2001

Department of Physics Newsletter: Spring 2001

Gerry Peterson

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UMASS

Department of Physics Newsletter

University of Massachusetts Amherst

Spring 2001

The First Endowed Chair in Physics: The Robert L. Gluckstern Professorship

The Department of Physics is excited to be receiving its first endowed Professorship. Appropriately, it is named in honor of a pivotal figure in Department history, Robert L. Gluckstern. It is to be funded by Robert's son Steven, with matching funds from the Commonwealth.

The Gluckstern Era

In 1964, Gluckstern was hired away from Yale University to become our department head at UMass. His mission was to build a department befitting a modern research university. Before his arrival there were 11 faculty members and very little research activity. Five years later, there were 45 faculty and more than $1 million in research funding in all of the key areas of physics. This spectacular transformation was almost single-handedly due to Bob Gluckstern. Bob would hear of a talented physicist who fit into his plan for the Department, and would attempt to land him or her. His vision shaped the Department's future.

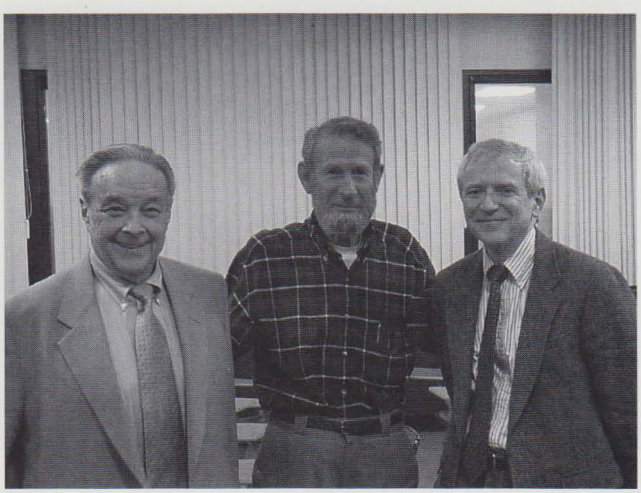
Bob was an ideal department head. He would often stop by one's office and inquire about teaching, about research, and about how he might be of help. The lights in the Hasbrouck fourth floor head's office would often be burning into the night. It was a time of intense activity when committee meetings often had to be scheduled for Saturday mornings.

Other Challenges

After his success in building our Department, Bob moved on to other challenges, serving as Provost and Vice Chancellor for Academic Affairs at UMass from 1969 to 1975. He then became the Chancellor of the University of Maryland System for the years 1975-82, after which he returned to full time teaching and research. Following his retirement in 1997, he has continued to work on his research interests in accelerator physics.

UMass Festivities

On Friday, March 30, Bob gave a talk about his current theoretical research on halos in accelerator beams. This was followed by a reception that gave Bob the opportunity to meet again with the many faculty members that he had hired and whose lives he has positively influenced. In addition, since Steven Gluckstern was a graduate of the UMass School of Education, he also funded a Professorship in honor of former Dean Dwight Allen of the School of Education. On the following day the University hosted a reception and dinner in honor of both of the Glucksterns and of Allen. Decisions about awarding the Gluckstern Professorship will be made during the coming year.



Bob Gluckstern (left) with Phil Jones (center) and Bob Hallock (right) at a reception for Gluckstern. Jones, who retired in 1993, was a professor here when Gluckstern arrived, and was one of Hallock's teachers. Hallock currently is interim Dean of the College of Natural Science and Mathematics.

Inside

University of Massachusetts
Physics Newsletter

Editors: Gerry Peterson
Bob Krotkov
Mary Ann Ryan
Kristine Reopell

This newsletter has been sent to more than 1,100 alumni and alumnae who received degrees in physics from UMass from the 1940's to the present, as well as to former staff and faculty, all of whom have rendered their mark upon our department through those six decades. This first edition cannot be comprehensive, but can only give a glimpse of the many facets of our department. For more information, visit our website at
http://www.physics.umass.edu/

We would appreciate your comments about how we can improve our next newsletter, and what you would like to read about. Also please send us some information about you, self, either by returning the enclosed card, by phoning **(413)545-2545**, or by sending e-mail to
newsletter@physics.umass.edu

A Letter from the Department Head

Dear Alumni and Friends,

Welcome to the first issue of our newsletter! This is our way of keeping in touch with the many students who have gone through our degree programs. We will tell you about some of the events and changes at UMass, and we hope that you will return the favor by letting us hear from you.

We are proud of our physics program. The alumni office tells us that our former students are working in all sectors of the economy. Business leaders say that they want people who are broadly educated because jobs will continue to change, and because it is important to be able to adapt. In these regards, physics is an ideal major. As a UMass alumnus (Ph.D., 1976) and a parent of a UMass student, I know firsthand the value of a UMass education.

We continue to have a strong research program thanks to the efforts of the many faculty hired in the Gluckstern Era. But many of those faculty are now retiring, and are probably the ones that most of you remember. We will miss their many contributions even as we welcome new, energetic, young faculty to take their places.

Our department continues to update its teaching program by introducing innovations, as is discussed elsewhere in this newsletter. Computational physics has been adopted as part of our curriculum by adding a required sophomore course and by adding a new course at the graduate level. The undergraduate course allows the use of computational methods in the advanced courses of the junior and senior years. A review of laboratory courses is also underway.

