark$  Spokesperson), A Teglia, B Vuaridel  
 ARGONNE - C Allgower, M Beddo, D Grosnick, T Kasprzyk, D Lopiano, H Spinka ( $\checkmark$  Spokesperson)

DUBNA - L S Barabash, V A Kalinnikov, Y M Kazarinov, B A Khachaturov ( $\checkmark$  Spokesperson), V N Matafonov, I L Pisarev, A A Popov, Y A Usov

DUBNA & PRAGUE, TECH U - Z Janout  
 ST PETERSBURG, INP - A N Prokofiev, V Vikhrov, A A Zhdanov

UCLA - A Boutefnouchet, C M Dulya, V Ghazikhanian, S Trentalange, C A Whitten  
 MIT, LNS - E L Lomon

Accelerator SATURNE-II Detector Combination

Reactions Polarized beam and target

$p p \rightarrow p p$  1.1 - 2.8 GeV ( $T_{\text{lab}}$ )

$p n \rightarrow p n$  1.1 - 2.4 GeV ( $T_{\text{lab}}$ )

Particles studied  $p, n$

Brief description Uses a polarized proton beam and polarized proton and deuteron targets. Measures the complete sets of spin-dependent observables in  $pn$  quasielastic scattering between 1.1 and 2.4 GeV. Dedicated  $pp$  spin-dependent observables are measured between 1.8 and 2.8 GeV in small steps of energy. The measuring apparatus consists of a two-arm spectrometer, one arm being a polarimeter, and two large neutron-counter hodoscopes. The direction of beam polarization is measured by three additional beam polarimeters. Data analysis in progress (July 96).

Journal papers NIM A327 (1993) 308, and PL B320 (1994) 206.

Related experiments SATURNE-144, SATURNE-216

E-mail contact ball@frcpn11.in2p3.fr, jmfont@frcpn11.in2p3.fr, hms@hep.anl.gov, khachaturov@main1.jinr.dubna.su

### SATURNE-237

(Proposed Nov 1990, Approved Jan 1991, Began data-taking Jul 1991, Completed data-taking 1995)

#### STUDY OF THE $pp \rightarrow pp\eta$ AND $(p, \eta)$ REACTIONS ON NUCLEI AT $T_p > 1.26$ GeV

#### PINOT COLLABORATION

TURIN U & INFN, TURIN - E Chiavassa, N De Marco (Spokesperson), C De Oliveira Martins, G Dellacasa, F Ferrero, M Gallio, P Guaita, A Musso, A Piccotti, E Scomparin, E Vercellin (Spokesperson)

SACLAY - J M Durand, G Milleret

Accelerator SATURNE-II Detector PINOT

#### Reactions

$p p \rightarrow p p \eta$   $> 1.26$  GeV ( $T_{\text{lab}}$ )

$p \text{ nucleus} \rightarrow \eta X$  "

$p \text{ deut} \rightarrow \eta X$  "

Particles studied  $\eta$

Brief description The aim is to study the first two reactions near the threshold by detecting  $\eta$  mesons with the two-arm neutral meson spectrometer, PINOT. For the first reaction the total and doubly differential cross-section  $d^2\sigma/d\Omega dT$  is measured. The  $(p, \eta)$  reaction on nuclei is studied at the same incident energies by measuring the  $\eta$  kinetic energy distributions for  $\eta$ 's emitted forward in the laboratory. Also investigates the  $pd \rightarrow \eta X$  reaction in order to extract information on the  $pn \rightarrow \eta X$  elementary process, by comparing  $pd$  and  $pp$  induced reactions. Uses the following targets: liquid  $\text{H}_2$  and  $\text{D}_2$ , C, Al, Cu, Mo, W, Au, and Ti. Data analysis in progress (July 96).

Journal papers NP A538 (1992) 121c, ZPHY A342 (1992) 107, JPHY G19 (1993) L51, NC 106A (1993) 861, ZPHY A344 (1993) 345, NC 107A (1994) 1195, PL B322 (1994) 270, and PL B337 (1994) 192.

Related experiments SATURNE-125

E-mail contact demarco@to.infn.it, vercellin@to.infn.it

## SUMMARIES OF SACLAY EXPERIMENTS

### SATURNE-251

(Proposed Nov 1992, Approved Dec 1992, Began data-taking Mar 1993, Completed data-taking Oct 1993)

#### SEARCH FOR THE EXCITATION OF THE ROPER RESONANCE (1440) IN NUCLEI

SACLAY – M Boivin, J L Boyard (Spokesperson), F Fuchs, R Kunne, H P Morsch (Spokesperson), F Plouin, P Radvanyi, W Spang  
 ORSAY, IPN – T Hennino, J C Jourdain, B Ramstein, M Roy-Stephan, S Rusteau  
 JULICH, FORSCHUNGSZENTRUM – V Jaeckle  
 WARSAW U – P Zupranski  
 STOCKHOLM U – P E Tegner  
 RENNELAER POLY – L Murphy, P Stoler

Accelerator SATURNE-II Detector SPES-IV

#### Reactions

${}^4\text{He deut} \rightarrow {}^4\text{He X}$  4.2 GeV/c  
 ${}^4\text{He } {}^{12}\text{C} \rightarrow {}^4\text{He X}$  "

Particles studied  $N(1440 P_{11})$

Brief description Studies the spectrum of alpha particles.

Searches for the excitation of the Roper resonance. Uses LD2, solid C, and  $\text{CH}_2$  targets. Data analysis in progress (July 96).

Related experiments SATURNE-220

E-mail contact boyard@frcpn11.in2p3.fr, morsch@frcpn11.in2p3.fr

### SATURNE-258

(Proposed Nov 1992, Approved Dec 1992, Began data-taking 1993, Completed data-taking 1993)

#### DIRECT MEASUREMENT OF THE BRANCHING RATIO IN THE $\eta \rightarrow \gamma\gamma$ DISINTEGRATION

ETA COLLABORATION

SACLAY – A Boudard, J M Durand, B Fabbro, M Garcon ( $\checkmark$  Spokesperson), B Mayer, J F Pillot, E Thomasi-Gustafsson  
 DUBNA – A Efendiev, L Lytkin ( $\checkmark$  Spokesperson)  
 UCLA – M Clajus ( $\checkmark$  Spokesperson), B Nefkens, D White  
 PSI, VILLIGEN – R Abela  
 TRIUMF – R Abegg, P Fuchs, W T H van Oers  
 GEORGE WASHINGTON U – W Briscoe, T Morrison  
 ST PETERSBURG, INP – V Nikulin

Accelerator SATURNE-II Detector Calorimeter, SPES-II

#### Reactions

$p \text{ deut} \rightarrow {}^3\text{He } \eta$  894 MeV ( $T_{\text{lab}}$ )

Particles studied  $\eta, \gamma$

Brief description The first direct measurement of the branching ratio  $\Gamma(\eta \rightarrow \gamma\gamma)/\Gamma_{\text{tot}}$ . Expected to achieve an accuracy of 1 to 2%. Uses two BGO photon calorimeters and SPES-II. The target is LD2. Data analysis completed.

Journal papers PR D53 (1996) 11. No other papers expected.

Related experiments SATURNE-198, SATURNE-284

E-mail contact clajus@uclapp.physics.ucla.edu, garcon@phnx7.saclay.cea.fr, lytkin@main1.jinr.dubna.su

### SATURNE-278

(Approved Jun 1993, Began data-taking Dec 1995, In progress)

#### STUDY OF BARYONIC RESONANCES WITH THE NEW DETECTOR AROUND THE SPES-IV TARGET POINT

SPES4-PI COLLABORATION

COPENHAGEN U – R Dahl, C Ellegard, C Gaarde, J Jensen, J S Larsen, M Skousen

DUBNA – Y T Borzunov, L P Golovanov, V P Ladygin, L V Malinina, N M Piskunov, I M Sitnik, E A Strokovsky ( $\checkmark$  Spokesperson), A P Tsvinev

ST PETERSBURG, INP – G D Alkhozov, A V Khanzadeyev, V A Mylnikov, A N Prokofiev, V M Samsonov, I V Tkach, V N Vikhrov, A A Vorobyov, A A Zhdanov

JULICH, FORSCHUNGSZENTRUM – H P Morsch

NORFOLK STATE U – V Punjabi

ORSAY – L Bimbot, J L Boyard ( $\checkmark$  Spokesperson), L Farhi,

J C Jourdain, B Ramstein, M Roy-Stephan

SACLAY – M Boivin, T Hennino, M Kagarlis, R A Kunne

( $\checkmark$  Spokesperson), P Radvanyi, E Tomasi-Gustafsson

WARSAW, INST NUCL STUDIES – W Augustyniak, P Zupranski

WILLIAM AND MARY COLL – M Jones, C F Perdrisat

Accelerator SATURNE-II Detector SPES4-PI

#### Reactions

deut  $p \rightarrow$  deut  $p X$  < 3.8 GeV/c  
 ${}^3\text{He nucleus} \rightarrow$  trit  $\pi^+ X$  "  
 ${}^4\text{He } p \rightarrow$   ${}^4\text{He } p X$  < 7.0 GeV/c  
 ${}^{12}\text{C nucleus} \rightarrow$   ${}^{12}\text{N } \pi^- X$  < 3.8 GeV/c

Particles studied  $N^*(\text{unspec}), N(1440 P_{11})$

Brief description This is a three-part experiment (278a,

278b, 278c), carried out with a new detector at the target point of SPES-IV. The detector consists of the SPES-IV high resolution spectrometer to detect the scattered beam particles in coincidence with the secondary protons and pions which are registered by two arms of chambers. Studies baryonic resonances. Uses polarized and unpolarized beams, and C, Ca, and Pb, targets. The topics covered by the three parts are (1) coherent pion production from charge exchange reactions, (2) production of the  $N^*(1440)$  resonance with alpha particles, and (3) study of spin observables in the production of the  $N^*(1440)$  resonance with deuterons. In progress (July 96).

Related experiments SATURNE-250, SATURNE-291,

SATURNE-305, JINR-LHE-0941-1B, JINR-LHE-0941-1C

E-mail contact boyard@frcpn11.in2p3.fr, strok@sunhe.jinr.dubna.su, kunne@frcpn11.in2p3.fr

## Other SATURNE Experiments

Listed here are some other Saclay experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

**SATURNE-121** (Completed data-taking 1991)

#### SEARCH FOR DIBARYONS OF STRANGENESS $S = -1$ BETWEEN THE $\Lambda N$ AND $\Sigma N$ THRESHOLDS

Spokespersons: J.P. Didelez, R. Frascaria [Orsay, IPN], B. Freedom [South Carolina U.]

E-mail contact didelez@ipncls.in2p3.fr, frascaria@ipncls.in2p3.fr

**SATURNE-144** (Completed data-taking Dec 1990)

#### NUCLEON-NUCLEON PROGRAM (PART II): $np$ SCATTERING UP TO 1.2 GeV

Spokespersons: F. Lehar, F. Perrot [Saclay], R. Hess [Geneva U.]

E-mail contact lehar@frcpn11.in2p3.fr, hess@sc2a.unige.ch

**SATURNE-145** (Completed data-taking 1990)

#### MEASUREMENTS OF $A_{zz}$ AND $P_z$ FOR THE REACTION $d p \rightarrow \bar{p} p n$ IN COMPLETE KINEMATICS

Spokespersons: S.L. Belostotsky [St. Petersburg, INP], A. Boudard [Saclay]

E-mail contact boudard@phnx7.saclay.cea.fr

## SUMMARIES OF SACLAY EXPERIMENTS

**SATURNE-166** (Completed data-taking 1991)

**REACTION  $H(d, 2p)n$  WITH POLARIZED DEUTERONS AT 200 MeV**

Spokesperson: S. Kox [Grenoble U.]

E-mail contact kox@frcpn11.in2p3.fr

**SATURNE-174** (Completed data-taking)

**PRODUCTION OF LIGHT MESONS  $X$  IN  $pp \rightarrow ppX$  AT THRESHOLD AND IN NUCLEAR MATTER**

Spokesperson: O. Bing [Strasbourg, CRN]

E-mail contact obing@frcpn11.in2p3.fr

**SATURNE-190** (Completed data-taking May 1991)

**SPIN STRUCTURE OF THE  $\Delta$  EXCITATION**

Spokespersons: C. Gaarde [Copenhagen U.], J.L. Boyard [Orsay], P. Zupranski [Soltan Inst., Swierk]

E-mail contact gaarde@nbivax.nbi.dk, zupran@fuw.edu.pl

**SATURNE-202** (Completed data-taking 1992)

**STUDY OF THE PROTON POLARIZATION IN  $\bar{d}A \rightarrow \bar{p}X$  REACTION AT  $0^\circ$  AND 2.1 GeV**

Spokespersons: C.F. Perdrisat [William and Mary Coll.], J. Yonnet [Saclay]

E-mail contact yonnet@frcpn11.in2p3.fr, perdrisat@cebaf.gov

**SATURNE-235** (Completed data-taking 1993)

**CALIBRATION OF POLDER, A NEW DEUTERON TENSOR POLARIMETER AT INTERMEDIATE ENERGIES**

Spokesperson: Serge Kox [Grenoble U.]

E-mail contact kox@frcpn11.in2p3.fr

**SATURNE-244** (Completed data-taking Sep 1991)

**STUDY OF THE REACTION  $\bar{p}p \rightarrow \pi^- \pi^- X$**

Spokesperson: B. Tatischeff [Orsay, IPN]

E-mail contact tati@frcpn11.in2p3.fr

**SATURNE-246** (Completed data-taking 1992)

**$\pi^0$  PRODUCTION IN THE REACTION  $dp \rightarrow {}^3\text{He} \pi^0$  NEAR THRESHOLD**

Spokespersons: B. Mayer [Saclay], B.M.K. Nefkens [UCLA]

E-mail contact mayer@phnx7.saclay.cea.fr, bnefkens@uclapp.physics.ucla.edu

**SATURNE-249** (Completed data-taking 1993)

**POLARIZATION TRANSFER IN ELASTIC BACKWARD DEUTERON PROTON SCATTERING**

Spokespersons: C.F. Perdrisat [William and Mary Coll.], V. Punjabi [Norfolk State U.], I. Sitnik [Dubna, JINR]

E-mail contact perdrisat@cebaf.gov, punjabi@cebaf.gov, sitnik@lhc06.jinr.dubna.su

**SATURNE-253** (Completed data-taking 1992)

**MEASUREMENTS OF THE POLARIZATION TENSOR AND THE PROBABILITY OF THE SPIN-FLIP IN THE REACTION  ${}^{12}\text{C}(d, d'){}^{12}\text{C}$  AT 400 MeV**

Spokespersons: S. Kox [Grenoble U.], E. Tomasi-Gustafsson [Saclay], M. Morlet [Orsay, IPN]

E-mail contact kox@frcpn11.in2p3.fr, tomasi@chatelet.saclay.cea.fr

**SATURNE-280** (Taking data)

**STUDY OF THE REACTION  $dd \rightarrow \alpha\eta$  CLOSE TO THE THRESHOLD OF  $\eta$  PRODUCTION**

Spokespersons: A. Zghiche [Strasbourg, CRN], R. Wurzinger [Saclay], L. Lytkin [Dubna, JINR], Y. Le Bornec, N. Willis [Orsay, IPN]

E-mail contact le\_bornec@ipncls.in2p3.fr, willis@ipncls.in2p3.fr

**SATURNE-290** (Completed data-taking 1994)

**MEASUREMENT OF TENSOR OBSERVABLES RELATED TO THE POLARIZATION OF RECOIL DEUTERON IN THE REACTION  $pp \rightarrow d\pi^+$**

Spokespersons: C. Furget, S. Kox [Grenoble U.]

E-mail contact kox@frcpn11.in2p3.fr

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## SATURNE Future Plans

The SATURNE-II accelerator, best known for its polarized proton and deuteron beams, will be closed by the end of 1997. The strong physics program involving large international participation has now been reduced to just two experiments (213 and 278) which are studying the baryonic resonances and a production of coherent pions in the charge exchange reactions. Other experiments and important R&D projects have either been completed or cancelled. There are no plans for direct experimental research at the site beyond 1997, but the Lab will be involved in many intermediate- and high-energy physics projects at other facilities.

# SUMMARIES OF SERPUKHOV EXPERIMENTS

## Selected Serpukhov Experiments

### SERPUKHOV-128

(Proposed 1977, Approved 1984, Began data-taking 1987)

#### SEARCH FOR NEW SHORT-LIVED PARTICLES IN NEUTRINO INTERACTIONS

SERPUKHOV - V V Ammosov, V I Baranov, A A Ivanilov, P V Ivenov, V M Korablev, V A Korotkov, V V Makeev, A G Myagkov, P V Pitukhin, A Y Polyarush, A A Sokolov  
 MOSCOW PHYS ENG INST - E Gushchin, A I Lebedev, S V Somov (Spokesperson), G I Tipografshchik  
 MOSCOW, ITEP - Y A Aleshin, O K Egorov, E D Kolganova, A N Maksimov, I A Melnichenko, E A Pozharova, V I Silaev, V A Smirnitsky, V A Smotryaev, I S Trostin  
 LEBEDEV INST - S I Kotelnikov, E P Kuznetsov, B I Lomonosov, L I Pervov, V A Ryabov, P S Vasiliev  
 MOSCOW STATE U - P F Ermolov, V S Murzin, S I Sivoklokov  
 DUBNA - Y A Batusov, S A Bunyatov, O M Kuznetsov, V V Lyukov, V I Tretyak

Accelerator SERPUKHOV Detector Combination

#### Reactions

$\nu_\mu$ nucleon $\rightarrow \mu^-$ charm X	3-30 GeV/c
$\nu_\mu$ nucleon $\rightarrow \Lambda_c^+ \mu^- X$	"
$\nu_\mu$ nucleon $\rightarrow \Sigma_c(2455)^+ \mu^- X$	"
$\nu_\mu$ nucleon $\rightarrow \Sigma_c(2455)^{++} \mu^- X$	"
$\nu_\mu$ nucleon $\rightarrow \mu^-$ charmed-meson X	"
$\nu_\mu$ nucleon $\rightarrow D_s^\pm \mu^- X$	"

Particles studied charm

Brief description The detector is a wide angle spectrometer with a streamer chamber and emulsions.  $2 \times 10^{18}$  protons on target were taken.

