

CERN/LEPC 96-3

LEPC 42

10 June 1996

LEP EXPERIMENTS COMMITTEE

Minutes of the 42nd meeting,
29 May 1996

OPEN SESSION

1. Conclusions of the Chamonix workshop

S. Myers reported on the outcome of the Chamonix VI workshop in January 1996. Based on the good experience at higher energies last year, the luminosity goal for LEP2 of 500 pb^{-1} over a 3-year period is considered well within reach. A large vertical beam-beam tune shift, $\xi_y = 0.05$, and a small betatron coupling parameter (emittance ratio), $\kappa^2 = 0.005$, were measured at 65 GeV. These measurements and others indicate that a peak luminosity of $10^{32} \text{ cm}^{-2}\text{s}^{-1}$ may eventually be reached at LEP2, with a peak bunch current of 1 mA/bunch. The machine will be operated in future with a maximum of 4 x 2 bunches per beam.

2. Status of LEP2

C. Wyss presented a progress report on the shut-down work for LEP, where the installation of a large number of superconducting (sc) rf modules is almost completed. The successful operation last year of 64 sc rf cavities (16 modules) in the LEP ring confirms that the system is well understood and the major problems are solved. The maximum centre-of-mass energy of LEP is expected to progress as follows: 161 GeV in June 1996 (144 sc + 120 warm rf cavities installed), 176 GeV in October 1996 (172 + 120 cavities), 188 GeV in June 1997 (240 + 86 cavities), and 192 GeV in May 1998 (272 + 52 cavities)—marking the completion of LEP2–PhaseIV. (These are “operational” energies, which allow for some sc rf modules to be down.)

3. Summary of results from the 130-140 GeV run

P. Fisher summarised the physics results of the four LEP detectors from the November 1995 run. This provided data samples of 5 pb^{-1} per experiment at energies between 130 and 140 GeV. Two interesting anomalies have emerged. ALEPH has observed an excess of 4-jet events, which show a jet-pair mass peak at 53 GeV of 10 events, with an expected background of 2 events. None of the other experiments observes this peak; the total observed events in the peak region is 7 with an expected background of 5. The second anomaly is from OPAL, which finds an excess of $\mu^+\mu^-q\bar{q}$ events: 5 observed and 0.6 expected. Again, the other detectors do not observe any excess. At this level of statistics, the signals can be neither confirmed nor ruled out; the new data at 160 GeV should, however, provide definitive answers.

4. LEP2 Workshop reports

Machine-physics interface	François Richard
Summary of physics groups	Fabio Zwirner
Event generators	Stavros Katsanevas

The highlights of the LEP2 Workshop (CERN 96-01, Vol. 1 & 2) were presented. An impressive amount of theory and simulation work has been carried out, and some ongoing refinements are in progress (such as understanding “colour reconnection” and its influence on the W mass measurement involving direct reconstruction of the di-jet mass peak).

CLOSED SESSION

Present: S. Bethke, W. Blum, M. Calvetti, J.D. Dowell (Chairman), L. Foà, B. Foster, P. Hansen, K. Hübner, G. Kantardjian, J. Kirkby (Secretary), K.-H. Kissler, T. Lohse, B. Mansoulié, R. Marshall, G. Matthiae, R. Mount, S. Myers, J. Panman, L. Pape, I. Videau, P. Wells, D.O. Williams, P. Zerwas and F. Zwirner.

Part time: D. Stickland and S.C.C. Ting.

Apologies: W. Hollik and M. Klein.

1. Approval of the minutes of the 41st meeting

The minutes of the 41st meeting (LEPC 95-10/LEPC 41) were approved without modification.

2. Chairman's report

The Chairman welcomed the new members of the LEPC: T. Lohse, R. Marshall and the chairman-elect, P. Zerwas. He reported that LEP2-PhaseIV was approved by Council in December 1995.

3. Discussion on aspects of the open session

The committee took great pleasure in congratulating the machine teams for their excellent progress in preparing for the run about to start at 161 GeV—especially concerning the installation of a large number of additional sc rf cavities and associated equipment.

The committee also thanked the organizers and participants in the LEP2 workshop, which has generated a fine blueprint for the expected physics at LEP2 and has very well prepared the physics community for the real data. Physics interest continues to push at the highest energy of LEP2 and the committee expressed its interest to closely follow any new developments in the physics case for further energy increases beyond 192 GeV.

Regarding beam energy calibration at LEP2, the desired precision is $\sigma(E_b) < 15$ MeV. Although this should be achievable with resonant depolarization, there are considerable uncertainties associated with the amount of polarization at higher energies and with the precision of the necessary extrapolation to different energies. Initial studies were made at the workshop of a new technique—Möller scattering on a jet target—which potentially can measure the beam energy to a precision of a few MeV. The committee expressed its wish to be kept informed of any developments of this approach.

4. Discussion on Z^0 calibration data during LEP2 operation.

Following a request from L3, the chairman invited D. Stickland and S.C.C. Ting to present further details to the committee on the L3 request for Z^0 calibration data. The calibration of the inner tracking detector (TEC) requires 4 pb^{-1} of Z^0 data; with only 1 pb^{-1} the impact parameter resolution is worse by a factor 1.5 (this assumes a good “starting point” calibration from the previous year). After a long discussion, the committee decided that L3 should be approved to receive its full requirement of calibration data in future years, 1997-1999, but that there would be only 1 pb^{-1} of Z^0 calibration data per experiment this year, near the beginning of the run in June. The reason for restricting the Z^0 calibration data this year is that the cycle is relatively short and a primary physics goal is to measure the W mass, for which the impact parameter resolution (b tagging) is less critical than is the case for new-particle searches.

5. Report from the LEP Co-ordinator

The LEP Co-ordinator, P. Wells, presented a report on the expected LEP operation in 1996, which is broken into two periods by a seven week technical stop to install additional sc rf cavities. The maximum number of days for physics will be about 48 days in the first period at 161 GeV, followed by about 24 days in the second period at 176 GeV. The estimated luminosities are about 30 pb^{-1} and 15 pb^{-1} , respectively.

6. A.O.B.

The Chairman warmly thanked the outgoing members of the LEPC, B. Foster, G. Matthiae and F. Zwirner.

At the close of the meeting, the Research Director thanked John Dowell for his wise chairmanship of the LEPC during an important stage in the development of the accelerator from LEP1 to LEP2. He welcomed Peter Zerwas as the incoming Chairman.

7. Next LEPC meeting

The dates of the next meeting of the LEPC are **Tuesday-Wednesday, 19-20 November 1996**. In addition, the dates **Thursday-Friday, 12-13 September 1996** are being kept in reserve if the need should arise for an earlier meeting.

J. Kirkby