The Department also has recently undergone structural change. UMass now boasts separate departments of physics and astronomy after many years as a joint department. In today's university, with its emphasis on interdisciplinary cooperation, this is not as much of a change as it might seem to be, as we have many students with dual majors, we share courses, attend each other's seminars, and remain collegial. However, the change gives Astronomy its separate identity and allows Physics to focus on its own issues. It is symbolic that "our" Nobel Prize in 1993 was shared by Joe Taylor of the Astronomy Program and Russell Hulse of the Physics Program (see page 7).

My fellow faculty and staff join me in extending our best wishes to all of our friends and former students.

Sincerely,
John Donoghue, Head

Hasbrouk Laboratory: New (left), Old (right)

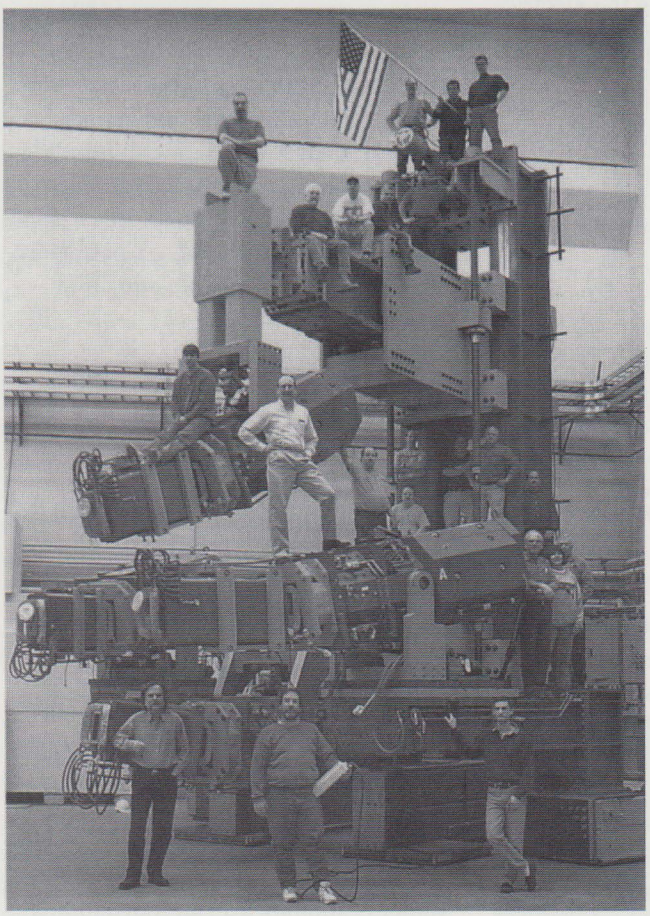
RESEARCH

OOPS! We Stretched the Protons!

A recently completed experiment, led by UMass physicists at the MIT-Bates Linear Accelerator, has measured how much a proton "stretches" when an external electric or magnetic field is applied by scattering electrons from it. This will aid in understanding the strong interaction, which binds the quarks in the proton together.

Electrons with energies of up to 670 MeV (million electron volts) struck a cryogenic target of liquid hydrogen. Protons from the reaction were detected by a set of unique instruments, the Out-of-Plane Spectrometers (OOPS), and the scattered electron in another spectrometer. In most nuclear physics experiments, all of the particles produced in the reaction are detected in a single plane, parallel to the floor of the experimental hall. This is because the magnetic spectrometers, devices used to detect and analyze the particles, typically weigh several hundred tons, and it would be very difficult to lift them outside of this plane. The OOPS spectrometers, however, have been designed to be small and light and, with a complex support structure, can be placed accurately in space far outside the usual scattering plane. This out-of-plane detection capability allowed for a great reduction in unwanted background events.

The experiment was also notable for being the first to use the new Bates Pulse Stretcher Ring. In many nuclear physics experiments, including this one, two particles from a reaction are detected in separate spectrometers and the arrival times of these particles are used as a first step in separating good events from background. If the particles were both produced in the same reaction, their arrival time in the spectrometers should be strongly correlated. However, the electron beam from the linear accelerator is pulsed, i.e., it is "on" only 1% of the time. This creates a problem. When a large number of electrons hit the target in the small time interval of a beam pulse, many events occur that are closely correlated in time. Most of the events are not of the reaction under study. It is far better to deliver the same number of electrons, but to have them spread out in time. This is exactly the function of the pulse stretcher ring. It takes beam pulses from the linac, stretches them out in time, and then delivers the electrons continuously onto the target. It effectively stretches time.



OOPS, the Out-of-Plane Spectrometer System

Commenting on the experiment, **Research Assistant Professor Jeff Shaw**, experiment spokesman, said, "Even though we are only in the preliminary stages of data analysis, the experiment has already generated considerable interest in the world-wide nuclear physics community." Dr. Shaw continued, "The atmosphere at Bates is very hands-on, which is not always the case at larger facilities. While we do world class research here, the scale of the experiments is small enough that our students can become involved in all aspects of the experiment. This gives our students a great deal of practical experience, and fosters a 'can-do' attitude that will serve them well in the future." UMass graduate student Paul Bourgeois, who will base his doctoral thesis on the experiment, agreed, saying, "Hands-on experience is the best teacher. I've learned a lot about all aspects of the experiment, from instrumentation to data analysis. The skills I've developed during my time at UMass will be invaluable in future experiments and in my career."