### SERPUKHOV-136

(Proposed 1978, Approved Apr 1978, Began data-taking 1988, In progress)

#### NEUTRINO DETECTOR

SERPUKHOV - A A Borisov, N I Bozhko, S K Chernichenko, G L Chukin, V N Goryachev, M M Kirsanov, A I Kononov, A S Kozhin, V I Kravtsov, A V Kulikov, A I Mukhin, Y I Salomatina, V A Tumakov, A S Vovenko ( $\checkmark$  Spokesperson)  
 DUBNA - L S Barabash, Y A Batusov, S A Bunyatov ( $\checkmark$  Spokesperson), O L Klimov, V V Lyukov, Y A Nefedov, B A Popov, V I Snyatkov, V Y Valuev

Accelerator SERPUKHOV Detector Calorimeter

#### Reactions

$p$ nucleon $\rightarrow$ charm X	70 GeV/c
$p$ nucleon $\rightarrow e^\pm X$	"
$\nu_\mu$ nucleon $\rightarrow \mu^- X$	5-30 GeV/c
$\nu_\mu$ nucleon $\rightarrow \mu^+ \mu^- X$	"
$\nu_\mu$ nucleon $\rightarrow$ charm X	"
$\bar{\nu}_\mu$ nucleon $\rightarrow \mu^+ X$	"
$\bar{\nu}_\mu$ nucleon $\rightarrow \mu^+ \mu^- X$	"
$\bar{\nu}_\mu$ nucleon $\rightarrow$ charm X	"
$\nu_e$ nucleon $\rightarrow e^\pm X$	"
$\bar{\nu}_e$ nucleon $\rightarrow e^\pm X$	"
charm $\rightarrow \mu^+ X$	—
charm $\rightarrow e^\pm X$	—

Particles studied charm

Brief description Searches for  $\nu_e \rightarrow \nu_x$  oscillation. Running (April 96).

Journal papers YF 30 (1979) 702 = SJNP 30 (1979) 362, YF 33 (1981) 715 = SJNP 33 (1981) 371, YF 40 (1984) 739 = SJNP 40 (1984) 475, YF 49 (1989) 172, ZPHY C51 (1991) 341, IJMP A7 (1992) 3835, YF 55 (1992) 2092, PL B279 (1992) 405, PL B295

(1992) 154, PL B302 (1993) 336, YF 57 (1994) 2050 = PAN 57 (1994) 1974, PL B369 (1996) 39, and ZPHY C70 (1996) 39.

E-mail contact vovenko@mx.ihep.su

### SERPUKHOV-145

(Proposed 1981, Approved 1984, Began data-taking 1987, Completed data-taking 1992)

#### STUDY OF THE PRODUCTION AND DECAY PROPERTIES OF THE CHARMED BARYONS IN NEUTRINO INTERACTIONS WITH THE BUBBLE CHAMBER SKAT

SERPUKHOV - V V Ammosov ( $\checkmark$  Spokesperson), E N Ardashev, Y V Bardin, A P Bugorsky, N A Chabrov, V I Ermolaev, V S Filipov, A A Ivanilov, V I Khleborad, V I Konyushko, V M Korablev, V A Korotkov, V V Makeev, G Y Mitrofanov, A G Myagkov, N A Netyaga, A A Sokolov, I L Vasiliev

Accelerator SERPUKHOV Detector HLBC-SKAT

#### Reactions

$\nu_\mu p \rightarrow \Sigma_c(2455)^{++} \mu^-$	5-20 GeV/c
$\nu_\mu p \rightarrow \Sigma_c(2530)^{++} \mu^-$	"
$\nu_\mu n \rightarrow \Lambda_c^+ \mu^-$	"

Particles studied  $\Sigma_c(2455)^{++}$ ,  $\Sigma_c(2530)^{++}$ ,  $\Lambda_c^+$

Brief description The chamber fill is a light freon-propane mix.

$4 \times 10^{18}$  protons on target were taken.

Journal papers ZETFP 58 (1993) 241.

E-mail contact ammosov@mx.ihep.su

### SERPUKHOV-147

(Proposed 1982, Approved Mar 1982, Began data-taking 1984, Completed data-taking 1991)

#### STUDY OF REACTIONS WITH STRANGE PARTICLE PRODUCTION IN THE $\pi^-$ AND $K^-$ MESON BEAM OF THE IHEP ACCELERATOR

MOSCOW, ITEP - B P Barkov, B V Bolonkin, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolov, V N Luzin, V V Miller, V N Nozdrachev, Y P Shkurenko, V V Sokolovsky ( $\checkmark$  Spokesperson), A I Surtormin, G D Tikhomirov, V V Vladimirovsky

Accelerator SERPUKHOV Detector MIS

#### Reactions

$\pi^- p \rightarrow n \Lambda \bar{\Lambda}$	40 GeV/c
$\pi^- p \rightarrow n \Lambda \bar{\Lambda} \pi^0$	"
$\pi^- p \rightarrow p \Lambda \bar{\Lambda} \pi^-$	"
$\pi^- p \rightarrow n 2K_S$	"
$\pi^- p \rightarrow n K_S K_L$	"
$\pi^- p \rightarrow n 2K_S \pi^0$	"
$\pi^- p \rightarrow n K_S K_L \pi^0$	"
$\pi^- p \rightarrow p 2K_S \pi^-$	"
$\pi^- p \rightarrow p K_S K_L \pi^-$	"
$\pi^- p \rightarrow n \Sigma^0 \bar{\Sigma}^0$	"
$\pi^- p \rightarrow$ glueball X	"
$\pi^- p \rightarrow f_2(1720) X$	"
$\pi^- p \rightarrow X C(1480)^-$	"
$K^- p \rightarrow \Lambda \bar{\Lambda} Y^*(\text{unspec})$	"
$K^- p \rightarrow K_S K_L Y^*(\text{unspec})$	"
glueball $\rightarrow 2K_S$	—
$f_2(1720) \rightarrow 2K_S$	—
$C(1480)^- \rightarrow K_S K_L \pi^-$	—

Particles studied  $f_0(975)$ ,  $a_0(980)^0$ ,  $f_2(1720)$ , glueball,  $C(1480)^-$ ,  $Y^*(\text{unspec})$ ,  $f_2'(1525)$

Brief description Requested 2400-3000 hours.

## SUMMARIES OF SERPUKHOV EXPERIMENTS

Journal papers YF 43 (1986) 1211, YF 43 (1986) 1487 = SJNP 43 (1986) 959, YF 46 (1987) 799, NP B309 (1988) 426, and YF 48 (1988) 1213 = SJNP 48 (1988) 770.

Related experiments SERPUKHOV-173

E-mail contact sokolovsky@vxitep.itep.ru

### SERPUKHOV-152

(Proposed 1983, Approved Aug 1984, In preparation)

#### NEUTRINO EXPERIMENT USING A TAGGED NEUTRINO BEAM

SERPUKHOV - V V Ammosov, V B Anykeyev, A A Bel'kov, S V Belikov, A P Bugorsky, A Chesnokov, A G Denisov, S P Denisov (✓ Spokesperson), A Y Dushkin, N N Fedyakin, A N Galyaev, N A Galyaev, S S Gershtein, Y V Gilitsky, S N Gurzhiev, V I Kochetkov, V I Kotov, A V Kozelov, V P Kryuchkov, V I Kurbakov, A A Lebedev, V N Lebedev, V V Lipajev, A Y Maslov, S A Medved, V N Mikhailin, Y V Mikhailov, V A Onuchin, Y M Pishchalnikov, A V Schukin, I V Shein, A P Soldatov, A A Spiridonov, A P Starkov, D A Stoyanova, A V Uzunyan  
 INFN, PISA - C Cerri, G Gennaro, F Sergiampietri, G Spandre  
 INFN, FLORENCE - G Conforto, A Marchionni  
 BERLIN-ZEUTHEN ADW - J Baehr, G Bohm, R Nahnauer, S Nowak, A Schwind  
 DUBNA - J Cvach, V K Dodokhov, N G Fadeev, V Genchev, I A Golutvin, J Hladky, V G Kadykov, V Y Karzhavin, V S Khabarov, Y T Kiryushin, V G Krivokhizhin, V V Kukhtin, V N Lysyakov, P K Markov, S Nemecek, A A Popov, D Pose, A Prokes, P Reimer, S Rimani, I A Savin, G I Smirnov, D A Smolin, J Strachota, G Sultanov, L V Svetov, V A Sviridov, P Todorov, M Vinde, J Zacek, N I Zamyatin

Accelerator SERPUKHOV Detector Combination

#### Reactions

$\nu_e e^- \rightarrow e^- \nu_e$	< 70 GeV ( $E_{lab}$ )
$\nu_\mu e^- \rightarrow e^- \nu_\mu$	"
$\nu_e \text{ nucleon} \rightarrow e^- X$	"
$\nu_e \text{ nucleon} \rightarrow \nu_e X$	"
$\nu_e \text{ nucleon} \rightarrow \tau^- X$	"
$\nu_e \text{ nucleon} \rightarrow e^- \mu^+ X$	"
$\nu_\mu \text{ nucleon} \rightarrow \mu^- X$	"
$\nu_\mu \text{ nucleon} \rightarrow \nu_\mu X$	"
$\nu_\mu \text{ nucleon} \rightarrow \mu^+ \mu^- X$	"
charmed-meson $\rightarrow \mu^+ X$	—

Particles studied  $\nu_e, \nu_\mu, \tau^-$ , charmed-meson

Brief description Some of the physics goals are a study of the  $\nu_e \nu_\mu$  universality and  $\nu_e \rightarrow \nu_\mu \rightarrow \nu_\tau$  oscillations, and a measurement of the charged to neutral currents ratio.

Journal papers YF 52 (1990) 1040.

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### SERPUKHOV-157

(Proposed 1983, Approved Mar 1983, Began data-taking 1986, In progress)

#### NEW RADIAL-EXCITED RESONANCES SEARCH IN DIFFRACTIVE PROCESSES ON NUCLEI WITH DETECTOR MIS-2

DUBNA - M A Ananjeva, V V Antipov, Y I Ivanshin, I G Kosarev, V A Moiseenko, V A Petrov, Y P Petukhov, S Y Sychkov, A A Tyapkin (✓ Spokesperson), I M Vasilevsky, V V Vishnyakov, O A Zaymidoroga  
 MILAN U - P L Frabetti, P F Manfredi, F Palombo

Accelerator SERPUKHOV Detector MIS-2

#### Reactions

$\pi^- \text{ Si} \rightarrow 3\pi \text{ Si}$	40 GeV/c
--	----------

$\pi^- \text{ Be} \rightarrow 3\pi \text{ Be}$  40 GeV/c

Particles studied meson

Brief description Uses the modified spectrometer MIS with additional spark chambers. Searches for new radial excitations of  $\pi$ ,  $a_1(1260)$ ,  $a_2(1320)$ , and  $\pi_2(1670)$  mesons. Requested running time is 720 hours.

Journal papers YF 43 (1986) 917 = SJNP 43 (1986) 585, and NC A107 (1994) 2855.

Related experiments FNAL-706, SERPUKHOV-164

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### SERPUKHOV-159

(Proposed 1983, Approved May 1986, Began data-taking 1992, In progress)

#### INVESTIGATION OF CHARMED PARTICLES AND SEARCH FOR MULTIQUARK STATES USING EXCHARM SPECTROMETER AT THE SERPUKHOV ACCELERATOR

DUBNA - A N Aleev, V P Balandin, I I Evsikov, P Z Hristov, I M Ivanchenko, Z M Ivanchenko, M N Kapishin, N N Karpenko, V D Kekelidze (✓ Spokesperson), I G Kosarev, Z I Kozhenkova, Y A Kozhevnikov, Y A Kretov, N A Kuz'min, A L Lyubimov, D T Madigojin, A S Mestvirishvili, P V Moisenz, A N Morozov, V V Pal'chik, Y K Potrebenikov, T G Progulova, V A Sashin, V E Simonov, A G Skripnichuk, V N Spaskov, G T Tatishvili, A L Tkachev, I P Yudin, O I Yuldashev, M B Yuldasheva, A I Zinchenko

ALMA ATA, PHYS INST - A A Loktionov

KAZAKH STATE U - G K Potrebenikov

LEBEDEV INST - S P Baranov, M V Belov, V A Kozlov, S Y Potashev

MINSK, INST NUCL PROBLEMS - A S Kurilin

BUCHAREST, INST PHYS - A Bragadireanu, L Groza, M Iliesku, T Ponta

SERPUKHOV - A P Bugorski

SOFIYA, INST CHEM TECH - V Zayachki

SOFIYA, INST NUCL RES - I M Geshkov, S Piperov

TBILISI STATE U - L N Abesalashvili, N S Amaglobeli,

B G Chiladze, M V Kopadze, R A Kvatadze, N L Lomidze, G I Nikobadze, T G Pitskhelauri

TBILISI, INST PHYS - T S Grigalashvili

Accelerator SERPUKHOV Detector EXCHARM

#### Reactions

$n \text{ nucleus} \rightarrow X(3100) X$	< 70 GeV ( $E_{lab}$ )
$n \text{ nucleus} \rightarrow X(3250) X$	"
$n \text{ nucleus} \rightarrow N\phi(1950) X$	"
$n \text{ nucleus} \rightarrow \bar{D}^0 X$	"
$n \text{ nucleus} \rightarrow \Sigma_c(2455)^{++} X$	"
$n \text{ nucleus} \rightarrow \Sigma_c(2455)^0 X$	"
$n \text{ nucleus} \rightarrow \Lambda_c^+ X$	"
$n \text{ nucleus} \rightarrow \Xi_c^+ X$	"
$n \text{ nucleus} \rightarrow \Xi_c^0 X$	"
$n \text{ nucleus} \rightarrow \phi X$	"

Particles studied  $X(3100), X(3250), N\phi(1950), \bar{D}^0, \Lambda_c^+, \Sigma_c(2455)^{++}, \Sigma_c(2455)^0, \Xi_c^+, \Xi_c^0, \phi$

Brief description Uses the EXCHARM detector.

Journal papers PTE 4 (1995) 8, JINR PAPID COM 3(77) (1996) 5.

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### SERPUKHOV-164

(Proposed 1980, Approved May 1986, Began data-taking 1988, Completed data-taking Mar 1996)

#### INVESTIGATIONS OF THE $\pi^- p \rightarrow n\pi^+\pi^-\pi^+\pi^-(\gamma's)$ REACTION AT 40 GeV/c USING THE VERTEX SPECTROMETER

## SUMMARIES OF SERPUKHOV EXPERIMENTS

SERPUKHOV - D V Amelin, E B Berdnikov, S I Bityukov,  
G V Borisov, V A Dorofeev, R I Dzhelyadin, Y P Gouz,  
Y M Ivanyushenkov, I A Kachaev, A N Karyukhin,  
Y A Khokhlov, G A Klyuchnikov, V F Konstantinov,  
S V Kopikov, M E Kostrikov, V V Kostyukhin, A A Kriushin,  
M A Kulagin, S A Likhoded, V D Matveev, A P Ostantkov,  
D I Ryabchikov, O V Solovianov, E A Starchenko,  
N K Vishnevsky, E A Vlasov, A M Zaitsev (✓ Spokesperson)  
TBILISI, INST PHYS - T A Lomtadze, G G Sekhniaidze,  
E G Tskhadadze

Accelerator SERPUKHOV Detector VES

### Reactions

$\pi^- p \rightarrow n 2\pi^+ 2\pi^-$ ( $\gamma$ 's)	37 GeV/c
$\pi^- p \rightarrow n 2\pi^+ 2\pi^-$	"
$\pi^- p \rightarrow n 2\rho^0$	"
$\pi^- p \rightarrow n 2\eta'$	"
$\pi^- p \rightarrow n f_1(1285)$	"
$\pi^- p \rightarrow n \eta' \eta$	"
$\pi^- p \rightarrow n \omega \eta$	"
$\pi^- p \rightarrow n$ meson (mesons)	"
$\pi^- p \rightarrow p$ meson (mesons)	"
$\pi^- p \rightarrow n \pi^+ \pi^- \eta$	"
$\pi^- p \rightarrow p \pi^- \eta \eta$	"
$\pi^- p \rightarrow n \omega \omega$	"
$\pi^- p \rightarrow p K^+ K^- \pi^-$	"
$K^- p \rightarrow p K^- \pi^+ \pi^-$	"
$K^- p \rightarrow p K^- \pi^+ \pi^- \pi^0$	"

Particles studied  $\rho^0$ ,  $\eta$ ,  $\eta'$ ,  $\omega$ ,  $f_1(1285)$ ,  $\pi(1770)$ , exotic, glueball, meson

Brief description Uses VES (VERtEX Spectrometer) - a wide aperture magnetic spectrometer combined with a lead glass gamma detector and Čerenkov identifiers. In addition to the reactions listed above, also studies decays of the mesons produced in the reactions.

Journal papers PL B268 (1991) 137, ZPHY C54 (1992) 235, ZPHY C54 (1992) 367, YF 55 (1992) 2460, ZPHY C57 (1992) 13, PL B313 (1993) 276, PL B337 (1994) 219, ZPHY C66 (1995) 71, PL B356 (1995) 595, ZPHY C80 (1996) 71, and YF 59 (1996) 1021.