The experiment was conducted by a collaboration of physicists from the United States, Japan and Greece.

Disordered Condensed Matter Physics

The sixties were the Big Bang, the Gluckstern Era. Those faculty hired then are now retiring and a new generation is coming in. Among these is **Narayanan Menon**, who arrived in 1998 from UCLA and Chicago. He is an experimentalist, interested in out-of-equilibrium systems. For example, one of his students is measuring the electric polarization produced in certain liquids by electric fields applied at low temperatures and high pressures. When the field changes, the polarization adjusts very slowly, just as glass in old cathedral windows slowly flows downward over the centuries. Is there a phase transition or just very slow relaxation?

Some recent work with postdoc Florence Rouyer on "gases" of agitated steel balls was recently highlighted in the *Scientific American* ("Science and the Citizen" in the Jan. 2001 issue) and in the Focus newsletter of the American Physical society (http://focus.aps.org/v6/st16.html). In the modern style of doing physics his research is interdisciplinary. He is associated with the Materials Research Science and Engineering Center here at UMass, and collaborates with Professor Nalini Easwar at Smith. As seen from across the hall by your correspondent, he has both graduate students and many undergraduates working with him. He is always there talking to them. How does he get anything done? His wife is also a physicist and is now teaching at Mt. Holyoke. They have one child.

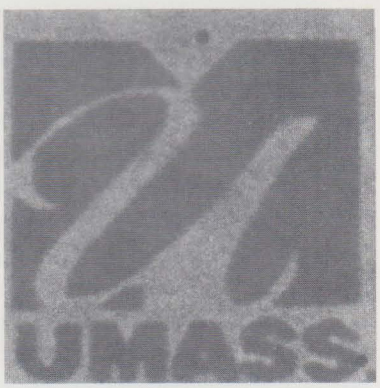
BK

Menon in his lab. The apparatus is to study crumpling.

Nanoscale Condensed Matter Physics

Nano-science and nano-engineering are hot topics these days. A recent addition to our department, **Professor Mark Tuominen**, works in these fields. One of the things he has done (though not here) is to show experimentally that given a billion or so electrons on a metal island you can measure whether the number is odd or even! At UMass his work is strongly inter-disciplinary; there are collaborations with IBM, the Chemistry Department, and also Polymer Science and Engineering. One of the main thrusts is to exploit a nano-fabrication technique which has been developed with the polymer scientists, and which can be used to produce a polymer film pierced by a regular array of long, thin, narrow (about 10 nanometer) channels. Patterns can be written on the array, as shown in the UMass logo. The channels can be filled with other materials, for example, cobalt, to produce a dense, regularly spaced array of very fine wires. Such arrays are very promising for use in various devices such as high-density magnetic storage, nanoelectrode arrays for electrochemical sensing, and many others. Another line of research is nano-shuttles, which are a nano-version of the "Franklin's Bells" demonstration commonly shown in introductory electricity courses. He works extensively with undergraduate students and has won an "outstanding teacher" award for his development of an interactive digital-video training system for the research electronics course. He was one of the organizers of a national conference sponsored by the NSF on nano-science. (http://www-unix.oit.umass. edu/~nano/) His wife and children are very much into community theater and he has often been pressed into service there (not too reluctantly).

BK



An example of the work done in Professor Tuominen's Laboratory, this logo was written on a closely spaced array of empty pores in a polystyrene film, and was read by an atomic force microscope. Filling the pores with, for example, cobalt, creates a forest of pillars which promises to have many interesting and practical properties.

Diamonds and Charm

An international team of about 50 physicists led by UMass Research **Professors Peter Bosted** and **Steve Rock** plans to use paper-thin slices of diamonds to learn about charm, but a different kind of charm than what is usually meant by the word. In this case, charm is the name given to one of the six elementary particles known as quarks. The diamond crystals will be used as a kind of diffraction grating. A beam of high-energy electrons (50 GeV) from the Stanford Linear Accelerator will hit the diamonds and radiate high-energy photons. For certain crystal orientations, it is possible to produce well-defined beams of these photons.

The photon beams will be directed onto a target nucleus, which of course is made up of protons and neutrons (nucleons). The nucleons in turn are made up of more common quarks called "up" or "down" quarks that are held together by exchange particles called "gluons." If a high-energy photon interacts with a nucleon, and a gluon participates too, a pair of charmed quarks can be produced. Using this type of interaction, three separate experiments are to be carried out that may take up to three years to complete.

In one of the experiments the production of J/psi particles (made up of pairs of bound charmed quarks) on different size nuclei, e.g. carbon and lead, will be studied. In this way they will learn about how the J/psi interacts with the other nucleons on its way out into free space. The results should be of great interest to other physicists who are searching for a form of matter called the quark-gluon plasma that filled the universe when it was less than a second old. The signature of the plasma's existence is the observation of a change in the rate of J/psi particles coming from very energetic head-on collisions between heavy nuclei such as those of gold.

A second experiment is designed to study how the gluons contribute to the spin of nucleons. All nucleons spin about their axes with the smallest amount of spin allowed by quantum mechanics. The question is: "How do the spinning quarks and gluons inside the nucleon add and subtract from one another to give the nucleon its spin?" We have already learned quite a bit about the up and down quark contribution to this puzzle by scattering spin-oriented (polarized) electrons from polarized nucleons in the 1990's. Similarly we plan to study the gluon contribution through the reaction in which a high energy polarized photon merges with a gluon to form two unbound charmed quarks. Eventually one of these charmed quarks decays into a muon (like a very heavy electron) that will be detected.

The diamond crystal, is at the heart of these experiment. Stay tuned. In a couple of years we should have results, and we will tell you about the third experiment too. As the popular song goes, "A diamond is a girl's best friend". Perhaps a physicist's too.

Teaching

Undergraduate Program

In October of 1998, the American Physical Society held a conference aimed at rejuvenation of undergraduate physics programs in the U.S. to counter declining enrollments in physics courses and in the number of students majoring in physics. Fortunately our Department had already started to revise its program by having three tracks for our majors: Professional, Applied, and General. We have also developed a course in Computational Physics that is required of all majors, we have substantially increased undergraduate participation in research, and we continue to have student-run freshman seminars and outreach programs. Our undergraduate recruitment is aided by a freshman residential program that places up to 24 astronomy, chemistry and physics majors on the same floor of the Washington Residential Tower to share living and learning experiences. In 2000, 13 of these students were physics majors, and half of their upperclassmen mentors were physics majors. The University's Commonwealth College has also played an important role in bringing in strong students interested in physics. The number of declared Physics majors was 20, 13, 20, and 20 for the freshman to senior classes for the 2000-2001 academic year.

Undergraduates Jon Ricci, Jon Celli, and John Savage helped to build this detector wheel to be used in a high energy nuclear physics experiment.

Graduate Program

We are very pleased to have an energetic, talented, and diverse group of 58 students in our graduate program, including a number of German exchange students. Generally after completing a set of core courses, and passing the qualifying exams, our students begin research. Some undertake theoretical research here on campus, and others experimental research in the Hasbrouck Laboratory, the Lederle Graduate Research Center, and the new Polymer Science Building. Still others move to some of our nation's large accelerator facilities to pursue experimental subatomic physics research. As we recruit new faculty members with a variety of research interests, the opportunity for graduate research broadens, and at the same time stays current. Because of this dynamic situation there are always opportunities for more graduate students to do front-line research.

Active Learning in Large Science Courses

"How can we teach better?" is a question that four faculty members in our department, **Bob Dufresne, Bill Gerace, Bill Leonard** and **Jose Mestre**, are answering by using a classroom communication system called *Classtalk* to make a large lecture more like a small class, with feedback from students to professor. Students use hand-held calculators to sign on to a classroom network over which they respond to questions posed by the professor. A computer processes the responses and displays a summary of the answers on a screen. Professor and students then engage in a dialog: Students discuss and argue for their answers, while other students offer counter-arguments. The class is run like a workshop, with students actively grappling with the physics concepts, and the instructor coaching students and offering mini-lectures to clear up points of confusion. Passively sitting through lectures is out. Attendance has improved and the failure rate in large courses has been reduced. The method is spreading to other departments (Biology, Sociology, and Economics). Last year, the *Classtalk* initiative was one of eleven finalists in the Academic Excellence and Cost Management national competition of the American Council on Education.

Other projects include *Minds-on Physics*, a recently published high school curriculum based on conceptual understanding and active learning. The group also has grants to explore the use of assessment in classroom instruction and of web-based homework. Its members remain active on the national scene, serving on numerous boards and committees.

STEMTEC

More and better-prepared science and math teachers! How do we produce them? STEMTEC - the Science, Technology, Engineering, and Mathematics Teacher Education Collaborative led by **Professor Emeritus Mort Sternheim** - is providing an answer.

The five-year $5,500,000 NSF funded project that began in 1997 included the Five Colleges and three area community colleges; now 21 Massachusetts colleges are involved. The "student program" includes scholarships, teaching experiences, and a pre-education program.

Future elementary teachers typically select their profession early in their college careers, so it is straightforward to direct them to suitable math and science courses. However, prospective physics teachers and other secondary science and math teachers generally decide to teach close to the time of their graduation, or later. Reaching them in their content courses requires reforming as many science and math courses as possible. Note that Massachusetts students cannot major in education; they need an arts and sciences major. Secondary teachers major in their discipline, and certification is usually post B.S.

STEMTEC offered workshops to 175 college science, math, and education faculty. STEMTEC courses incorporate cooperative-, project-, and problem-based learning, alternative assessment, and educational technology. Many courses offer teaching experiences: students work with peers or pre-college students. These experiences encourage students to think about teaching careers.

The pre-education program includes STEMTEC courses, a seminar on teaching and learning, an education or psychology course, and teaching experiences. Future elementary teachers gain strength in science and math, and future secondary teachers get a chance to explore teaching and acquire credentials that can be applied to certification programs. STEMTEC also awards $100,000 per year in scholarships for future science and math teachers. It is searching for funds to continue the pre-education and scholarship programs once the NSF funding has ended.