Related experiments BNL-852, SERPUKHOV-163

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WWW Home-page <http://dxbec.ihep.su/>

## SERPUKHOV-166

(Proposed 1987, Approved 1987, Began data-taking 1987)

### STUDY OF RARE DECAYS WITH THE ISTRA-M DETECTOR

MOSCOW, INR - V N Bolotov (Spokesperson), E N Gushchin,  
V V Isakov, O V Karavichev, V A Lebedev, V N Marin,  
Y V Musienko, A A Poblaguev, V E Postoev, G N Semenuk,  
S A Volkov

SERPUKHOV - V F Konstantinov

DUBNA - G Kalmar, A Z Kitikyan, E V Komissarov, V S Kurbatov,  
V Z Serdyuk, V V Sidorov, A D Volkov, B Z Zalikhano

Accelerator SERPUKHOV Detector ISTRA-M

### Reactions

$K^- \rightarrow \pi^- \nu_e \bar{\nu}_e$	25 GeV/c
$K^- \rightarrow \pi^- \nu_\mu \bar{\nu}_\mu$	"
$K^- \rightarrow e^- \bar{\nu}_e \gamma$	"
$K^- \rightarrow \pi^- e^- e^+$	"
$K^- \rightarrow \pi^- \mu^- \mu^+$	"

Particles studied  $\pi^-$ ,  $K^-$

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## SERPUKHOV-167

(Proposed 1975, Approved 1987, Began data-taking 1987, In progress)

### STUDY OF RARE KAON DECAYS

SERPUKHOV - A M Blick, V N Kolosov, V M Kutjin,  
V N Shelikhov

DUBNA - V Y Batusov, Y A Budagov, I E Chirikov-Zorin,  
Y I Davydov, V B Flyagin (✓ Spokesperson), V V Glagolev,  
A V Kolomyichenko, Y F Lomakin, S N Malyukov, O E Pukhov,  
V I Romanovsky, N A Rusakovich, N L Rusakovich,  
A A Semenov, A N Shalugin, A S Soloviev, V B Vinogradov,  
A G Volodko

TBILISI STATE U - G A Chlachidze, I A Minashvili

SOFIYA U - A B Jordanov, L Litov, G V Velev

MINSK, INST PHYS - Y A Kulchitsky, A S Kurilin

Accelerator SERPUKHOV Detector HYPERON-II

### Reactions

$K^+ \rightarrow \pi^+ 2\pi^0$	10 GeV/c
$K^+ \rightarrow \pi^+ \pi^0 \gamma$	"
$K^+ \rightarrow \pi^+ 2\gamma$	"
$K^+ \rightarrow \pi^0 e^+ \nu_e$	"
$K^+ \rightarrow 2\pi^0 e^+ \nu_e$	"
$K^+ \rightarrow \pi^0 e^+ \nu_e \gamma$	"
$K_S \rightarrow e^- e^+$	"
$K_S \rightarrow 2\gamma$	"
$K_S \rightarrow e^- e^+ \gamma$	"
$K_S \rightarrow \pi^0 e^- e^+$	"

Particles studied  $K^+$ ,  $K_S$

Brief description The setup consists of a pair of one-arm spectrometers: one to measure the beam momentum, and the second, a large aperture spectrometer, to register the secondary charged particles momenta. All coordinates in the spectrometers are measured by proportional chambers (about 10,000 channels). Two large lead glass multichannel (850 channels) hodoscopic spectrometers are used to detect  $\gamma$  energies. Taking data (July 96).

Journal papers PL B259 (1991) 225, PL B334 (1994) 234, and PTE 3 (1994) 13.

Related experiments SERPUKHOV-166, BNL-791, BNL-845

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## SERPUKHOV-169

(Proposed 1977, Approved Jul 1977, Began data-taking 1985, Completed data-taking 1993)

### INVESTIGATIONS OF HADRONIC SPECTROSCOPY WITH THE DETECTOR SPHINX

SERPUKHOV - S V Golovkin, A P Kozhevnikov,  
V P Kubarovsky, A I Kulyavtsev, V F Kurshetsov,  
A E Kushnerenko, L G Landsberg (✓ Spokesperson),  
V V Molchanov, V A Mukhin, I N Nikitin, A V Skleznev,  
V I Solyanik, D V Vavilov, V A Viktorov

MOSCOW, ITEP - M Y Balatz, G B Dzyubenko, G K Kliger,  
V Z Kolganov, V S Lakaev, G S Lomkatzi, A F Nilov,  
V T Smolyankin, V E Vishnyakov

Accelerator SERPUKHOV Detector SPHINX

### Reactions

$p$ nucleon $\rightarrow DD < p K^+ K^- >$	70 GeV ( $E_{lab}$ )
nucleon	
$p$ nucleon $\rightarrow DD < p \phi >$ nucleon	"
$p$ nucleon $\rightarrow DD < \Lambda K^+ >$ nucleon	"
$p$ nucleon $\rightarrow DD < \Lambda(1405 S_{01}) >$	"
$K^+ >$ nucleon	
$p$ nucleon $\rightarrow DD < \Lambda(1520 D_{03}) >$	"
$K^+ >$ nucleon	
$p$ nucleon $\rightarrow DD < \Sigma^0 K^+ >$ nucleon	"



## SUMMARIES OF SERPUKHOV EXPERIMENTS

$p$ nucleon $\rightarrow$ DD $\langle \Sigma(1385 P_{13})^0 K^+ \rangle$ nucleon	70 GeV ( $E_{lab}$ )
$p$ nucleon $\rightarrow$ DD $\langle p \pi^+ \pi^- (\gamma's) \rangle$ nucleon	"
$p$ nucleon $\rightarrow$ DD $\langle p \omega \rangle$ nucleon	"
$p$ nucleon $\rightarrow$ DD $\langle p \eta \rangle$ nucleon	"
$p$ nucleon $\rightarrow$ DD $\langle p \eta' \rangle$ nucleon	"
$p$ nucleon $\rightarrow$ DD $\langle p p \bar{p} \rangle$ nucleon	"
$p$ nucleon $\rightarrow$ (neutrals) X	"
$p$ nucleus $\rightarrow$ DD $\langle p K^+ K^- \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle p \phi \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle \Lambda K^+ \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle \Lambda(1405 S_{01}) K^+ \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle \Lambda(1520 D_{03}) K^+ \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle \Sigma^0 K^+ \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle \Sigma(1385 P_{13})^0 K^+ \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle p \pi^+ \pi^- (\gamma's) \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle p \omega \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle p \eta \rangle$ nucleus	"
$p$ nucleus $\rightarrow$ DD $\langle p p \bar{p} \rangle$ nucleus	"
$\phi \rightarrow K^+ K^-$	—
$\Lambda \rightarrow p \pi^-$	—
$\Lambda(1405 S_{01}) \rightarrow \Sigma^+ \pi^-$	—
$\Lambda(1405 S_{01}) \rightarrow \Sigma^0 \pi^0$	—
$\Sigma^+ \rightarrow p \pi^0$	—
$\Lambda(1520 D_{03}) \rightarrow p K^-$	—
$\Sigma^0 \rightarrow \Lambda \gamma$	—
$\Sigma(1385 P_{13}) \rightarrow \Lambda \pi^0$	—
$\omega \rightarrow \pi^+ \pi^- \pi^0$	—
$\eta \rightarrow \pi^+ \pi^- \pi^0$	—
$\eta' \rightarrow \pi^+ \pi^- \eta$	—

Particles studied baryon,  $N\phi(1950)$ ,  $\Sigma(3170 B)^+$

Brief description Studies baryon diffractive production, coherent reactions on nuclei, and searches for exotic baryons including pentaquark cryptoexotic baryon resonances with hidden strangeness in the mass region up to 4.5 GeV/c<sup>2</sup>. Uses Be and C as nuclear targets. SPHINX consists of a wide aperture magnetic spectrometer with proportional and drift chambers working in combination with a multichannel gamma spectrometer and a system of Čerenkov detectors for the identification of charged secondary particles. Data analysis completed.

Journal papers YF 52 (1990) 494, YF 57 (1994) 47, YF 57 (1994) 241, YF 57 (1994) 253, ZPHY C61 (1994) 223, ZPHY C61 (1994) 399, NC A107 (1994) 2441, YF 57 (1994) 1376, YF 57 (1994) 2030, YF 57 (1994) 2042, UFN 164 (1994) 1129, YF 58 (1995) 1426, and ZPHY C68 (1995) 585.

Related experiments SERPUKHOV-120, SERPUKHOV-178

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### SERPUKHOV-172

(Proposed 1988, Approved May 1988, Began data-taking Dec 1991, In progress)

**STUDY OF MESONS WITH AN ENHANCED GLUON COMPONENT (GLUEBALLS INCLUDED) AND MESONS WITH HIGH SPINS USING THE MULTIPHOTON  $4\pi$  SPECTROMETER**

SERPUKHOV - A V Dolgopolev, S V Donskov, A V Inyakin, G V Khaustov, A A Kondashov, A K Konoplyannikov, A V Kulik, A A Lednev, V A Lishin, Y M Melnik, S A Polovnikov, V A Polyakov, Y D Prokoshkin

( $\sqrt$  Spokesperson), S A Sadovsky, V D Samoylenko, P M Shagin, A V Shtannikov, A V Singovsky, E A Sobol, V P Sugonyaev  
TBILISI, INST PHYS - A K Djavrishvili, T A Lomtadze,  
G G Sekhniadze, E G Tskhadadze  
LOS ALAMOS - D Alde, E A Knapp, T Lopez  
BRUSSELS U, IISN - F Binon, J P Stroot  
ANNECY - J P Peigneux, M Poulet  
KEK - S Inaba, M Kobayashi, T Tsuru  
MIYAZAKI U - T Nakamura, K Takamatsu  
Accelerator SERPUKHOV Detector GAMS-4PI

#### Reactions

$\pi^- p \rightarrow n 2\pi^0$	32 GeV/c
$\pi^- p \rightarrow n 2\eta$	"
$\pi^- p \rightarrow n \eta' \eta$	"
$\pi^- p \rightarrow n \eta \pi^0$	"
$\pi^- p \rightarrow n \eta 2\pi^0$	"
$\pi^- p \rightarrow n 2\omega$	"
$\pi^- p \rightarrow n K^0 \bar{K}^0$	"
$\pi^- p \rightarrow n 2meson^0$	"
$\pi^- p \rightarrow meson^0 X$	"
$\pi^- p \rightarrow glueball X$	"
$\pi^- p \rightarrow J/\psi(1S) X$	"
$\pi^- p \rightarrow \psi(2S) X$	"
$\pi^- p \rightarrow \eta_c(1S) X$	"
$\pi^- p \rightarrow \chi_c(unspec) X$	"
$K^- p \rightarrow meson^0 X$	"
glueball $\rightarrow 4\pi^0$	—
glueball $\rightarrow 2\eta$	—
glueball $\rightarrow \eta' \eta$	—
glueball $\rightarrow 2\eta'$	—
meson <sup>0</sup> $\rightarrow 2\pi^0$	—
meson <sup>0</sup> $\rightarrow 2\eta$	—
meson <sup>0</sup> $\rightarrow \eta' \pi^0$	—
$\eta_c(1S) \rightarrow \eta 2\pi^0$	—
$\pi^0 \rightarrow 2\gamma$	—
$\eta \rightarrow 2\gamma$	—

Particles studied glueball, meson<sup>0</sup>

Brief description Data taking and data analysis are in progress (May 96).

Journal papers NIM A268 (1988) 112, NIM A276 (1989) 652, PTE 1 (1990) 68, PTE 2 (1990) 90, PTE 5 (1991) 55, and NIM A302 (1991) 443.

Related experiments BNL-852

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### SERPUKHOV-173

(Proposed 1991, Approved 1992, Began data-taking 1992, In progress)

**STUDY OF STRANGE PARTICLE RESONANT STATES USING HADRON BEAMS WITH MOMENTA OF 40-70 GeV/c AT THE IHEP ACCELERATOR**

MOSCOW, ITEP - B P Barkov, I A Erofeev, O N Erofeeva, V K Grigoriev, A P Grishin, Y V Katinov, I Y Korolkov, V I Lysin, V N Luzin, V N Nozdrachev ( $\sqrt$  Spokesperson), Y P Shkurenko, V V Sokolovsky, G D Tikhomirov, V V Vladimirovsky

Accelerator SERPUKHOV Detector MIS

#### Reactions

$\pi^- p \rightarrow n 2K_S$	40 GeV/c
$\pi^- p \rightarrow n 2K_S \pi^0$	"
$\pi^- p \rightarrow n K_S K_L \pi^+ \pi^-$	"
$\pi^- p \rightarrow n K_S K_L \pi^0$	"
$\pi^- p \rightarrow K_S \pi^+ \pi^- Y^*(unspec)$	"
$\pi^- p \rightarrow p K_S K_L \pi^-$	"
$\pi^- p \rightarrow n \Lambda \bar{\Lambda}$	"

## SUMMARIES OF SERPUKHOV EXPERIMENTS

$K^- p \rightarrow 2K_S Y^*$  (unspec) " "  
 $K^- p \rightarrow n K_S \pi^+ \pi^-$  " "  
 $K^- p \rightarrow \Lambda \bar{\Lambda} Y^*$  (unspec) " "  
Particles studied  $C(1480)^-$ ,  $C(1480)^0$ ,  $\rho(1700)^0$ ,  $X(3100)$ ,  
 $\phi(1680)$ ,  $\phi_3(1850)$ ,  $f_2(1720)$ ,  $f_2(1810)$ ,  $f_2(2010)$ ,  $f_4(2050)$ ,  
 $f_4(2220)$ ,  $K_2^*(1430)^-$

Brief description Extends an earlier  $K_S K_S$  and  $\Lambda \bar{\Lambda}$  final states study (SERPUKHOV-147) to the range of masses between 1.8 and 2.5 GeV. Investigates the  $K_S K_L$  system using  $\pi^-$  and  $K^-$  beams with the momentum of 40 GeV/c. Studies baryon-antibaryon and  $\phi\phi$  states. Searches for  $C(1480)$  mesons by detecting  $K^0 K^*$  pairs. Uses two charged-particle triggers. Requested 2100 hours.

Journal papers PTE 3 (1994) 43, YF 58 (1995) 50 = PAN 58 (1995) 46, and YF 58 (1995) 1628.

Related experiments SERPUKHOV-147

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 nozdrachev@vxitep.itep.ru

### SERPUKHOV-177

(Proposed 1990, Approved Jul 1993, In preparation)

#### MEASUREMENT OF THE MASS OF THE $\Sigma^-$ HYPERON

ST PETERSBURG, INP - A S Denisov, O L Fedin, M P Guriyev,  
Y M Ivanov ( $\checkmark$  Spokesperson), L P Lapina, P M Levchenko,  
 A A Petrunin, Y P Platonov, V M Suvorov, A V Zhelamkov

Accelerator SERPUKHOV Detector QUARTZ

#### Reactions

$p C \rightarrow \Sigma^- X$  70 GeV/c  
 $p Mg \rightarrow \Sigma^- X$  "  
 $p Cu \rightarrow \Sigma^- X$  "  
 $p Pb \rightarrow \Sigma^- X$  "

Particles studied  $\Sigma^-$

Brief description Approved for 360 hours. QUARTZ is a crystal diffraction spectrometer for hadronic X-rays with a semiconductor detector. Waiting for the run time (July 96).

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### SERPUKHOV-178

(Proposed 1994, Approved 1994, In preparation)

#### SEARCH FOR EXOTIC BARYON STATES WITH THE MODIFIED DETECTOR SPHINX

SERPUKHOV - S A Akimenko, Y M Antipov, V A Batarin,  
 V A Bezzubov, A A Derevshchikov, S V Erin, O V Eroshin,  
 S V Golovkin, Y P Gorin, V N Govorun, A N Isaev,  
 V A Kachanov, Y D Karpekov, A S Konstantinov,  
 A P Kozhevnikov, V P Kubarovsky, V F Kurshetsov,  
 L G Landsberg ( $\checkmark$  Spokesperson), M Y Matveev,  
 V A Medovikov, V V Molchanov, V A Mukhin, I N Nikitin,  
 O V Orel, A I Pavlinov, S V Petrenko, V S Petrov,  
 A I Petrukhin, P A Semenov, V A Senko, M M Soldatov,  
 V L Solovianov, V I Solyanik, A N Sytin, V S Vaniev,  
 D V Vavilov, V A Viktorov, S A Zimin

MOSCOW, ITEP - G K Kliger, V Z Kolganov, G S Lomkatzi,  
 A F Nilov, V T Smolyankin

Accelerator SERPUKHOV Detector SPHINX

#### Reactions

$p \text{ nucleon} \rightarrow DD \langle p K^+ K^- \rangle$  70 GeV ( $E_{\text{lab}}$ )  
     nucleon  
 $p \text{ nucleon} \rightarrow DD \langle p \phi \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle \Lambda K^+ \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle \Lambda(1405 S_{01}) K^+ \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle \Lambda(1520 D_{03}) K^+ \rangle \text{ nucleon}$  "

$p \text{ nucleon} \rightarrow DD \langle \Sigma^0 K^+ \rangle \text{ nucleon}$  70 GeV ( $E_{\text{lab}}$ )  
 $p \text{ nucleon} \rightarrow DD \langle \Sigma(1385 P_{13})^0 K^+ \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle p \pi^+ \pi^- (\gamma\text{'s}) \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle p \omega \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle p \eta \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle p \eta' \rangle \text{ nucleon}$  "  
 $p \text{ nucleon} \rightarrow DD \langle p p \bar{p} \rangle \text{ nucleon}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p K^+ K^- \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p \phi \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle \Lambda K^+ \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle \Lambda(1405 S_{01}) K^+ \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle \Lambda(1520 D_{03}) K^+ \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle \Sigma^0 K^+ \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle \Sigma(1385 P_{13})^0 K^+ \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p \pi^+ \pi^- (\gamma\text{'s}) \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p \omega \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p \eta \rangle \text{ nucleus}$  "  
 $p \text{ nucleus} \rightarrow DD \langle p p \bar{p} \rangle \text{ nucleus}$  "  
 $\phi \rightarrow K^+ K^-$  —  
 $\Lambda \rightarrow p \pi^-$  —  
 $\Lambda(1405 S_{01}) \rightarrow \Sigma^+ \pi^-$  —  
 $\Lambda(1405 S_{01}) \rightarrow \Sigma^0 \pi^0$  —  
 $\Sigma^+ \rightarrow p \pi^0$  —  
 $\Lambda(1520 D_{03}) \rightarrow p K^-$  —  
 $\Sigma^0 \rightarrow \Lambda \gamma$  —  
 $\Sigma(1385 P_{13}) \rightarrow \Lambda \pi^0$  —  
 $\omega \rightarrow \pi^+ \pi^- \pi^0$  —  
 $\eta \rightarrow \pi^+ \pi^- \pi^0$  —  
 $\eta' \rightarrow \pi^+ \pi^- \eta$  —

Particles studied baryon,  $N\phi(1950)$ ,  $\Sigma(3170 B)^+$

Brief description Studies the baryon diffractive production, coherent reactions on nuclei, and searches for exotic baryons including pentaquark cryptoexotic baryon resonances with hidden strangeness in the mass region up to 4.5 GeV/c<sup>2</sup>. Uses C and nuclear targets. SPHINX consists of a wide aperture magnetic spectrometer with proportional chambers and drift tubes working in combination with a multichannel gamma spectrometer and a system of Čerenkov detectors (including RICH counters) for the identification of charged secondary particles.