Outreach and Service

Radon Project

With the twin purpose of providing our students valuable practical experience in the real world, and to foster a spirit of public service in them, an outreach program of Indoor-Radon measurement has been established (**Professor Sastry**). The program involves students in the Radiation Physics Course (Phys. 530) as an integral part of the course. This on-going project has so far served about 500 residential homes in the greater Amherst area, at no cost to the homeowner. Major contributors to this work include **Shahriar Mehrtash** (2000, Biology, Chancellor's Citation, 1999); **Dimitriy Fridman** and **Kang Lu** (1999, Senior Honors, Summa-cum-Laude, Physics). The project has been well received by the students and the public at large.

Physics Faculty Currently Serving in Administration

Frederick Byron, Jr.:
Interim Vice Chancellor for Research
John Dubach:
Now Interim Deputy Chancellor; formerly Associate Chancellor, Office of Information Technologies
Robert Hallock:
Acting Dean, College of Natural Sciences and Mathematics
Michael Kreisler:
Division Leader, Atomic, Nuclear, Particle Physics, Lawrence Livermore National Laboratory
David Scott:
Chancellor of the University of Massachusetts Amherst
James Walker:
Associate Dean of the Graduate School and Associate Dean of the College of Natural Sciences and Mathematics (He finds time to teach the Physics of Music course, too!)

People

Where are they now?

In 1993 **Joe Taylor** and **Russell Hulse** were awarded the Nobel prize for research done here at UMass. (http://www.almaz.com/nobel/nobel.html) The radio telescope at Quabbin Reservoir just outside Amherst was one of the first large telescopes to conduct pulsar searches. (The telescope was originally built on a shoestring out of used telephone poles and chicken wire ordered from Sears.) The discovery of the binary pulsar, for which the Nobel Prize was awarded, was actually at the Arecibo telescope in Puerto Rico, where Taylor and Hulse took some of their receiving equipment. Detailed observations of the radio pulses emitted provided precise tests of Einstein's theory of gravity ("General Relativity"). Such observations are still the most direct way to test the theory's prediction that oscillating masses emit gravitational radiation.

Both men are now at Princeton University: Taylor is Dean of the Faculty and Hulse is at the Princeton Plasma Physics Laboratory.

Taylor (left) and Hulse (right) at a press conference after announcment of their Nobel Prize.

Joe Taylor seems to do everything: his research group is a leader in finding and studying new pulsars, he is a Dean, and he chairs national committees on Astronomy.

After obtaining his Ph.D. from UMass in 1975, Russell Hulse was a postdoc at the National Radio Astronomy Observatory, and since 1977 has been at the Princeton Plasma Physics Laboratory, where he is head of the Advanced Modeling Sciences Laboratory. He maintains a connection with us in that he is a member of the advisory committee to the Dean of the Faculty of Natural Sciences and Mathematics (who is temporarily one of ours, Prof. R. Hallock).

Faculty Honors (since 1999)

American Physical Society (APS)

Professor Po-Zen Wong has been elected a fellow of the APS "for studies of disordered magnetic systems, porous media, and random interfaces." About one-half of one-percent of the membership is elected to fellowship each year for their contributions to the advancement of physics.

For the year 2000, **Research Professor Raymond G. Arnold** received the highest honor in nuclear physics bestowed by the APS, the Tom W. Bonner Award. His citation reads: "For his leadership in pioneering measurements of the electromagnetic properties of nuclei and nucleons at short distance scales that addressed the fundamental connection of nuclear physics to Quantum Chromodynamics and motivated new experimental programs."

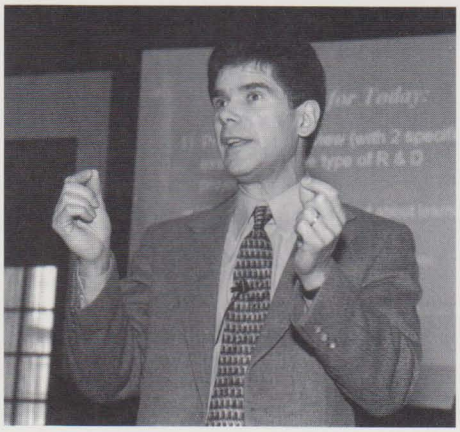
Amherst Campus Honors:

The University's TEACHnology Fellow Award
1999 **William Mullin**

The University's Distinguished Faculty Lecturers
2000-2001 **Jose Mestre**

Outstanding Teaching Award
2000 **Mark Tuominen**

Outstanding Academic Advisor
2001 **James F. Walker**



Jose Mestre delivering his University Distinguished Faculty Lecture "What Makes Learning Science So Difficult?"

Faculty Retired

(from 1984)	
John Brehm	12/97
Ben Crooker	6/87
Stan Engelsberg	5/00
Norm Ford	8/86
Phil Jones	8/93
Bob Krotkov	12/97
Al Mathieson	10/84
Bill Mullin	5/00
Arthur Quinton	8/94
Gerry Peterson	5/00
Hajime Sakai	6/97
Janice Shafer	12/97
Ed Soltysik	8/90
Mort Sternheim	12/97

Faculty Deceased

David Inglis	1995
Phil Rosen	1992
Bill Ross	1975
Klaus Schultz	2000
John Strong	1992
David Van Blerkom	2001

Graduate Student Awards (Since 1998)

Arthur R. Quinton Award

To recognize outstanding teaching assistants (Endowed by Professor Quinton)

1998 Otilia Gabor
1999 Moataz Eman
2000 Pablo Marrero

Eugene M. Isenberg Award

For students who show a commitment to the interrelation of science or engineering and management

1998 Justin Hermann
1999 Chong Jiang
1999 Yung Ho Kahng
1999 Ilija Dukovski
2001 Xuenan Li

Xiaodong Jiang received an award from U.S. Secretary of Energy Bill Richardson for achievement in graduate student research at the MIT-Bates Linear Accelerator Center. Jiang is now a postdoctoral research associate at Rutgers University.

Undergraduate Awards (Since 1999)

The Barry M. Goldwater Scholarship

Awarded nationally to students pursuing careers in mathematics, the natural sciences and engineering.

2001 Jonathan Celli

(Celli is a junior jointly majoring in physics and music (organ). He hopes to become a physics professor at a research university.)

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The Kandula Award

For academic excellence, leadership, and potential for future contributions to physics (Endowed by Prof. Kandula Sastry)

1999 Paul Silva
1999 Thomas Vanderveld
1999 Matthew L. Breuer
2000 Christian M. Guertin
2000 Zeke Kaufman
2000 Zheng Wang
2001 Elizabeth K. Clark
2001 Thomas C. Moran
2001 Melissa M. Motew

The Hasbrouck Scholarship

In honor of Philip B. Hasbrouck, Professor of Physics and Registrar from 1911 until his death in 1925: Open to junior and senior physics majors.

1999 John D. Cummings
1999 Ryan B. Duvally
2000 Kristine M. Brown
2000 Ryan S. McWilliams
2001 Jonathan P. Celli

Staff News: Secretarial

Many of us have fond memories of the Office Staff who over the years typed our letters, tests, and purchase orders on a typewriter, often in triplicate. Although the computer has taken the place of the typewriter, and many tasks are performed on-line, with some improvement in efficiency, the total amount of work has not diminished.

Nellie Bristol was secretary in the Department from 1956 until 1987. She tells us that she is enjoying retirement in North Amherst, although she does miss meeting her old departmental friends. Nellie's successor in the Head's office, **Jackie (Golonka) Bell**, after a few years became the Business Manager for the Radio Astronomy effort. She now lives on Diamond Point Island off the coast of Maine where she and her husband are in the process restoring a beautiful and very old home. **Betty Orloski** (was there ever a faster typist?) still lives in Whately, but is able to spend a long winter vacation in Florida each year. She is still a big Red Sox fan. **Stella Rewa** does not get out much these days, but she has a daughter living nearby, and is visited each day by a good friend and by the "Meals on Wheels" program. We have lost touch with **Selma May** whom you probably remember as the cheerful bookkeeper in the first floor office in Hasbrouck. It is thought that she is still living in Gilbertville. **Jan (Peene) Van Pelt** resides in Amherst and works at National Evaluation Systems. She says she is looking forward to summer and getting back to gardening. **Charlotte Pekarski** may be retired, but you'd never know it if you saw her at work at her specialty meat business in South Deerfield. Sometime she intends to take a vacation and to use the fishing gear she received when she retired. **Diana LaRue (formerly Diana Coppa)**, stopped by in March to say hello. She now lives in Cody, Wyoming where she and her husband own a 4 1/2-acre "ranchette." **Doris Atkins**, who was the Nuclear Physics secretary for many years, is still in Amherst, although she and her husband Bill have sold their 12-acre home for something smaller and more manageable. After several years of traveling and cruising, they are "busy doing nothing" and enjoying it. **Dianne Quilty**, who took over for Doris, lives in rural North Carolina and works at the Bank of America in Charlotte. She is looking forward to moving even further south to Florida to be nearer to good "bird watching." We still often see **Judy Ksieniewicz**, who worked for the High Energy Experimental Group. She has since moved to the Department of Mathematics and Statistics on the 16th floor of the GRC Tower. Similarly **Terri Grzybowski**, who was with us faithfully in the physics program for a long time when we were a joint Department of Physics and Astronomy, is now in the new Department of Astronomy. We see her often, but miss her office with its abundant greenery.

Perhaps you would like to send a card or note to one of your above friends. If so, the Department will be very happy to forward it.

Arthur R. Quinton

(Editors Comment: The next edition of this newsletter will feature our very talented machinists and technical staff, who are so essential in a modern university physics department that must have an experimental research orientation in addition to its usual teaching functions.)

Alumni News

Matthew Breuer (B.S. '00) has stayed on at UMass as a graduate student in the medium-energy nuclear physics group. As an undergraduate he worked in Prof. Mark Tuominen's Nanotechnology Laboratory, and for that work he co-authored articles in Physical Review Letters and the American Journal of Physics . He comes from a background outside of physics: before returning to work on the B.S. degree, Matt operated his own business as a systems analyst, and provided software consulting, tutoring and training on a national basis for over ten years. Previous work experience includes technical sales of electronic components and laser research crystals. He initially obtained a bachelor's degree in studio art in 1979 from Lehman College of the City University of New York. As co-founder of a non-profit scientific-educational organization in New York City in 1980, he took part in developing and implementing programs that brought together artists, scientists, and philosophers in various projects, and sat on the board of directors for seven years. Born in Oregon, he has lived in the eastern U.S. for over 25 years and currently resides with his wife Barbara in Amherst.