Related experiments SERPUKHOV-169

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### SERPUKHOV-UNK-001

(Proposed 1988, Approved Apr 1988, In preparation)

#### STUDY OF SPIN EFFECTS AT 100 TO 600 GeV USING AN INTERNAL JET TARGET AT UNK

SERPUKHOV - G A Alekseev, Y I Arestov, N I Belikov,  
 V V Borog, B V Chujko, V S Datsko, A M Davidenko,  
 A A Derevshchikov, A M Gorin, O A Grachev, V N Grishin,  
 V A Kachanov, Y V Kharlov, V Y Khodyrev, V G Lapshin,  
 V M Leontiev, I V Manujlov, Y A Matulenko, V A Medvedev,  
 Y M Melnik, A P Meschanin, N G Minaev, V V Mochalov,  
 A I Mysnik, S B Nurushev, D I Patalakha, A M Pavlinov,  
 V A Polyakov, A F Prudkoglyad, V I Rykalin, V V Rykalin,  
 V L Rykov, V L Solovianov ( $\checkmark$  Spokesperson), L F Soloviev,  
 S M Troshin, O D Tsai, M N Ukhanov, A N Vasiliev,  
 A E Yakutin, S V Yerin

DUBNA - L S Barabash, S I Bilenkaya, N S Borisov,  
 V A Budilov, V V Fimushkin, M Finger, N V Gorbunov,

## SUMMARIES OF SERPUKHOV EXPERIMENTS

N L Gorshkova, V A Kalinnikov, A G Karev, B A Khachaturov,  
 V S Kiselev, B Z Kopeliovich, M I Kulikov, R H Kutuev,  
 E A Ladygin, A B Levkovich, M Y Liburg, V N Matafonov,  
 A B Neganov, V A Nikitin, P V Nomokonov, V P Obudkovsky,  
 Y K Pilipenko, I L Pisarev, Y A Pliss, A A Popov,  
 I K Potashnikova, M G Shafranov, V V Shutov, V I Snyatkov,  
 Y A Usov, A I Valevich, V P Yershov, I V Zhigulin,  
 N K Zhydkov, R Y Zulkarneev

TBILISI STATE U - N S Amaglobeli, Y S Bagaturia,  
 B G Chiladze, G A Dzhambazishvili, L N Glonty,  
 G G Macharashvili, A I Ocherashvili, R M Sakandelidze,  
 T M Sakhelashvili

MOSCOW STATE U - L I Belzer, A I Demianov,  
 A M Gribushkin, N A Kruglov, A S Proskuryakov,  
 L I Sarycheva, N B Sinev, A A Yershov

MICHIGAN U - L V Alexeeva, V A Anferov, B B Blinov,  
 J A Bywater, C M Chu, D G Crabb, D B Crandell,  
 Y S Derbenev, S E Gladychyeva, S-Q Hu, S V Koutin,  
 A D Krisch (✓ Spokesperson), A M T Lin, T J Liu,  
 V G Luppov, D C Peaslee, R A Phelps, L G Ratner,  
 R S Raymond, M A Skalsey, J A Stewart, S M Varzar,  
 V K Wong

MIT - G R Court, D Kleppner

Accelerator SERPUKHOV-UNK Detector NEPTUN

<u>Reactions</u>	Polarized target	
$p p \rightarrow p p$		100-600 GeV/c
$p p \rightarrow \gamma X$		"
$p p \rightarrow e^- e^+ X$		"
$p p \rightarrow \mu^- \mu^+ X$		"
$p p \rightarrow \text{pion } X$		"
$p p \rightarrow K^\pm X$		"
$p p \rightarrow \eta X$		"
$p p \rightarrow \eta' X$		"
$p p \rightarrow \omega X$		"
$p p \rightarrow f_2(1270) X$		"
$p p \rightarrow \text{jet } X$		"
$p p \rightarrow \gamma \text{ jet } X$		"
$p p \rightarrow \Lambda X$		"
$p p \rightarrow \bar{\Lambda} X$		"
$p p \rightarrow p X$		"
$p p \rightarrow \bar{p} X$		"
$p p \rightarrow \text{hyperon } X$		"
$p p \rightarrow \Sigma^+ X$		"
$p p \rightarrow \Sigma^- X$		"
$p p \rightarrow \Xi^- X$		"
$p p \rightarrow \Lambda_c^+ X$		"
$p \text{ nucleus} \rightarrow \gamma X$		"
$p \text{ nucleus} \rightarrow e^- e^+ X$		"
$p \text{ nucleus} \rightarrow \mu^- \mu^+ X$		"
$p \text{ nucleus} \rightarrow \text{pion } X$		"
$p \text{ nucleus} \rightarrow K^\pm X$		"
$p \text{ nucleus} \rightarrow \eta X$		"
$p \text{ nucleus} \rightarrow \eta' X$		"
$p \text{ nucleus} \rightarrow \omega X$		"
$p \text{ nucleus} \rightarrow f_2(1270) X$		"
$p \text{ nucleus} \rightarrow \text{jet } X$		"
$p \text{ nucleus} \rightarrow \gamma \text{ jet } X$		"
$p \text{ nucleus} \rightarrow \Lambda X$		"
$p \text{ nucleus} \rightarrow \bar{\Lambda} X$		"
$p \text{ nucleus} \rightarrow p X$		"
$p \text{ nucleus} \rightarrow \bar{p} X$		"
$p \text{ nucleus} \rightarrow \text{hyperon } X$		"
$p \text{ nucleus} \rightarrow \Sigma^+ X$		"
$p \text{ nucleus} \rightarrow \Sigma^- X$		"
$p \text{ nucleus} \rightarrow \Lambda_c^+ X$		"

Brief description Studies spin effects when the 600 GeV protons in the UNK rings collide with a spin-polarized ultra-cold atomic hydrogen internal jet target. Five different spectrometers will observe spin phenomena in various hadron-hadron reactions at

small, medium, and large transverse momenta.

Journal papers PTE 3 (1991) 52, and PTE 4 (1991) 57.

Related experiments BNL-794

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 krisch@miphys.physics.lsa.umich.edu

## Other Serpukhov Experiments

Listed here are some other Serpukhov experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

### SERPUKHOV-149 (Completed data-taking 1996)

**STUDY OF ASYMMETRY IN INCLUSIVE REACTIONS**  
 $\pi^- \bar{p} \rightarrow \pi^0 X$  AT 40 GeV/c AND  $p\bar{p} \rightarrow \pi^0 X$  AT 70 GeV/c

Spokesperson: A.N. Vasiliev [Serpukhov, IFVE]

E-mail contact vasiliev@mx.ihep.su

### SERPUKHOV-155 (Completed data-taking 1992)

**SINGLE AND PAIR HADRON PRODUCTION WITH LARGE MOMENTUM TRANSFER IN PROTON AND  $\pi^-$  MESON BEAMS**

Spokesperson: V.I. Kryshkin [Serpukhov, IFVE]

E-mail contact kryshkin@mx.ihep.su

### SERPUKHOV-161 (Taking data)

**STUDY OF CHARMED PARTICLE PRODUCTION AT IHEP ACCELERATOR ENERGIES**

Spokespersons: A.M. Moiseev [Serpukhov, IFVE], P.F. Ermolov [Moscow State U.], I.V. Boguslavsky [Dubna, JINR]

E-mail contact moiseev@mx.ihep.su, ermolov@sgi.npi.msu.su,  
 boguslav@lhe08.jinr.dubna.su

### SERPUKHOV-171 (Taking data)

**DETERMINATION OF ENERGY DEPOSITION IN THICK TARGETS FROM CONSTRUCTION MATERIALS EXPOSED TO PROTONS WITH KINETIC ENERGIES OF 0.8-1.2 GeV/c**

Spokesperson: V.I. Belyakov-Bodin [Moscow, ITEP]

E-mail contact belyakov\_b@vxitep.itep.ru

### SERPUKHOV-174 (Completed data-taking 1991)

**PHYSICS OF RELATIVISTIC DIMESON ATOMS**

Spokesperson: L.L. Nemenov [Dubna, JINR]

E-mail contact nemenov@nusun.jinr.dubna.su

### SERPUKHOV-175 (Taking data)

**SINGLE AND PAIR HADRON PRODUCTION WITH LARGE MOMENTUM TRANSFER IN POLARIZED PROTON BEAM**

Spokesperson: V.I. Kryshkin [Serpukhov, IFVE]

E-mail contact kryshkin@mx.ihep.su

## SUMMARIES OF SLAC EXPERIMENTS

### Selected SLAC Experiments

#### SLAC-E-142

(Proposed Oct 1989, Approved May 1990, Began data-taking Nov 1992, Completed data-taking Dec 1992)

#### MEASUREMENT OF THE NEUTRON SPIN DEPENDENT STRUCTURE FUNCTION

AMERICAN U - R G Arnold, P E Bosted, J Dunne, C E Keppel, S E Rock, M Spengos, Z M Szalata, J L White  
 BONN U - W Meyer  
 CLERMONT-FERRAND U - V Breton, H Fonvieille  
 HARVARD U - A K Thompson  
 LBL - G Shapiro  
 LIVERMORE - P L Anthony, F Dietrich, K van Bibber  
 MICHIGAN U - T E Chupp  
 PRINCETON U - G Cates, H L Middleton, N Newbury  
 SACLAY - H Borel, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien  
 SLAC - R A Gearhart, E W Hughes (✓ Spokesperson), T Maruyama, G M Petratos, R Pitthan, L S Rochester, S H Rokni, M B Woods, C C Young  
 STANFORD U - D M Kallow, S Kuhn, Z E Mezziani  
 SYRACUSE U - R Holmes, P A Souder, J Xu  
 WISCONSIN U - H Band, J R Johnson, R A Mair, R Prepost, G H Zapalac

Accelerator SLAC Detector Double-arm spectrometer

Reactions Polarized beam and target  
 $e^- \text{ } ^3\text{He}$  22.66 GeV/c ( $P_{\text{lab}}$ )

Particles studied n

Brief description Studies a polarized electron beam scattering off a polarized  $^3\text{He}$  gas target. The scattered electrons are detected by a two-arm fixed spectrometer. Tests the Bjorken polarization sum rule and nucleon spin models. Run for 400 hours. Data analysis in progress (July 96).

Journal papers PRL 71 (1993) 959, and NC 107A (1994) 2197.

Related experiments SLAC-E-154

E-mail contact emlyn@slac.stanford.edu

#### SLAC-E-143

(Proposed Nov 1991, Approved Dec 1991, Began data-taking Nov 1993, Completed data-taking Feb 1994)

#### MEASUREMENTS OF THE NUCLEON SPIN STRUCTURE IN END STATION A AT SLAC

##### E143 COLLABORATION

AMERICAN U - R G Arnold (✓ Spokesperson), P E Bosted, J Dunne, J Fellbaum, D Reyna, S E Rock, M Spengos, Z M Szalata, J L White  
 BASEL U - A Feltham, I Sick, P Steiner, B Zihlmann  
 CLERMONT-FERRAND U - V Breton, C Comptour, H Fonvieille, Y Roblin  
 CEBAF - J Gomez, J H Mitchell  
 DAPNIA, SACLAY - H Borel, P Grenier, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien  
 LIVERMORE - F Dietrich  
 MASSACHUSETTS U, AMHERST - J Bauer, J Button-Shafer  
 MICHIGAN U - T E Chupp, K P Coulter, T B Smith  
 OLD DOMINION U - C E Hyde-Wright, A Klein, S Kuhn, B Raue  
 PENN U - R Antonov, K A Griffioen, P Raines  
 SLAC - P L Anthony, J Clendenin, M Daoudi, H Dutz, R Erbacher, R A Gearhart, E W Hughes, T Maruyama, W Meyer, G M G Petratos, R Pitthan, C Prescott, L S Rochester, S J St Lorant, L M Stuart, H Tang, T Usher, D R Walz, K Witte, C C Young, B Youngman  
 STANFORD U - D M Kallow  
 TEMPLE U - Z E Mezziani  
 TOHOKU U - K Abe, T Akagi, M Kuriki, F Suekane, H Yuta

VIRGINIA U - T Averett, J P Chen, D G Crabb, D B Day, E Frlež, R A Lindgren, T J Liu, J S McCarthy, R C Minehart, D Počanić, O A Rondon (✓ Spokesperson), L C Smith, D Zimmerman

WISCONSIN U - H Band, J R Johnson, R Prepost, G H Zapalac  
Accelerator SLAC Detector Spectrometer

Reactions Polarized beam and target  
 $e^- \text{ deut}$  9.7, 16.2, 29.1 GeV ( $E_{\text{lab}}$ )  
 $e^- \text{ p}$  "

Particles studied p, n

Brief description Uses high-energy polarized electron beams and a set of ammonia based polarized proton and deuteron targets. Both parallel and perpendicular beam-target spin orientations are used. Studies the proton and neutron spin structure over the range  $0.03 \leq x \leq 0.8$  at momentum transfers greater than  $0.3 \text{ (GeV/c)}^2$ . Data analysis in progress (July 96).

Journal papers PRL 74 (1995) 346, PRL 75 (1995) 25, PL B364 (1995) 61, and PRL 76 (1996) 587.

Related experiments SLAC-E-142, SLAC-E-154, SLAC-E-155, CERN-NA-037, CERN-NA-047

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WWW Home-page

<http://www.slac.stanford.edu/exp/e143/home.html>

#### SLAC-E-154

(Proposed Oct 1993, Approved Nov 1993, Began data-taking Oct 1995, Completed data-taking Nov 1995)

#### PRECISION MEASUREMENT OF THE NEUTRON SPIN STRUCTURE FUNCTION USING A POLARIZED $^3\text{He}$ TARGET

AMERICAN U - R G Arnold, P E Bosted, J N Fellbaum, D Reyna, S E Rock, L Sorrell, Z M Szalata, T Toole  
 UC, BERKELEY & LBL - G Shapiro  
 CAL TECH - T Averett  
 CLERMONT-FERRAND U - V Breton, H Fonvieille, S Incerti  
 GRENOBLE U - M J Buenerd  
 KENT STATE U - B D Anderson, M Khayat, M D Manley, M Olson, G G (M) Petratos, J W Watson, W-M Zhang  
 MASSACHUSETTS U - C M Berisso, S Churchwell, Y Kolomensky, G Peterson  
 MICHIGAN U - T E Chupp, K Coulter, T B Smith, R Welsh  
 MIT, LNS - B Brau  
 NIST, WASH, DC - A K Thompson  
 OLD DOMINION U - S E Kuhn, B Raue, F Wesselmann  
 PENN U - P Raines  
 PRINCETON U - P Bogorad, G D Cates, K Kumar, H Middleton, M Romalis  
 RUHR U, BOCHUM - W Meyer  
 SACLAY - H Borel, R Lombard-Nelsen, J Marroncle, F Sabatie, F Staley, Y Terrien  
 SLAC - T Akagi, P L Anthony, M Daoudi, R Erickson, R Gearhart, R Hicks, E W Hughes (✓ Spokesperson), G Igo, T Maruyama, D Miller, R Pitthan, L Rochester, S H Rokni, J Shaw, S St Lorant, L M Stuart, T Usher, K Witte, C C Young, B Youngman  
 SMITH COLL - P Decowski  
 SOUTHERN OREGON STATE COLL - T Marvin  
 SYRACUSE U - R Holmes, P A Souder, XJ (J) Wang  
 TEMPLE U - J Martoff, Z-E Mezziani, P Zyla  
 TOHOKU U - K Abe, M Kuriki, F Suekane, H Yuta  
 UCLA - V Ghazikhanian  
 WILLIAM AND MARY COLL - K Griffioen  
 WISCONSIN U - H R Band, J R Johnson, G Mitchell, R Prepost

Accelerator SLAC Detector Spectrometer

Reactions Polarized beam and target  
 $e^- \text{ } ^3\text{He}$  48.6 GeV ( $E_{\text{lab}}$ )

Particles studied n

Brief description Measures the neutron spin structure function  $g_1^n$  over  $x$  ranging from 0.015 to 0.7 and  $Q^2$  ranging from 1

## SUMMARIES OF SLAC EXPERIMENTS

to 16 (GeV/c)<sup>2</sup>. Provides also a precision test of the Bjorken sum rule at high average  $Q^2$  at about 5 (GeV/c)<sup>2</sup>, and allows an extraction of the quark parton model parameters,  $\Delta s$  and  $\Delta q$ . Uses the 82% polarized electron beam in the upgraded A-line. The target polarization is achieved by way of the optical pumping and spin exchange. Data analysis in progress (July 96).