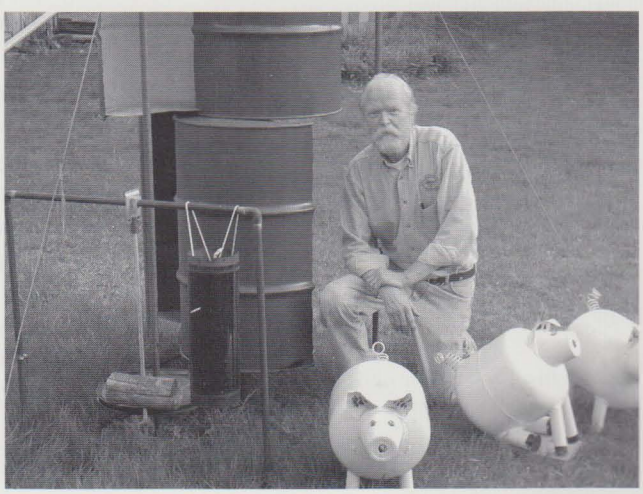
Jay Flanz (Ph.D. '79) After building a magnet system and using it for 180 degree electron scattering studies for his thesis work at the M.I.T.-Bates Linear Accelerator Center, Jay joined the M.I.T. staff in constructing a beam recirculator facility that doubled the beam energy from 500 MeV to 1 GeV. Later he was in charge of building a beam storage/pulse-stretcher ring at Bates. (see page 4, Ed.) At the same time he developed a hands-on accelerator instrumentation and beam optics course for the U.S. Particle Accelerator Physics School (USPAPS). In 1993 Jay left M.I.T. to build and serve as Technical Director of a Proton Therapy Facility for treating cancerous tumors at the Massachusetts General Hospital. He is now developing a new course in Medical Applications of Accelerators for USPAPS. Jay met his wife Nancy at UMass. They now have two sons, Adam and Scott, who just might be aspiring scientists. (flanz @hadron.mgh.harvard.edu)

Jill Foley (B.S. '98) is in her third year of the Ph.D. program in plasma physics at Princeton University. She is greatly enjoying her thesis work in developing a Motional Stark Effect diagnostic with laser induced fluorescence for measuring magnetic fields in plasmas. She is the recipient of a Fannie and John Hertz Foundation Fellowship. (efoley@princeton.edu).

Dan Grubbs (M.S. '95) writes: I was last seen leaving UMass with an M.S. in hand somewhere around the Spring of '95. I didn't get very far as I'm still in Shutesbury (No, that's not the same as Shrewsbury). Due to familial inertia, (a wife and 4 kids, (warning: don't try combining this with grad school)), I found that I couldn't leave the area. The job prospects for physicists in the area were meager, so I tried my hand at computer programming, but with no "work experience," or a degree in the field, I could not get in the door anywhere. This led to my writing a program for doing 3D graphics, and it turned out that my algorithm for the 3D rendering engine was at least 10 times faster than anyone else's for comparable quality. Now I am writing software for designing boxes. I enjoy it, and they actually pay me money to do it! I'm quite active at the local Friends' Meeting, and am director of the Franklin County Chapter of the Fatherhood Coalition. So it goes...

Yury Kolomensky (Ph.D. '97, M.S. '94), B.S., St. Petersburg Technical University, Russia '91, received the American Physical Society Award in nuclear physics for his thesis entitled "Precision Measurement of the Neutron Spin-Dependent Structure Functions" for work done at the Stanford Linear Accelerator Center. He then received the Robert A. Millikan Postdoctoral Fellowship at the California Institute of Technology. On July 1, 2000, he was appointed Asst. Professor at the University of. California, Berkeley. (yury@SLAC.Stanford.EDU)

Dan Krause (Ph.D. '72) writes us that since receiving his degree he has been working at Amherst College. For about ten years he worked closely with Bruce Benson studying gas solubilities in liquids and says he has finally learned some thermodynamics. This work was initially motivated by a desire to understand processes occurring in the ocean and other natural environments.



Dan Krause on his South Amherst lawn, with Propane Pigs (foreground) and a Whirligig (above and behind him). When wind makes the Whirligig go round, the wooden mallet melodiously strikes the chime in front of it. He also has a scale model of the solar system.

The next ten years were spent in collaboration with Larry Hunter, working on various laser and atomic physics problems. Initial (and continuing) efforts were directed toward setting better limits on the electric dipole moment of the electron. Other work has included precision measurements of the Stark shifts of alkali atoms, tests of local Lorentz invariance, examination of the spin-mass coupling in the axion window, and measurements of relativistic effects in a rotating, magnetic, dielectric cylinder. At present Dan is head of the Amherst College machine shop, where he gets to participate in all of the experimental research projects. In his spare time he adorns his entire South Amherst neighborhood with "lawn art": a scale model of the solar system, propane pigs, whirligigs, rusty bats, a trebuchet, and so much more.