*Related experiments* SLAC-E-142, SLAC-E-143, SLAC-E-155, CERN-NA-047, DESY-HERA-HERMES

*E-mail contact* emlyn@slac.stanford.edu

*WWW Home-page*

<http://www.slac.stanford.edu/exp/e154/home.html>

### SLAC-E-155

(Proposed Oct 1993, Approved Nov 1993, In preparation)

#### MEASUREMENTS OF THE NUCLEON SPIN STRUCTURE IN END STATION A AT SLAC

AMERICAN U - R G Arnold (Spokesperson), P E Bosted, J Dunne, J Fellbaum, D Reyna, S E Rock, M Spengos, Z M Szalata, J L White  
 BASEL U - A Feltham, I Sick, P Steiner, B Zihlmann  
 BONN U - W Meyer  
 CEBAF - J Gomez  
 CLERMONT-FERRAND U - V Breton, C Comptour, H Ponvieuille, Y Roblin  
 LIVERMORE - P L Anthony, F Dietrich  
 MASSACHUSETTS U, AMHERST - J Bauer, J Button-Shafer  
 MICHIGAN U - T E Chupp, K P Coulter, T B Smith  
 NAVAL POSTGRADUATE SCHOOL - D Garvey, X K Maruyama  
 OLD DOMINION U - C E Hyde-Wright, A Klein, B Raue  
 PENN U - R Antonov, K A Griffioen, P Raines  
 DAPNIA, SACLAY - T Akagi, H Borel, R Erbacher, P Grenier, R Lombard-Nelsen, J Marroncle, J Morgenstern, F M Staley, Y D Terrien  
 SLAC - J Clendenin, G Court, M Daoudi, H Dutz, R A Gearhart, E W Hughes, T Maruyama, G M G Petratos, R Pitthan, C Prescott, A Rijllart, L S Rochester, S J St Lorant, L M Stuart, H Tang, T Usher, D R Walz, K Witte, C C Young, B Youngman  
 STANFORD U - D M Kaway, S Kuhn, Z E Meziani  
 TOHOKU U - K Abe, M Kuriki, F Suekane, H Yuta  
 VIRGINIA U - T Averett, J P Chen, D G Crabb, D B Day, E Frlez, S Hoibraten, R A Lindgren, T J Liu, J S McCarthy (Spokesperson), R C Minehart, J H Mitchell, D Počanić, O A Rondon, L C Smith, D Zimmerman  
 WISCONSIN U - H Band, J R Johnson, R Prepost, G H Zapalac  
*Accelerator* SLAC *Detector* Spectrometer

*Reactions* Polarized beam and target

$e^- n$  48.55 GeV ( $E_{lab}$ )  
 $e^- p$  "

*Particles studied*  $n, p$

*Brief description* Measures the deep inelastic scattering of polarized electrons from polarized ammonia targets, NH<sub>3</sub> and ND<sub>3</sub>, to determine the spin structure functions  $g_1$  and  $g_2$  over  $x$  ranging from 0.015 to 0.85 and  $Q^2$  ranging from 1 to 17 (GeV/c)<sup>2</sup>. The data will double the  $Q^2$  range of precision measurements and allow a search for nonscaling higher twist contributions to the spin structure functions. Uses a new pair of focussing magnetic spectrometers instrumented with shower counters, Čerenkov counters, and scintillator hodoscopes to measure scattered electrons and reject pions. In preparation (July 96). Scheduled to run in January 97.

*Related experiments* SLAC-E-142, SLAC-E-143, SLAC-E-154, CERN-NA-037, CERN-NA-047

*E-mail contact* arnold@slac.stanford.edu, jsm8p@virginia.edu

### SLAC-SLC-SLD

(Proposed 1983, Approved May 1984, Began data-taking Apr 1991, In progress)

#### THE SLD DETECTOR FOR THE SLC

#### SLD COLLABORATION

BOSTON U - J A Collier, S Hedges, J T Shank, J S Whitaker  
 BRUNEL U - N J Allen, P Dervan, E Etzion, A Hasan, A K McKemey, C Ward, S J Watts  
 COLORADO U - S Fahey, U Nauenberg, D Wagner  
 COLORADO STATE U - M Dima, J Harton, M Smy, H Staengle, R J Wilson  
 COLUMBIA U - P C Rowson  
 FERRARA U & INFN, FERRARA - G Menegatti, L Piemontese  
 FRASCATI - A Calcaterra, R De Sangro, I Peruzzi, M Piccolo  
 LBL - G Shapiro, H Steiner  
 LOUISIANA TECH U - B Barakat, X- Jiang, K Johnston  
 MASSACHUSETTS U, AMHERST - G Blaylock, S S Hertzbach, R R Kofler, A Trandafir, J Wittlin  
 MIT - P N Burrows, R F Cowan, J Dagraca, D Dong, M J Fero, H W Kendall, V Lia, L S Osborne, J Quigley, F E Taylor, E Torrence, R Verdier, R K Yamamoto  
 MISSISSIPPI U - B Bolen, R Kroeger, J Reidy  
 MOSCOW STATE U - G Bashindzhagyan  
 NAGOYA U - K Abe, R Kajikawa, N Oishi, A Sugiyama, S Suzuki  
 OREGON U - A Arodzero, J E Brau, R Frey, J Huber, M Langston, N B Sinev, X- Yang, J- Zhou  
 PERUGIA U & INFN, PERUGIA - D Falciai, G Mancinelli, G Mantovani  
 RUTGERS U - K G Baird, P Jacques, M Kalelkar, R J Plano, P Stamer  
 RUTHERFORD - C J S Damerell, D J Jackson, F J Wickens  
 SLAC - T Akagi, D Aston, T L Barklow, J R Bogart, G R Bower, M Breidenbach (✓ Spokesperson), D Burke, D H Calloway, R Cassell, A Chou, G Crawford, M Daoudi, N DeGroot, R Dubois, M E Huffer, J A Jaros, J Jiang, A S Johnson, H Kawahara, M E King, D W G Leith, H L Lynch, T W Markiewicz, T Maruyama, R Messner, K C Moffeit, D Muller, T J Pavel, C Y Prescott, B N Ratcliff, L S Rochester, J J Russell, O H Saxton, J Schwiening, D Su, M Swartz, T Usher, J Va'Vra, S R Wagner, A P Waite, S H Williams, S Willocq, W J Wisniewski, M B Woods, C C Young  
 SOGANG U - Y- Kim, C H Park  
 TENNESSEE U - B Bugg, H O Cohn, E L Hart, L Kamychkov, D Onoprienko, K Shmakov, A W Weidemann  
 TOHOKU U - K Abe, K Hasuko, T Nagamine, S Narita, F Suekane, J Yashima, H Yuta  
 UC, SANTA BARBARA - S J Yellin  
 UC, SANTA CRUZ - D G Coyne, J Fernandez, X Liu, P L Reinertsen, T Schalk  
 VANDERBILT U - R S Panvini, T W Reeves  
 WASHINGTON U, SEATTLE - T H Burnett, E Church, V Cook, P M Mockett, E R Weiss  
 WISCONSIN U - H R Band, J R Johnson, R Prepost, V Serbo, T Wright  
 YALE U - C Baltay (✓ Spokesperson), M Liu, S Manly, T Moore, J A Snyder

*Accelerator* SLAC-SLC *Detector* SLD

*Reactions* Polarized beam  
 $e^+ e^-$  <100 GeV ( $E_{cm}$ )

*Particles studied*  $Z^0$

*Brief description* Studies include (1) precision tests of the Standard Model of the electroweak interactions and the  $Z$  partial width to bottom states, particularly by measuring the left-right polarization asymmetry  $A_{LR}$ , (2) heavy quark physics of the  $B$  system, (3)  $B\bar{B}$  mixing with polarized beams, (4) tests of QCD in multi-jets, and (5) a search for new phenomena. The detector system consists of a high-precision upgraded CCD vertex detector (VXD3), a cylindrical central drift chamber with four circular endcap drift chambers, a Čerenkov ring imaging detector, finely segmented projective tower geometry calorimetry, and a muon tracking system. Taking data (July 96). Expected to run till March 98.

*Journal papers* NIM A238 (1985) 489, IEEE TNS 33 (1986) 46, IEEE TNS 33 (1986) 65, IEEE TNS 33 (1986) 81, IEEE TNS 33 (1986) 113, IEEE TNS 33 (1986) 167, IEEE TNS 33 (1986) 176, IEEE TNS 33 (1986) 194, IEEE TNS 33 (1986) 197, IEEE TNS 33 (1986) 201, IEEE TNS 33 (1986) 261, NIM A252 (1986) 295, NIM A257 (1987) 139, NIM A257 (1987) 625, IEEE TNS 35 (1988) 231, IEEE TNS 35 (1988) 282, IEEE TNS 35 (1988) 311, IEEE TNS 35 (1988) 398, NIM A264 (1988) 219, NIM A265

## SUMMARIES OF SLAC EXPERIMENTS

(1988) 99, NIM A273 (1988) 858, IEEE TNS 36 (1989) 23, IEEE TNS 36 (1989) 276, IEEE TNS 36 (1989) 339, IEEE TNS 36 (1989) 595, IEEE TNS 36 (1989) 675, IEEE TNS 36 (1989) 751, IEEE TNS 36 (1989) 822, IEEE TNS 36 (1989) 1657, NIM A275 (1989) 484, NIM A276 (1989) 94, NIM A277 (1989) 222, NIM A283 (1989) 582, NIM A283 (1989) 590, NIM A284 (1989) 339, IEEE TNS 37 (1990) 1132, IEEE TNS 37 (1990) 1191, NIM A288 (1990) 236, NIM A289 (1990) 449, NIM A289 (1990) 463, NIM A289 (1990) 577, NIM A290 (1990) 353, NIM A293 (1990) 136, IEEE TNS 38 (1991) 348, NP (PROC SUPPL) 23B (1991) 219, NP (PROC SUPPL) 23B (1991) 227, NIM A300 (1991) 501, NIM A328 (1993) 472, MPL A8 (1993) 2237, PRL 70 (1993) 2515, PRL 71 (1993) 2528, NP (PROC SUPPL) 37B (1994) 23, PRL 72 (1994) 3145, PRL 73 (1994) 25, PR D50 (1994) 5580, NP (PROC SUPPL) 39BC (1995) 121, PRL 74 (1995) 1512, PRL 74 (1995) 2880, PRL 74 (1995) 2890, PRL 74 (1995) 2895, PRL 75 (1995) 3609, PRL 75 (1995) 3624, PRL 75 (1995) 4173, PR D51 (1995) 962, PR D52 (1995) 4240, PR D52 (1995) 4828, PL B371 (1996) 149, PR D53 (1996) 1023, and PR D53 (1996) 2271.

*Related experiments* CERN-LEP-ALEPH, CERN-LEP-DELPHI, CERN-LEP-L3, CERN-LEP-OPAL

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baltay@yaleph2.physics.yale.edu

*WWW Home-page*  
<http://www-sld.slac.stanford.edu/sldwww/sld.html>

### SLAC-PEP2-BABAR

(Proposed Jun 1994, Jun 1994, Approved Jan 1996, In preparation)

#### THE B FACTORY DETECTOR

##### BABAR COLLABORATION

*Accelerator* SLAC-PEP2 *Detector* BABAR

*Brief description* BABAR is a detector designed to exploit the single interaction region in the PEP2 facility. The primary aim is a detailed study of  $CP$  violating asymmetries in  $B^0$  meson decay, but a wide variety of other  $B$ , charm,  $\tau$ , and two-photon physics will also be accessible. The detector comprises a nested set of detector subsystems to (1) precisely measure the collision point and decay points of the  $B$  meson pairs produced, (2) measure the momentum and energy of the decay particles with a high resolution, and (3) precisely identify particles in these decays (i.e. electrons, muons, pions, kaons). The machine will be commissioned Fall 1998 and the detector should be ready to begin the studies in early 1999. Under construction (July 96). The collaboration consists of more than 500 scientists, engineers, and graduate students from 10 countries. For further details, please contact the Spokesperson, Prof. David G. Hitlin [Cal Tech]. The Deputy Spokesperson is Dr. Roy Aleksan [Saclay].

*E-mail contact* hitlin@slac.stanford.edu

*WWW Home-page*  
<http://www.slac.stanford.edu/BF/doc/www/bfHome.html>

## Other SLAC Experiments

Listed here are some other SLAC experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons.

### SLAC-E-140X (Completed data-taking Sep 1991)

#### MEASUREMENT OF THE $x$ , $Q^2$ , AND HYDROGEN-DEUTERIUM DEPENDENCE OF $R = \sigma_L/\sigma_T$

Spokespersons: Stephen E. Rock [American U.], Arie Bodek [Rochester U.]

*E-mail contact* ser@slac.stanford.edu,  
bodek@urhep.pas.rochester.edu

### SLAC-E-144 (Taking data)

#### STUDY OF QED AT CRITICAL FIELD STRENGTH IN INTENSE LASER - HIGH-ENERGY ELECTRON COLLISIONS AT SLAC

By E144 Collaboration

Spokespersons: Kirk T. McDonald [Princeton U.], Adrian C. Melissinos [Rochester U.], David L. Burke [SLAC]

*E-mail contact* mcdonald@puphep.princeton.edu,  
meliss@urhep.pas.rochester.edu, daveb@slac.stanford.edu

*WWW Home-page*  
<http://www.slac.stanford.edu/exp/e144/e144.html>

### SLAC-E-146 (Completed data-taking Apr 1993)

#### STUDY OF THE INTERFERENCE BETWEEN MULTIPLE SCATTERING AND BREMSSTRAHLUNG (LPM EFFECT)

Spokesperson: Spencer R. Klein [LBL, Berkeley]

*E-mail contact* srklein@lbl.gov

### SLAC-NE-17 (Completed data-taking Oct 1991)

#### TWO-BODY PHOTODISINTEGRATION OF THE DEUTERON AT FORWARD ANGLES BETWEEN 1.0 AND 3.0 GeV

Spokesperson: Roy J. Holt [Argonne]

*E-mail contact* r-holt@uiuc.edu

### SLAC-NE-18 (Completed data-taking Oct 1991)

#### MEASUREMENT OF THE NUCLEAR DEPENDENCE AND MOMENTUM TRANSFER DEPENDENCE OF QUASIELASTIC ( $e, e'p$ ) SCATTERING AT LARGE MOMENTUM TRANSFER

Spokespersons: Richard G. Milner [MIT, LNS], Bradley W. Filippone [Cal Tech]

*E-mail contact* milner@mitlms.mit.edu, brad@erin.caltech.edu

## SLAC Future Plans

In the next few years SLAC will continue to support a series of complementary high-energy physics programs: (1) studies of the spin structure of nucleons using the high current, high energy, polarized electron-beam scattering from polarized neutron and proton targets, (2) study of the electro-weak interaction with the SLD detector through precision measurements at the  $Z$  pole, using polarized electron collisions on unpolarized positrons at the energy of the  $Z$ , (3) accelerator R&D towards a real linear collider (NLC), (4) preparations to study time-dependent  $X$ -ray sources with the USA experiment to be launched in 1997, and R&D towards a new space experiment studying high-energy  $\gamma$  rays - a follow on to the very successful EGRET experiment now orbiting earth, and (5) activity related to the development of the far-future high-gradient accelerators. The spin structure and SLD experiments are scheduled to run through March 1998. The asymmetric  $B$  Factory (PEP2) is expected to be commissioned before the end of that year, and the BaBar detector should begin its study of the  $CP$ -violation phenomena in early 1999.

## SUMMARIES OF TRIUMF EXPERIMENTS

### Selected TRIUMF Experiments

#### TRIUMF-497-287

(Proposed Oct 1987, Approved Dec 1987, Began data-taking 1995, In progress)

#### MEASUREMENT OF THE FLAVOR-CONSERVING HADRONIC WEAK INTERACTION

PARITY COLLABORATION

MANITOBA U - J Birchall (✓ Spokesperson), J R Campbell, A A Green, A Hamian, L R Lee, S A Page (✓ Spokesperson), W D Ramsay, S D Reitzner, V Sum, W T H van Oers (✓ Spokesperson), R Woo

LOS ALAMOS - J D Bowman, R E Mischke  
TRIUMF - C A Davis, D C Healey, R Helmer, P Levy, P W Schmor

ALBERTA U - P W Green, E Korkmaz, G Roy, J Soukup, G M Stinson

CARNEGIE MELLON U - A Berdoz  
MOSCOW, INR - Y Kuznetsov, N Titov, S Zadorozny, A Zelenski

Accelerator TRIUMF Detector Ionization

Reactions Polarized beam



Brief description Measures the parity violating (PV) longitudinal analyzing power  $A_z$  and the weak meson-nucleon coupling constant  $h_{\rho}^{pp}$ . Uses a new beamline dedicated to the PV measurements, and a liquid hydrogen target. In progress (July 96).

Journal papers PR D37 (1988) 1769, NIM A307 (1991) 26, and NP A553 (1993) 823c.

E-mail contact birchall@physics.umanitoba.ca, shelley@triumf.ca, vanoers@triumf.ca

#### TRIUMF-537

(Proposed May 1988, Completed data-taking Jun 1991)

#### RADIATIVE DECAY OF THE $\Delta$ RESONANCE

BRITISH COLUMBIA U - D F Measday (Spokesperson), S Stanislaus, P Weber

KENTUCKY U - M A Kovash  
NEW MEXICO U - B Bassalleck  
BOSTON U - E C Booth, J P Miller

Accelerator TRIUMF Detector Photon spectrometer

Reactions Polarized target



Brief description Measures  $\Delta^0$  radiative decay multipoles and differential cross-sections. A polarized target has been successfully used in phase-II of the experiment. Data analysis in progress (July 96).

E-mail contact measday@triumf.ca

#### TRIUMF-614

(Proposed Jun 1990, Approved Dec 1993, In preparation)

#### PRECISION MEASUREMENT OF THE MICHEL PARAMETERS IN $\mu^+$ DECAY

TRIUMF - R Abegg, M Comyn, D R Gill (✓ Spokesperson), P Gumplinger, R Helmer, J Macdonald, J-M Poutissou, R Poutissou, G Wait, D Wright

TEXAS A AND M - C Gagliardi (✓ Spokesperson), R Tribble (✓ Spokesperson)

BRITISH COLUMBIA U - M Hasinoff  
VALPARAISO U, INDIANA - D Koetke, R Manweiler  
KURCHATOV INST, MOSCOW - A Khruchinsky, Y Lechin, L Miassoedov, V Selivanov (✓ Spokesperson), I Sinitzin, V Torokhov

ALBERTA U - N Rodning  
SASKATCHEWAN U - Y M Shin  
REGINA U & TRIUMF - R Tacik

Accelerator TRIUMF Detector Spectrometer

Brief description Tests the right-left models of weak interactions. A surface muon beam is used as a source of muons with polarization almost completely (better than 99.99%) opposite to the muon momentum. The experimental apparatus is contained in a superconducting solenoid with a maximum field of 2.3 T, collinear to the muon polarization. Muons stop in a thin planar aluminum target located in the center of the magnet, and the resulting positrons are recorded by one of the two planar drift chamber (PDC) assemblies located on both sides of the target. Under construction. Data taking expected in Fall 1997.

Related experiments LAMPF-1240

E-mail contact drgill@triumf.ca, tribble@comp.tamu.edu, svi@slv.kiae.su

#### TRIUMF-645

(Proposed Jun 1991, Approved Jun 1991, Began data-taking May 1992, Completed data-taking Jun 1992)

#### ABSOLUTE DIFFERENTIAL CROSS-SECTIONS IN THE $\pi^\pm p \rightarrow \pi^\pm p$ REACTION AROUND THE $\Delta$ RESONANCE

PISCAT COLLABORATION

BRITISH COLUMBIA U - F Duncan, A Feltham, G Jones, J Lange, M M Pavan (✓ Spokesperson), K Raywood, M E Sevier  
TRIUMF - R Adams, J T Brack (✓ Spokesperson), D Ottewill, G R Smith, B Wells

REGINA U - E L Mathie, R Tacik

COLORADO U - R A Ristinen

KARLSRUHE U - H M Staudenmaier

ST PETERSBURG, INP - I I Strakovsky

SIMON FRASER U - R Helmer

Accelerator TRIUMF Detector Scintillator

Reactions



Brief description Uses flat, solid CH<sub>2</sub> (polyethylene) targets as well as a supercooled flat-window liquid hydrogen target. Scintillator telescopes are used for coincidence detection of pions and protons. Covers angular range between 30° and 160° c.m. Anticipates 1-1.5% statistical and 1.5-2.0% systematic uncertainties. Data analysis completed and a publication being prepared (July 96).

Related experiments TRIUMF-322, TRIUMF-471

E-mail contact pavan@mitlms.mit.edu, mpavan@bun.mit.edu, brack@spectr.colorado.edu

#### TRIUMF-703

(Proposed May 1993, Approved Jul 1993, Began data-taking Dec 1993, In progress)

#### PION LIFETIME MEASUREMENT

TRIUMF - D A Bryman, M Fujiwara, J A Macdonald, G Marshal, T Numao (✓ Spokesperson), A Olin

Accelerator TRIUMF Detector Counter

Reactions



Particles studied  $\pi^+$

Brief description The pion lifetime is measured by observing the time dependence of the surface muon yield. Taking data (July 96).

Journal papers PR D52 (1995) 4855.

Related experiments TRIUMF-248

E-mail contact toshio@triumf.ca

## SUMMARIES OF TRIUMF EXPERIMENTS

### Other TRIUMF Experiments

Listed here are some other TRIUMF experiments of interest to the particle physics community. Find more details about these projects online, in the SLAC's EXPERIMENTS database (see p. 3), or contact the spokespersons. Check also the yearly TRIUMF publication 'Annual Report of Scientific Activities', which lists all the Lab's ongoing experiments.

**TRIUMF-369** (Completed data-taking Mar 1993)

#### CHARGE SYMMETRY BREAKING IN $np$ ELASTIC SCATTERING AT 350 MeV

Spokespersons: Willem T.H. van Oers [Manitoba U.], L.Gordon Greeniaus [Alberta U.]

*E-mail contact* gree@phys.ualberta.ca, vanoers@triumf.ca

**TRIUMF-372** (Completed data-taking Feb 1991)

#### SINGLE PION PRODUCTION IN $np$ SCATTERING

Spokesperson: Norman E. Davison [Manitoba U.]

*E-mail contact* davison@umphys.physics.umanitoba.ca

**TRIUMF-445** (Completed data-taking Dec 1993)

#### POLARIZATION MEASUREMENT IN THE ${}^3\text{He}(\pi^+, \bar{p}p)$ REACTION

Spokespersons: D. Ashery, S. MayTal-Beck [Tel Aviv U.]

*E-mail contact* ashery@tauphy.tau.ac.il, ashery@triumf.ca

**TRIUMF-452** (Completed data-taking Feb 1994)

#### RADIATIVE MUON CAPTURE ON HYDROGEN By RMC Collaboration

Spokespersons: Michael D. Hasinoff [British Columbia U.], Georges Azuelos [Montreal U.]

*E-mail contact* miha@triumf.ca, azuelos@lps.umontreal.ca

**TRIUMF-482** (Completed data-taking Sep 1991)

#### MEASUREMENTS OF SPIN TRANSFER COEFFICIENTS IN $pd$ ELASTIC SCATTERING

Spokesperson: Rudolf Abegg [TRIUMF]

*E-mail contact* abegg@triumf.ca

**TRIUMF-498** (Completed data-taking 1993)

#### ANALYZING POWER ZERO CROSSING ANGLES IN $np$ ELASTIC SCATTERING BELOW 300 MeV

Spokesperson: Charles A. Davis [TRIUMF]

*E-mail contact* cymru@triumf.ca

**TRIUMF-502** (Completed data-taking 1992)

#### MEASUREMENT OF ANALYZING POWERS IN LOW ENERGY $\pi d$ ELASTIC SCATTERING

Spokesperson: N.R. Stevenson [Saskatchewan U.]

**TRIUMF-506** (Completed data-taking 1991)

#### LOW ENERGY $\pi d \rightarrow pp$ ANALYZING POWERS

Spokesperson: Edward L. Mathie [Regina U.]

*E-mail contact* mathie@meena.cc.uregina.ca, mathie@triumf.ca

**TRIUMF-508**

#### STUDY OF THE $\pi^+ d \rightarrow \pi^- \pi^+ pp$ REACTION AT $T = 240$ MeV

Spokesperson: Rinaldo Rui [Trieste U.]

*E-mail contact* rui@triumf.ca

**TRIUMF-557** (Completed data-taking 1992)

#### ELASTIC SCATTERING OF 100 MeV $\pi^+$ FROM A POLARIZED ${}^3\text{He}$ TARGET

Spokespersons: Otto F. Haeusser [TRIUMF and Simon Fraser U.], B. Larson [Simon Fraser U.]

*E-mail contact* hausser@triumf.ca

**TRIUMF-560** (Completed data-taking 1994)

#### LOW ENERGY $\pi^+ p$ ANALYZING POWERS WITH CHAOS

Spokesperson: G.R. Smith [TRIUMF]

*E-mail contact* smith@erich.triumf.ca

**TRIUMF-561** (Completed data-taking Feb 1991)

#### THRESHOLD MEASUREMENTS OF $H(\pi^-, \pi^+ \pi^-)n$ AND $H(\pi^+, \pi^+ \pi^+)n$

Spokesperson: Martin E. Seviior [British Columbia U.]

*E-mail contact* mseviior@triumf.ca

**TRIUMF-566**

#### ELASTIC PROTON SCATTERING FROM POLARIZED ${}^3\text{He}$

Spokesperson: Otto F. Haeusser [Simon Fraser U. and TRIUMF]

*E-mail contact* hausser@triumf.ca

**TRIUMF-570** (Completed data-taking Jan 1993)

#### GAMMA-NEUTRINO ANGULAR CORRELATION IN MUON CAPTURE ON ${}^{28}\text{Si}$

Spokesperson: David S. Armstrong [LBL, Berkeley]

*E-mail contact* armd@newton.physics.wm.edu, armd@reg.triumf.ca

**TRIUMF-592** (Completed data-taking 1995)

#### RADIATIVE MUON CAPTURE ON ${}^3\text{He}$ By RMC Collaboration

Spokesperson: Dennis H. Wright [TRIUMF]

*E-mail contact* wright@triumf.ca

**TRIUMF-598** (Completed data-taking Aug 1992)

#### INTEGRAL CROSS-SECTIONS FOR THE $\pi^+ p$ INTERACTION IN THE 3, 3 RESONANCE REGION

Spokesperson: Eli Friedman [Hebrew U.]

*E-mail contact* elifried@vms.huji.ac.il

**TRIUMF-612** (Completed data-taking 1994)

#### HYPERTFINE DEPENDENCE OF EXCLUSIVE MUON CAPTURE ON ${}^{19}\text{F}$ , ${}^{23}\text{Na}$ , ${}^{27}\text{Al}$ , ${}^{35}\text{Cl}$ , AND ${}^{37}\text{Cl}$

Spokesperson: Tim P. Gorringer [Kentucky U.]

*E-mail contact* gorringer@ukcc.uky.edu, gorringer@triumf.ca



## SUMMARIES OF TRIUMF EXPERIMENTS

**TRIUMF-624** (Completed data-taking Aug 1994)

### THE $(\pi, 2\pi)$ REACTION, A TOOL TO DETERMINE SCATTERING LENGTHS AND COUPLING CONSTANTS

Spokespersons: Richard R. Johnson, Martin E. Sevier [British Columbia U.], Nevio Grion, Rinaldo Rui [Trieste U.]

E-mail contact johnson@physics.ubc.ca, rrjohnson@triumf.ca, msevier@triumf.ca, grion@trieste.infn.it, grion@triumf.ca, rui@triumf.ca

**TRIUMF-630** (Completed data-taking 1994)

### ELASTIC PROTON SCATTERING FROM SIDEWAYS AND LONGITUDINALLY POLARIZED $^3\text{He}$

Spokesperson: D.M. Whittall [Simon Fraser U.]

**TRIUMF-633**

### MEASUREMENT OF $pp \rightarrow pn\pi^+$ AT 420 AND 500 MeV

Spokesperson: Kenneth H. Hicks [Ohio U.]

E-mail contact hicks@ouvaxa.cats.ohiou.edu, hicks@triumf.ca

**TRIUMF-643** (Completed data-taking 1992)

### TEST OF THE LOW ENERGY THEOREM FOR RADIATIVE PION CAPTURE

Spokespersons: David A. Hutcheon [TRIUMF], Michael A. Kovash [Kentucky U.]

E-mail contact smurf@triumf.ca, kovash@ie.pa.uky.edu, kovash@triumf.ca, phy133@ukcc.uky.edu

**TRIUMF-653** (Completed data-taking Aug 1993)

### MEASUREMENT OF THE $\pi^+\pi^-$ INVARIANT MASS IN NUCLEI AS A TOOL FOR DETERMINING THE MASS DISTRIBUTION OF THE $\sigma$ MESON

Spokespersons: Nevio Grion, Rinaldo Rui [Trieste U.]

E-mail contact grion@triumf.ca, grion@trieste.infn.it, rui@triumf.ca

**TRIUMF-661** (Completed data-taking Jun 1994)

### NEUTRON-NEUTRON SCATTERING LENGTH VIA $\pi^-d \rightarrow \gamma nn$

Spokesperson: Michael A. Kovash [Kentucky U.]

E-mail contact kovash@triumf.ca, kovash@ie.pa.uky.edu, phy133@ukcc.uky.edu

**TRIUMF-683** (Completed data-taking Sep 1994)

### ASYMMETRIES FOLLOWING MUON CAPTURE BY POLARIZED MUONIC $^3\text{He}$

Spokespersons: W. Cummings [Simon Fraser U.], O.F. Hausser [Simon Fraser U. and TRIUMF]

E-mail contact hausser@triumf.ca

**TRIUMF-704** (In preparation)

### CHARGE SYMMETRY BREAKING IN $np \rightarrow d\pi^0$ CLOSE TO THRESHOLD

By SASP-CSB Collaboration

Spokespersons: Allena K. Opper [Alberta U.], Elie Korkmaz [Northern British Columbia U.]

E-mail contact opper@phys.ualberta.ca, korkmaz@unbc.edu

**TRIUMF-719** (Completed data-taking 1995)

### $^4\text{He}(\pi^+, \pi^- pp)$ INVARIANT MASS MEASUREMENT WITH CHAOS

Spokesperson: Greg R. Smith [TRIUMF]

E-mail contact smith@triumf.ca

## SUMMARIES OF NONACCELERATOR EXPERIMENTS

### Nonaccelerator Experiments

#### UNDERGROUND-BOREXINO

(In preparation)

##### BOREXINO: A SOLAR NEUTRINO EXPERIMENT AT GRAN SASSO

###### BOREXINO COLLABORATION

**Brief description** BOREXINO is one of the 'next generation' solar neutrino projects at the Gran Sasso Laboratory. Uses a Pseudocumene based liquid scintillator as active medium. Measures the  $^7\text{Be}$  line neutrino flux (energy = 0.861 MeV). It is very sensitive to the neutrino oscillations in both the scenarios of vacuum oscillations and the MSW effect. Tests of the feasibility of the project have been successfully completed. For further information, please contact the Spokesperson, Prof. Gianpaolo Bellini [Milan U. and INFN, Milan].

**Related experiments** SAGE, GALEX, SUDBURY, KAMIOKANDE, SUPERKAMIOKANDE

**E-mail contact** bellini@mi.infn.it, bellini@lngs.infn.it

**WWW Home-page**

<http://www.lngs.infn.it/lngs/htexts/borex/html/borex.html>

#### UNDERGROUND-GALEX

(Proposed 1983, Approved Apr 1985, Began data-taking May 1991, In progress)

##### GALLIUM EUROPEAN EXPERIMENT

###### GALEX COLLABORATION

HEIDELBERG, MAX PLANCK INST - W Hampel, G Heusser, J Kiko, T Kirsten (✓ Spokesperson), M Laubenstein, E Pernicka, W Rau, U Roenn, M Wojcik, Y Zakharov  
 FORSCHUNGSZENTRUM, KARLSRUHE - K Ebert, T Fritsch, D Heidt, E Henrich, L Stieglitz, R von Ammon, F Weirich  
 GRAN SASSO - M Balata, F X Hartmann, M Sann  
 MILAN U - E Bellotti, C Cattadori, O Cremonesi, N Ferrari, E Fiorini, L Zanotti  
 MUNICH, TECH U - M Altmann, R Moessbauer, F von Feilitzsch  
 NICE OBSERVATORY - G Berthomieu, E Schatzman  
 ROME U & INFN, ROME - C Bacci, P Belli, R Bernabei, S D'Angelo, L Paoluzi  
 SACLAY - A Bevilacqua, M Cribier, L Gosset, J Rich, M Spiro, C Tao, D Vignaud  
 BROOKHAVEN - J Boger, R L Hahn, J K Rowley, R W Stoerner, J Weneser

**Accelerator** NONE **Detector** Counter

###### Reactions



**Particles studied**  $\nu_e$

**Brief description** This is a radiochemical neutrino experiment.

Uses 30 tons of gallium in the 8.2-molar  $\text{GaCl}_3$  solution. Installed in the South Wing of Hall A of the Gran Sasso Laboratory. Has an overhead shielding of about 3400 m of water equivalent. An interaction with neutrinos effectively transforms gallium chloride into  $\text{GeCl}_4$ , which is then extracted from the solution with an appropriate gas purging system. Counted in extremely low-level proportional counters. Sensitive to the low-energy neutrinos produced by  $pp$  fusion in the Sun. Designed for an order of one event per day. Taking data (July 96).

**Journal papers** NIM A274 (1989) 203, PL B285 (1992) 376, PL B285 (1992) 390, NIM A329 (1993) 541, PL B314 (1993) 445, PL B327 (1994) 377, NP (PROC SUPPL) 35 (1994) 418, PL B342 (1995) 440, PL B357 (1995) 237, and ASPP 4 (1995) 23.

**Related experiments** SAGE, BOREXINO

**E-mail contact** kirst@kosmo.mpi-hd.mpg.de

**WWW Home-page**

<http://kosmopc.mpi-hd.mpg.de/galex/galex.htm>

#### UNDERGROUND-HOMESTAKE-CHLORINE

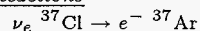
(Proposed 1965, Approved 1965, Began data-taking 1970, In progress)

##### THE HOMESTAKE CHLORINE SOLAR NEUTRINO EXPERIMENT

PENN U - B T Cleveland, T Daily, R Davis, Jr (✓ Spokesperson), K Lande (✓ Spokesperson), C K Lee, P Wildenhain  
 LEHMANN COLL - J Ullman

**Accelerator** NONE **Detector** Counter

###### Reactions



**Particles studied**  $\nu_e$

**Brief description** The  $^{37}\text{Cl}$  solar neutrino detector in the Homestake Gold Mine consists of 615 tons of tetrachloroethylene ( $\text{C}_2\text{Cl}_4$ ), 4200 m of water equivalent underground. It uses radiochemical techniques to determine the  $^{37}\text{Ar}$  production rate. The detector was built at BNL in 1965-67 and operated by Brookhaven until 1984. At that time the laboratory was transferred to Penn U. Collecting data regularly since 1970.

**Journal papers** PRL 47 (1981) 1507, and ASTJ (1996) (to be published).

**E-mail contact** klande@mail.sas.upenn.edu

#### UNDERGROUND-HOMESTAKE-IODINE

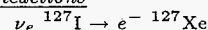
(Proposed 1993, Approved 1994, In preparation)

##### THE HOMESTAKE IODINE SOLAR NEUTRINO EXPERIMENT

PENN U - B T Cleveland, T Daily, R Davis, Jr, K Lande (✓ Spokesperson), C K Lee, P Wildenhain (✓ Spokesperson)  
 LEHMANN COLL - J Ullman  
 LOS ALAMOS - R Burman  
 WASHINGTON U, SEATTLE - W Haxton  
 MOSCOW, INR - V N Gavrin

**Accelerator** NONE **Detector** Counter

###### Reactions



**Particles studied**  $\nu_e$

**Brief description** The  $^{127}\text{I}$  solar neutrino experiment in the Homestake Gold Mine uses a detector medium of sodium iodide dissolved in water. The total detector mass of the unit now under construction will be 235 tons of which 100 tons is  $^{127}\text{I}$ . The detector is located 4200 m of water equivalent underground. It uses radiochemical techniques to determine the  $^{127}\text{Xe}$  production rate. The detector, which has an extraction time constant of 11 minutes, will be fully automated and will operate under complete computer control. Two extractions will be carried out per day to search for a Day/Night effect for electron neutrinos from the decay of  $^7\text{Be}$ . Expected to begin data taking at the end of 1996.