Carol Livermore (B.S. '93) went on to graduate school at Harvard. There she earned her M.S. in 1995 and her Ph.D. in 1998, writing her dissertation about experiments on the interactions between coupled quantum dots. In 1998 she took a postdoctoral position at M.I.T. working on power MEMS in the Microsystems Technology Laboratories. She is currently a Research Scientist at M.I.T. and is working on the development of button-sized microelectrical generators for portable power applications.

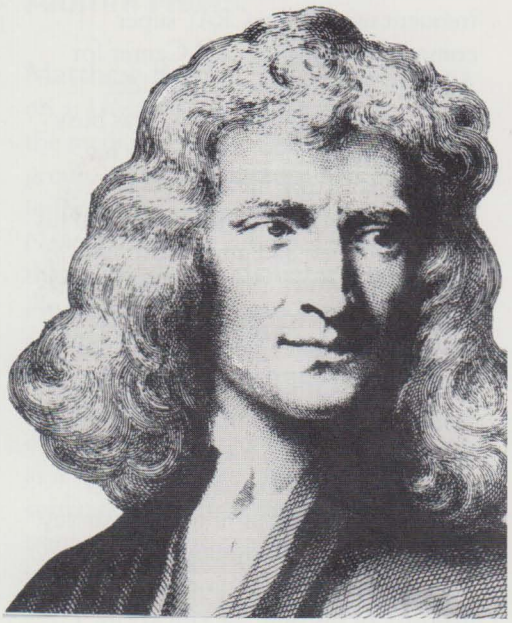
Paul Nakroshis (Ph.D. '94) whose thesis was on an experimental test of the "Fifth Force" writes: Since leaving UMass, I spent two years at Clark University as a postdoc in physics education and also spent time developing experiments for a new course at Clark. I taught for two years at Souhegan High School in Amherst, NH, and then left for a tenure track position at the University of Southern Maine in Portland, Maine. I am in my fourth year here, and am studying the dynamics of stick-slip oscillations in granular media with two undergraduate majors. In addition, I am supported by a NSF grant to improve the quality of science education for our education students. On a personal note, I am getting married to Meg Clews in August, and we have recently bought a house in Bridgton, Maine.

Dandamudi V. Rao (Ph.D., '72) was awarded the Loevinger-Berman Award of the Society of Nuclear Medicine (2000) for excellence in medical internal radionuclide dosimetry. Earlier in 1989, he was the recipient of the Royal Swedish Medical Society Medal for his contributions to the dosimetry of internal Auger-electron-emitting radionuclides. His work led to a greater understanding of the radiobiological effects of these radionuclides. Professor Sastry was Dr. Rao's advisor for his graduate studies. After 25 years of distinguished service as Professor of Radiology, University of Medicine and Dentistry, Newark, NJ, Dr. Rao recently retired for reasons of health. Congratulations, Dan, on your achievements. We wish you and the family all the best.

John Savage (B.S., Feb. 2001) will stay on at UMass working toward a Ph.D. in physics. He especially likes the open-door policy in the department and the ready availability of faculty to discuss physics issues. John is married and is the father of a two-year old son. Both he and his wife grew up in the Northampton area, so he has two sets of family to help care for his son when exam time nears.

Bill Schoenfeld (Ph.D. '94) after finishing his degree in Atomic Physics/ Solar Spectroscopy under the guidance of Prof. Edward Chang, headed west for a postdoc, joining the atmospheric spectroscopy group at the University of Denver (DU). While there, he spent time analyzing stratospheric infrared absorption spectra recorded by DU during their balloon flights and was a frequent user of the CRAY super computer at the National Center for Atmospheric Research in Boulder. When not doing physics, he was busy learning to ski, and challenging his stamina by hiking up 13 and 14 thousand foot peaks with his son on his back. After two and a half years as a postdoc he joined the Physics Department of Manhattan College in New York City as an Assistant Professor. Since joining the Department he has taught nearly the complete spectrum of courses offered, from introductory engineering physics, to junior level mechanics, as well as non-major survey courses in both astronomy and geology. While prep and class time occupies the majority of his time, he still keeps sporadic contact with his former thesis advisor to discuss research projects of mutual interest. Bill and wife Susan Bourque (the former UMass Craft Center Director) live 35 miles north of New York City along the Hudson River with their two sons Noah (6) and Gabriel (4).(wschoenf@manhattan.edu)

Zenon Szalata (Ph.D. '76) has been at the Stanford Linear Accelerator Center (SLAC) since receiving his Ph.D., first as a research professor in the American University Group, and since '99 as physicist engineer for SLAC. He is still involved with various UMass projects, such as the current experiment E158: "A Precision Measurement of the Weak Mixing Angle in Moller Scattering." (zms@SLAC.Stanford.EDU)



$$\nabla \cdot \epsilon_0 \mathbf{E} = \rho$$

$$\nabla \times \frac{\mathbf{B}}{\mu_0} = \mathbf{J} + \frac{\partial \epsilon_0 \mathbf{E}}{\partial t}$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

$$\nabla \cdot \mathbf{B} = 0$$

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