**Related experiments** LAMPF-1213, IUCF-E-373

**E-mail contact** klande@mail.sas.upenn.edu, paul@goodricke.astro.upenn.edu

#### UNDERGROUND-ICARUS

(Approved 1995, In preparation)

##### ICARUS: IMAGING COSMIC AND RARE UNDERGROUND SIGNAL

CERN - P Cennini, S Cittolin, G Maurin, A Placci, J P Revol, C Rubbia (✓ Spokesperson), W H Tian  
 AQUILA U & INFN, AQUILA - F Cavanna, E Olejarczyk, G Piano Mortari, M Verdecchia

## SUMMARIES OF NONACCELERATOR EXPERIMENTS

BEIJING, IHEP - L K Ding, Y Li, F Lu, J M Ma, J F Qiu,  
 H Y Sheng, K L Tung, J Y Zeng, B Zhang  
 FRASCATI - F Casagrande, D Dzialo-Giudice, X Li,  
 G Mannocchi, S Motto, P Picchi  
 UCLA - D Cline, W Hong, G Muratori, S Otwinowski, J Park,  
 H G Wang, M Zhou  
 PADUA U & INFN, PADUA - A Bettini, C Carpanese, S Centro,  
 C De Vecchi, D Pascoli, A Pepato, F Pietropaolo, S Ventura  
 PAVIA U & INFN, PAVIA - P Benetti, E Calligarich, R Dolfini,  
 A Gigli-Berzolari, F Mauri, L Mazzone, C Montanari,  
 A Piazzoli, A Rappoldi, G L Raselli, M Rossella, D Scannicchio,  
 C Vignoli  
 PISA U & INFN, PISA - F Sergiampietri  
 TURIN, COSMO-GEOFISICA LAB - L Periale, S Suzuki  
 TEXAS U, DALLAS - E Feynyves  
 MILAN U & INFN, MILAN - D Cavalli, S Cesana, A Ferrari,  
 F Gianotti, S Resconi, P Sala, M Terrani

Accelerator NONE Detector ICARUS

Particles studied  $p, \nu$

Brief description The first phase of the project includes the construction of a 600-ton detector at Gran Sasso Laboratory. This could be done within the next three years. In the second phase, a 5,000-ton detector will be built. The ICARUS detector represents a new generation of bubble chambers, and will use the ultra-pure liquid argon and the readout technique (LAR-TPC) of ionization data. It is designed to provide three-dimensional views of ionizing events with particle identification from  $dE/dx$  and range measurements. It is also a homogeneous calorimeter of very fine granularity and high accuracy, and thus a good tool for rare event searches, such as proton decays. Other topics covered include atmospheric neutrino studies and solar neutrino detection (above 5 MeV). It is expected that the detector will be used in a long baseline neutrino oscillation experiment with the  $\nu$  beam from CERN (732-km to the North). Under construction (July 96).

Journal papers NIM A315 (1992) 223, NIM A327 (1993) 173, NIM A332 (1993) 395, NIM A333 (1993) 567, NIM A345 (1994) 230, NIM A346 (1994) 550, NIM A355 (1995) 660, NIM A356 (1995) 507, and NIM A356 (1995) 526.

Related experiments SUPERKAMIOKANDE

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WWW Home-page <http://www.aquila.infn.it/icarus/>

### UNDERGROUND-KAMIOKANDE-III

(Began data-taking Nov 1985, Completed data-taking Apr 1996)

#### THE KAMIOKANDE EXPERIMENT

TOKYO U, ICRR - Y Fukuda, T Hayakawa, K Inoue, T Ishida, K Ishihara, H Ishino, S Joukou, T Kajita, S Kasuga, Y Koshio, T Kumita, K Matsumoto, M Nakahata, K Nakamura, K Okumura, A Sakai, M Shiozawa, J Suzuki, Y Suzuki, T Tomoeda, Y Totsuka (✓ Spokesperson)  
 TOKYO U, INS - E Ichihara, S Miyamoto, K Nishikawa  
 KEK - K S Hirata, K Kihara, Y Oyama  
 TOKAI U, SHIBUYA - T Horiuchi, M Koshiba, K Nishijima  
 KOBE U - T Suda, A T Suzuki  
 NIIGATA U - T Ishizuka, K Miyano, H Okazawa  
 OSAKA U - T Hara, Y Nagashima, M Takita, T Yamaguchi  
 TOKYO INST TECH - Y Hayato, K Kaneyuki, T Suzuki, Y Takeuchi, T Tanimori  
 GIFU U - S Tasaka  
 TOHOKU U - K Fujita, S Hatakeyama, M Koga, S Maruyama, A Suzuki  
 MIYAGI U OF EDUCATION - S Mori

Accelerator NONE Detector Counter

Reactions

$\nu e^- \rightarrow \nu e^-$  —  
 $\bar{\nu}_e p \rightarrow n e^+$  —

Particles studied  $p, n, \text{monopole}, \mu\text{on}, \nu$

Brief description A 3000-ton water Čerenkov detector, 2700 m of water equivalent underground. The KAMIOKANDE-I detector has been upgraded with new electronics, TDC's, and

one thousand 20-inch phototubes surrounded by aluminized reflectors. Studies nucleon decays, solar, supernova, atmospheric and high-energy cosmic neutrinos, high-energy muons, etc. The second phase was completed in April 90, the third phase started in October 90. Data taking officially ended in April 96, but the detector is still capable of recording possible supernova neutrinos. Data analysis in progress (July 96).

Journal papers NIM 205 (1983) 443, JPSJ 54 (1985) 3213, JPSJ 54 (1985) 4065, PRL 56 (1986) 991, JPSJ 55 (1986) 711, JPSJ 55 (1986) 3786, PR D34 (1986) 902, PRL 58 (1987) 1490, PRL 59 (1987) 2604, PR D36 (1987) 3537, PL B205 (1988) 416, PRL 61 (1988) 385, PRL 61 (1988) 2653, PR D38 (1988) 448, PL B220 (1989) 308, PRL 63 (1989) 16, PR D39 (1989) 1481, ASTJ 359 (1990) 574, PRL 65 (1990) 1297, PRL 65 (1990) 1301, PL B270 (1991) 89, PRL 66 (1991) 9, JPSJ 60 (1991) 2808, PR D43 (1991) 2843, PR D44 (1991) 617, PR D44 (1991) 2220, PR D44 (1991) 2241 [erratum: PR D45 (1992) 2170], NIM A320 (1992) 310, PL B278 (1992) 217, PL B280 (1992) 146, PL B283 (1992) 446, PL B289 (1992) 463, PR D45 (1992) 3355, NIM A329 (1993) 299, PL B311 (1993) 357, NP (PROC SUPPL) 31 (1993) 105, PR D48 (1993) 5505, NIM A340 (1994) 612, PL B335 (1994) 237, ASTJ 435 (1994) 225, and PL B374 (1996) 238.

Related experiments KEK-261A

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WWW Home-page

<http://www-sk.icrr.u-tokyo.ac.jp/doc/kam/index.html>

### UNDERGROUND-SUPERKAMIOKANDE

(Proposed 1986, Approved 1991, Began data-taking Apr 1996, In progress)

#### THE SUPER-KAMIOKANDE SOLAR NEUTRINO AND NUCLEON DECAY DETECTOR

TOKYO U, ICRR - Y Fukuda, T Hayakawa, K Inoue, K Ishihara, K Ishino, Y Itow, T Kajita, J Kameda, S Kasuga, Y Koshio, K Martens, M Miura, M Nakahata, M Oketa, K Okumura, M Ota, N Sakurai, M Shiozawa, Y Suzuki, Y Takeuchi, Y Totsuka (✓ Spokesperson)  
 KEK - J Kanzaki, K Nakamura, Y Oyama, M Sakuda, O Sasaki  
 TOHOKU U - K Fujita, A Hasegawa, T Hasegawa, S Hatakeyama, T Iwamoto, T Kinebuchi, M Koga, T Maruyama, H Ogawa, M Saito, A Suzuki, F Tsushima  
 TOKAI U, HIRATSUKA - M Eto, M Koshiba, K Nishijima  
 OSAKA U - A Kusano, Y Nagashima, M Takita, T Yamaguchi  
 NIIGATA U - T Ishizuka, Y Kitaguchi, H Koga, K Miyano, H Okazawa, M Takahata  
 TOKYO INST TECH - Y Hayato, Y Kanaya, K Kaneyuki, Y Watanabe  
 GIFU U - S Tasaka  
 MIYAGI U OF EDUCATION - M Mori  
 KOBE U - S Echigo, M Kohama, A T Suzuki  
 TOKYO U, INS - E Ichihara, T Inagaki, K Nishikawa, A Sakai  
 BOSTON U - M Earl, E Kearns, S B Kim, M Messier, J L Stone, L R Sulak, K Yoshida  
 BROOKHAVEN - M Goldhaber  
 UC, IRVINE - T Barszczak, W Gajewski, P G Halverson, J Hsu, W R Kropp, L R Price, F Reines, H W Sobel  
 CAL STATE, DOMINGUEZ HILLS - K Ganezer, W Keig  
 GEORGE MASON U - R W Ellsworth  
 HAWAII U - J Flanagan, J Learned, S Matsuno, V Stenger  
 LOS ALAMOS - T J Haines  
 LOUISIANA STATE U - E Blaufuss, R Sanford, R Svoboda, M R Vagins  
 MARYLAND U - M L Chen, Z Conner, J A Goodman, G Sullivan  
 SUNY, STONY BROOK - J Hill, C K Jung, C Mauger, C McGrew, B Viren, C Yanagisawa  
 WARSAW U - D Kielczewska  
 WASHINGTON U, SEATTLE - V Chaloupka, J George, A Stachyra, L Wai, J Wilkes, K Young

Accelerator NONE Detector SUPER-KAMIOKANDE

Brief description Uses a 50,000-ton ring imaging water Čerenkov detector at a depth of 2700 m of water equivalent (mwe) in the Kamioka Mozumi mine in Japan. The detector consists of

## SUMMARIES OF NONACCELERATOR EXPERIMENTS

a stainless steel tank in the shape of a right circular cylinder, 39 m diameter and 41 m height, filled with purified water. It is optically segmented into an inner volume, and an outer (anti-coincidence) region. The inner region is viewed by 11,200 photomultiplier tubes (PMT's). The outer annulus is used to tag entering muons as well as to attenuate low-energy  $\gamma$ 's and neutrons. The outer region is viewed by 1,800 PMT's. Taking data (July 96).

Related experiments KEK-362

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WWW Home-page <http://www-sk.icrr.u-tokyo.ac.jp/>

### UNDERGROUND-KGF

(Began data-taking Oct 1980, Completed data-taking 1992)

#### THE KOLAR GOLD FIELD EXPERIMENT

TATA INST - H Adarkar, S R Dugad, S D Kalmani,  
M R Krishnaswamy, J D Kulkarni, M G K Menon, N K Mondal,  
P S Murty, P Nagaraj, V S Narasimham ( $\checkmark$  Spokesperson),  
B Satyanarayana, B V Sreekantan  
OSAKA CITY U - Y Hayashi, N Ito, S Kawakami, T Mitsuyama,  
T Nakamura, K Tanaka  
KANAGAWA U - S Miyake

Accelerator NONE Detector Calorimeter

Particles studied  $p, n$

Brief description Phase-I of the experiment was completed in 1985. The phase-II detector is a 260-ton iron tracking calorimeter with 60 layers of proportional counter tubes, 6600 m of water equivalent underground. A monopole detector has been added in phase-III. Studies nucleon decays and searches for magnetic monopoles and point sources of high-energy  $\nu_{\mu}$ 's. Completed in 1992.

Journal papers PL B106 (1981) 339, PL B115 (1982) 349, PL B142 (1984) 99, NC 9C (1986) 167, NIM A284 (1989) 422, and PL B267 (1991) 138. No further papers expected.

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### UNDERGROUND-LVD

(Proposed 1984, Approved Apr 1985, Began data-taking Jun 1992, In progress)

#### SEARCH FOR STELLAR-COLLAPSE NEUTRINOS WITH THE LARGE VOLUME DETECTOR

##### LVD COLLABORATION

ASHIKAGA INST TECH - K Saitoh  
BOLOGNA U - P Antonioli, G Bari, M Basile, F Bersani,  
G Bonoli, G Bruni, G Cara Romeo, L Cifarelli, F Cindolo,  
A Contin, L Emaldi, C Ghetti, P Giusti, F Grianti, G Iacobucci,  
M L Luvisetto, T Massam, R Nania, A Pesci, G Sartorelli,  
M Selvi, A Zichichi ( $\checkmark$  Spokesperson)  
BROWN U - A Bosco, A De Silva, M Widgoff  
CAMPINAS U - J A Chincellato, L G Dos Santos, E Kemp,  
N Mengotti Silva, A Turtelli  
FRASCATI - F L Fabbri, G Maccarrone, L Votano  
GRAN SASSO & INFN, ASSERGI - N Taborgna  
HOUSTON U - K Lau, B Mayes, L Pinsky, J Pyrlík, R Weinstein  
INDIANA U - E D Aleya  
MIT, LNS - M Deutsch, E S Hafen, P Haridas, I A Pless, J Tang  
NORTHEASTERN U - J Moromisato, E Von Goeler  
MOSCOW, INR - V S Berezinsky, V L Dadykin, R I Enikeev,  
F F Khalchukov, E V Korolkova, P V Kortchaguin,  
V B Kortchaguin, V A Kudryavtsev, A S Malguin, V G Rysany,  
O G Ryazhskaya, V P Talochkin, V F Yakushev, G T Zatsepin  
OKAYAMA U - S Tsuji, T Wada  
OKAYAMA UNIV SCI - I Yamamoto  
PERUGIA U & INFN, PERUGIA - B Alpat, I Uman  
SAITAMA U - N Inoue  
TURIN, COSMO-GEOFISICA LAB & TURIN U & INFN,  
TURIN - C Aglietta, G Badino, M Bertaina, R Bertoni,  
C Castagnoli, A Castellina, A Chiavassa, W Fulgione,

P Galeotti, P Ghia, R Granella, C Melagrana, C Morello,  
G Navarra, L Panaro, L Periale, P Picchi, O Saavedra,  
G C Trincherò, P Vallania, S Vernetto, C Vigorito  
URBINO U & INFN, FLORENCE - G Conforto, P Dominici,  
G Guidi, R Mantovani, A Megna, S Santini, F Vetrano

Accelerator NONE Detector Scintillator, Streamer chamber

##### Reactions

$\bar{\nu}_e p \rightarrow e^+ n$	—
$\nu C \rightarrow \nu C \gamma$	—
$\bar{\nu} C \rightarrow \bar{\nu} C \gamma$	—
$\nu e^- \rightarrow \nu e^-$	—
$\nu_e C \rightarrow e^- \text{Nit}$	—
$\bar{\nu}_e C \rightarrow e^+ \text{Bor}$	—

Particles studied  $p, n, \text{muon}, \nu$

Brief description The experiment is located in the Gran Sasso Laboratory at a minimum depth of about 3300 mwe. The apparatus consists of a streamer tube tracking system interleaved with a large volume of liquid scintillator and its support structure which acts as a passive absorber. It is a high precision tracking calorimeter with the major part of its volume sensitive, and with the sensitive elements uniformly distributed. Of the five towers which will constitute the complete LVD, the first one is operational since June 92 and the second one since June 94. The main features of an LVD tower are: surface area 660 m<sup>2</sup>, geometrical acceptance 1768 m<sup>2</sup> sr, and liquid scintillator mass 368 tons. The major purpose of the experiment is to search for neutrinos from stellar collapses in our galaxy. Other physics goals include: measurement of the atmospheric neutrino flux and search for neutrino oscillations, study of the spectrum and interactions of cosmic ray muons and muon bundles, and investigation of events detected in time coincidence with the EASTOP experiment at the surface of the mountain. Taking data (July 96).

Journal papers NC C9 (1986) 237, NIM A264 (1988) 5, NIM A274 (1989) 177, NIM A277 (1989) 11, NIM A277 (1989) 17, NIM A295 (1990) 466, NC 105A (1992) 1793, NC 105A (1992) 1815, NIM A329 (1993) 521, NP (PROC SUPPL) 31 (1993) 450, NP (PROC SUPPL) 35 (1994) 240, NP (PROC SUPPL) 35 (1994) 243, NP (PROC SUPPL) 35 (1994) 259, NP (PROC SUPPL) 35 (1994) 267, ASPP 2 (1994) 103, ASPP 3 (1995) 311, and NC 18C (1995) 628.

Related experiments MACRO, KAMIOKANDE, SU-PERKAMIOKANDE

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### UNDERGROUND-MACRO

(Proposed 1984, Approved Apr 1985, Began data-taking Feb 1989, In progress)

#### MONOPOLE, ASTROPHYSICS, AND COSMIC RAYS OBSERVATORY

##### MACRO COLLABORATION

BARI U & INFN, BARI - R Bellotti, F Cafagna, M Calicchio,  
M Castellano, L De Benedictis, G De Cataldo, C De Marzo,  
O Erriquez, C Favuzzi, P Fusco, N Giglietto, P Guarnaccia,  
M N Mazziotta, T Montaruli, A Raino, P Spinelli  
BOLOGNA U & INFN, BOLOGNA - S Cecchini, H Dekhissi,  
R Fantini, G Giacomelli ( $\checkmark$  Spokesperson), F Maaroufi,  
G Mandrioli, S Manzoor, A Margiotta-Neri, L Patrizii, V Popa,  
P Serra-Lugaresi, M Spurio, V Togo  
BOSTON U - E Kearns, C Okada, C Orth, J L Stone, L R Sulak  
CAL TECH - B C Barish ( $\checkmark$  Spokesperson), E Katsavounidis,  
S Kyriazopoulou, N Longley, D G Michael, R Nolty, C W Peck,  
K Scholberg, C W Walter  
DREXEL U - C Lane, R Steinberg  
FRASCATI - G Battistoni, H Bilokon, C Bloise, M Carboni,  
V Chiarella, C Forti, E Iarocci, A Marini, V Patera, F Ronga,  
L Satta, A Sciubba, M Spinetti  
GRAN SASSO - R Antolini, A Di Credico, A Grillo, C Gustavino,  
S Mikheyev, S Parlati, J Reynoldson, E Scapparone  
INDIANA U - C Bower, A Habig, A Hawthorne, R Heinz,  
L Miller, S Mufson, J Musser

## SUMMARIES OF NONACCELERATOR EXPERIMENTS

AQUILA U - I De Mitri, P Monacelli  
 LECCE U & INFN, LECCE - P Bernardini, G Mancarella,  
 D Martello, O Palamara, S Petrera, P Pistilli, A Surdo  
 MICHIGAN U - R Baker, S Coutu, K Hanson, D Levin, M Longo,  
 G Tarle  
 NAPLES U, IFS & INFN, NAPLES - M Ambrosio,  
 G C Barbarino, D Campana, F Guarino, G Osteria, U Rubizzo  
 PISA U & INFN, PISA - A Baldini, C Bemporad, F Cei,  
 G Giannini, M Grassi, D Nicolo, R Pazzi  
 ROME U - G Auriemma, S Bussino, M De Vincenzi, E Lamanna,  
 P Lipari, C Satriano, M Severi  
 TEXAS A AND M - A Sanzgiri, R Webb  
 TURIN U & INFN, TURIN - V Bisi, A Marzari-Chiesa, M Mon-  
 teno, M Sitta

Accelerator NONE Detector MACRO

Particles studied monopole, muon,  $\nu$

Brief description The MACRO detector has been primarily designed to conduct a search for supermassive grand unified magnetic monopoles. It is a general purpose detector, which is also searching for nuclearites, WIMP's, fractional charge particles,  $\nu_e$  from stellar gravitational collapses, high-energy  $\nu_\mu$ 's from cosmic sources, etc. It is studying high-energy cosmic ray muons (vertical intensity, seasonal variation, moon shadow, anisotropy, possible muon astronomy), cosmic ray composition at high energies, atmospheric neutrinos, etc. Operates in coincidence with an air shower array (EASTOP) to study the primary cosmic ray composition at high energies. The detector has six supermodules in two levels, each instrumented to operate independently of the others. Each lower supermodule consists of a horizontal array of two layers of liquid scintillation counters, ten layers of limited streamer tubes, one layer of CR39 nuclear track detectors and seven layers of absorbers. The upper part (Attico) has four horizontal layers of streamer tubes and one layer of scintillators. The sides are covered with one layer of scintillators and 6 layers of streamer tubes. The CR39 detector is also mounted on the east vertical side and on the north lower side. The global dimensions are  $12 \times 76 \times 9 \text{ m}^3$  and it contains 600 tons of liquid scintillator. The detector is located in Hall B of the Gran Sasso Laboratory. Has an overhead shielding of about 3800 m of water equivalent. Taking data in its full configuration (July 96).

Journal papers NC 9C (1986) 281, NIM A281 (1989) 213, PR D42 (1990) 1396, PL B249 (1990) 149, NIM A300 (1991) 581, NIM A301 (1991) 275, NP (PROC SUPPL) 24B (1991) 191, NIM A321 (1992) 609, PRL 69 (1992) 1860, ASPP 1 (1992) 11, PR D46 (1992) 895, PR D46 (1992) 4836, NP B370 (1992) 432, NIM A324 (1993) 337, ASTJ 412 (1993) 30, PL B337 (1994) 376, PRL 72 (1994) 608, PRL 73 (1994) 1306, PR D50 (1994) 3046, PL B357(1995) 481, ASPP 4 (1995) 33, and PR D52(1995) 3793.

Related experiments CERN-WA-086, CERN-EMU-018

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### UNDERGROUND-SAGE

(Proposed 1964, 1984, Approved 1985, Began data-taking May 1988, In progress)

#### THE RUSSIAN-AMERICAN GALLIUM SOLAR NEUTRINO EXPERIMENT (SAGE)

##### SAGE COLLABORATION

MOSCOW, INR - J N Abdurashitov, V N Gavrin  
 (✓ Spokesperson), S V Girin, V V Gorbachev, T V Ibragimova,  
 A V Kalikhov, N G Khairnasov, T V Knodel, I N Mirmov,  
 A A Shikhin, E P Veretenkin, V M Vermul, V E Yants,  
 G T Zatsepin

LOS ALAMOS - T J Bowles (✓ Spokesperson), J S Nico,  
 W A Teasdale, D L Wark

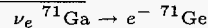
WASHINGTON U, SEATTLE - S R Elliott, J F Wilkerson

PENN U - B T Cleveland, T Daily, R Davis, K Lande, C K Lee,  
 P W Wildenhain

LOUISIANA STATE U - M L Cherry

Accelerator NONE Detector GGNT

##### Reactions



Particles studied  $\nu_e$

Brief description Uses the Gallium-Germanium Neutrino

Telescope (GGNT) situated in an underground laboratory built in the Baksan Neutrino Observatory, Northern Caucasus, Russia. Has an overhead shielding of about 4700 m of water equivalent. Sensitive to the low energy neutrinos produced by the pp fusion in the Sun. Exploits the radiochemical procedure and uses liquid metallic gallium (30 tons in the first stage, 57 tons in 1991). A purification procedure, implemented beginning with the January 90 extraction, resulted in a significant background reduction. The SAGE-II phase began in September 92. Counts the K and L peaks in  $^{71}\text{Ge}$  decay, with 57 tons of Ga and low background. A calibration with a  $^{51}\text{Cr}$  artificial neutrino source of about 0.5 mC activity was carried out in 1995. Taking data (July 96).

Journal papers PRL 67 (1991) 3332, and PL B328 (1994) 234.

Related experiments GALEX, BOREXINO

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### UNDERGROUND-SOUDAN-2

(Proposed 1981, Approved 1983, Began data-taking 1988, In progress)

#### THE SOUDAN-2 PROTON DECAY EXPERIMENT

ARGONNE - D S Ayres, T H Fields, M C Goodman, E N May,  
 L E Price, R V Seidlein, J L Thron, J L Uretsky

MINNESOTA U - C R Bode, P M Border, H Courant,

D M DeMuth, R Gran, S M S Kasahara, N P Longley,

M L Marshak (✓ Spokesperson), W H Miller, L Mualem,

E A Peterson, K Ruddick, M H Schub, V Vassiliev, G Guillaume,  
 S Wakely

OXFORD U - W W M Allison, C B Brooks, J H Cobb,

H M Gallagher, D H Perkins, A Stassinakis, N West, U Wielgosz

RUTHERFORD - G J Alner, D J A Cockerill, R J Cotton,

P J Litchfield, G F Pearce

TUFTS U - B Ewen, T Kafka, W Leeson, W A Mann,

R H Milburn, A Napier, W Oliver, J Schneps, N Sundaralingam

WESTERN WASHINGTON U - W L Barrett

Accelerator NONE Detector Calorimeter

Particles studied p, n,  $\nu_e$ ,  $\nu_\mu$

Brief description A 960-ton iron tracking calorimeter uses drift projection tubes arranged in a hexagonal array. The tubes are 15 mm in diameter separated by 1.6 mm of steel. Trigger thresholds are 100 MeV kinetic energy for muons and 150 MeV for electrons. The main detector is completely surrounded by a 1700 m<sup>2</sup> active shield of proportional tubes which identifies events associated with cosmic ray muons. A charged particle test-beam calibration of the 4.3-ton calorimeter modules has been completed. A surface array and an air Cerenkov detector are operated in coincidence with the SOUDAN-2 detector to provide information about the air showers which produce underground muons. The experiment is located in the Soudan mine, Minnesota, 2090 m of water equivalent underground. The data taking began in mid-1988 when 275 tons of the detector were installed. The detector was completed in late 1993. Physics topics include studies of nucleon decay, atmospheric neutrinos and neutrino oscillations, cosmic ray composition, and searches for magnetic monopoles and point sources of cosmic rays. Taking data (July 96). The collaboration has also proposed the use of the SOUDAN-2 detector for a long baseline neutrino oscillation experiment MINOS (see FNAL-875).

Journal papers NIM A276 (1989) 371, NIM A283 (1989) 642, PR D42 (1990) 2967, JPHY G17 (1991) S393, PL B269 (1991) 220, NP (PROC SUPPL) 28A (1992) 377, PR D46 (1992) 4846, PR D52 (1995) 2760, and NIM A376 (1996) 36.

Related experiments FNAL-822, FNAL-875

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## SUMMARIES OF NONACCELERATOR EXPERIMENTS

### UNDERGROUND-SUDBURY

(Proposed 1985, Approved 1990, In preparation)

#### THE SUDBURY NEUTRINO OBSERVATORY (SNO)

##### SNO COLLABORATION

QUEENS U, KINGSTON - E P Bonvin, L Erhardt, H C Evans, G T Ewan (✓ Spokesperson), R J Ford, A L Hallin, A Hamer, C J Jillings, H W Lee, J R Leslie, J D MacArthur, H B Mak, A B McDonald (✓ Spokesperson), W McLatchie, B Moffat, T J Radcliffe, B C Robertson, P Skensved, R L Stevenson  
 CHALK RIVER, AECL - E D Earle, J D Hepburn, G Jonkmans, B Sur  
 CRPP, OTTAWA - W F Davidson, F Delnoki-Varess, C K Hargrove, K McFarlane, T Noble, V M Novikov, M O'Neill, M Shatkey, D Sinclair  
 GUELPH U - T Anderson, M C Chon, P Jagam, J Law, R Ollerhead, J J Simpson, J X Wang  
 LAURENTIAN U - J Bigu, E D Hallman, R U Haq, J G Hykaway, A Roberge, E Saettler, C J Virtue  
 BRITISH COLUMBIA U - R Helmer, R Komar, A Poon, C Waltham  
 PENN U - E W Beier (✓ Spokesperson), D Cowen, W Frati, J R Klein, D McDonald, F M Newcomer, R Van de Water, R Van Berg, J Wang, P Wittich  
 LOS ALAMOS - T J Bowles, S J Brice, M M Fowler, A Goldschmidt, A Hime, P Thornewell, J B Wilhelm, J M Wouters  
 LBL - Y D Chan, M P Isaac, K T Lesko, M E Moorhead, E B Norman, A R Smith, R G Stokstad  
 WASHINGTON U, SEATTLE - Q R Ahmad, J Beck, M C Browne, P J Doe, C Duba, S R Elliott, J V Germani, R Meijer-Drees, R G H Robertson, T D Steiger, J F Wilkerson  
 OXFORD U - J C Barton, S Biller, M G Bowler, X Chen, G Doucas, H D Heron, N A Jelley (✓ Spokesperson), A B Knox, W J Locke, J J Lyon, N W Tanner (✓ Spokesperson), R K Taplin, M D Thorman, P T Trent, D L Wark, N West  
 BROOKHAVEN - J Boger, R L Hahn, J K Rowley

Accelerator NONE Detector Counter

##### Reactions

$\nu e^- \rightarrow \nu e^-$	---
$\nu_e \text{ deut} \rightarrow p p e^-$	---
$\nu \text{ deut} \rightarrow p n \nu$	---
$\bar{\nu}_e \text{ deut} \rightarrow n n e^+$	---
$\bar{\nu}_e p \rightarrow n e^+$	---

##### Particles studied $\nu$

Brief description The detector is a 1000-ton heavy water ( $D_2O$ ) Čerenkov detector designed to study neutrinos from the Sun and other astrophysical sources. The use of heavy water allows both electron neutrinos and all other types of neutrinos to be observed by three complementary reactions. The detector will be sensitive to the  $\nu_e$  flux and energy spectrum shape and to the total neutrino flux irrespective of neutrino type. These measurements will provide information on both vacuum neutrino oscillations and matter-enhanced oscillations, the MSW effect. In the event of a supernova it will be very sensitive to  $\nu_\mu$  and  $\nu_\tau$  as well as the  $\nu_e$ 's emitted in the initial burst, enabling sensitive mass measurements as well as providing details of the physics of stellar collapse. The underground cavity is complete and equipment is being installed. The detector is scheduled to be filled with heavy water in Spring 1997. In preparation (July 96).

Journal papers NC 9C (1986) 308, PL B194 (1987) 321, NIM A314 (1992) 373, and NIM A370 (1996) 579.

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### UNDERICE-AMANDA

(In preparation)

#### ANTARCTIC MUON AND NEUTRINO DETECTOR: AMANDA

##### AMANDA COLLABORATION

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 BARTOL RESEARCH INST - T C Miller

Accelerator NONE Detector PMT

##### Particles studied $\nu$

Brief description AMANDA is a high-energy neutrino observatory which uses the deep South Pole ice as a target and a track-sensitive, transparent detecting medium. Upward moving neutrinos, having passed through the Earth, interact with ice and produce muons. The muons generate Čerenkov radiation which can be recorded by photomultiplier tubes (PMT). The tubes are placed in vertical shafts melted into the icecap to the depth of 1720 m. The data acquisition is handled in a counting facility at the surface. As of July 96, a total of 173 operating PMTs has been installed. The plan is to have at least 800 optical modules operating before the end of the century. Under construction (July 96).

Journal papers NATU 353 (1991) 807, and SCI 267 (1995) 1147.

Related experiments BAIKAL, DUMAND, NESTOR

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### UNDERWATER-BAIKAL

(Proposed 1984, Approved Jan 1987, Nov 1992, Began data-taking 1993, In progress)

#### THE LAKE BAIKAL DEEP UNDERWATER NEUTRINO TELESCOPE, NT-200

##### BAIKAL COLLABORATION

MOSCOW, INR - L B Bezrukov, B A Borisovets, I A Danilchenko, Z A M Djilkibaev, G V Domogatsky (✓ Spokesperson), A A Doroshenko, A A Garus, A M Klabukov, S I Klimushin, B K Lubsandorzhev, A I Panfilov, D P Petukhov, P G Pokhil, I A Sokalski  
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Accelerator NONE Detector Counter

##### Particles studied $\nu$ , muon, monopole

Brief description The deep-underwater Čerenkov detector NT-200, effective area of about 2000 m<sup>2</sup>, will consist of 192 optical

## SUMMARIES OF NONACCELERATOR EXPERIMENTS

modules arranged on 8 strings at 1100 m depth. The modules are equipped with 37-cm QUASAR phototubes. The experiment studies muons generated in neutrino interactions or in reactions of primary cosmic rays in the atmosphere, and searches for GUT magnetic monopoles. Measures the neutrino flux from the Earth atmosphere, searches for neutrinos from cosmic sources and from WIMP annihilations in the center of the Earth. A part of the detector consisting of 36 optical modules has operated in 1993/94. A 72-module version took data from Apr 95 to Mar 96, and the 96-module detector (half of the NT-200) began taking data in Apr 96.

*Journal papers* NP (PROC SUPPL) 14B (1990) 51, NP (PROC SUPPL) 19 (1991) 388, YF 52 (1990) 86 = SJNP 52 (1990) 54, NP (PROC SUPPL) 28B (1992) 491, NP (PROC SUPPL) 35 (1994) 290, NP (PROC SUPPL) 35 (1994) 301, NP (PROC SUPPL) 43 (1995) 241, and NP (PROC SUPPL) 48 (1995) 463.

*Related experiments* AMANDA, DUMAND, NESTOR

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### UNDERWATER-DUMAND

(Proposed 1988, Approved 1990, In preparation)

#### DEEP UNDERWATER MUON AND NEUTRINO TELESCOPE

##### DUMAND-II COLLABORATION

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T Narita, D Nicklaus

*Accelerator* NONE *Detector* Counter

*Particles studied* muon,  $\nu$ , monopole

*Brief description* In the first stage of the experiment

(DUMAND-I), a test of the operation of 7 phototube modules was carried out. Measurements were made with a vertical string of modules suspended from a ship. Phase-II was approved in 1990. The plans called for an octagonal 9-string array, 24 tubes per string, to be built by 1995. The array called DUMAND-II was to be located at a depth of 4760 m, 25 km off the coast of the Hawaiian Islands. For more details see the DUMAND-II proposal (U. of Hawaii report, HDC-1-88). The aim of the experiment is to build a system capable of searching for point sources of high-energy neutrinos of astrophysical origin, and very-high-energy cosmic ray muons. Other systems to be studied include WIMP's, quark nuggets, and monopoles. The detector is a 2-megaton Čerenkov counter, with a muon area of 20,000 m<sup>2</sup>, and an angular resolution of 1°. Initial installation took place in December 93, and proof data was acquired. As of June 94, three strings are ready to be installed. However, a SAGENAP report

of June 96 recommends cancellation of funding for the project, despite endorsement of its goals and feasibility. Other sources of support are being sought (July 96).

*Journal papers* NIM A276 (1989) 359, and PR D42 (1990) 3613.

*Related experiments* BAIKAL, AMANDA, NESTOR

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*WWW Home-page* [http://web.phys.washington.edu/local\\_web/dumand/aaa\\_dumand\\_home.html](http://web.phys.washington.edu/local_web/dumand/aaa_dumand_home.html)

### UNDERWATER-NESTOR

(In preparation)

#### NESTOR: A NEUTRINO PARTICLE ASTROPHYSICS UNDERWATER LABORATORY FOR THE MEDITERRANEAN

NESTOR COLLABORATION

*Accelerator* NONE *Detector* Counter

*Particles studied*  $\nu$

*Brief description* NESTOR is a detector for underwater neutrino astrophysics. It is located in the international waters off the southwest coast of Greece. The first phase of the project calls for the construction and deployment of a hexagonal tower with 168 optical modules and an effective area of 20,000 m<sup>2</sup> suitable for the detection of TeV neutrinos. When completed, the full NESTOR array will have six additional towers in a hexagonal configuration, providing a sensitive area bigger than 100,000 m<sup>2</sup> for 1 TeV neutrinos, and an overall angular resolution better than 1°. The first tower is under construction and is expected to be deployed in 1997. For further information about the project please contact the Spokesperson, Prof. Leonidas K. Resvanis [Athens U.]

*Related experiments* BAIKAL, DUMAND, AMANDA

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