2003

Department of Physics Newsletter: Spring 2003

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Department of Physics Newsletter

University of Massachusetts Amherst

Issue 3, Spring 2003

- A NEW HEAD -

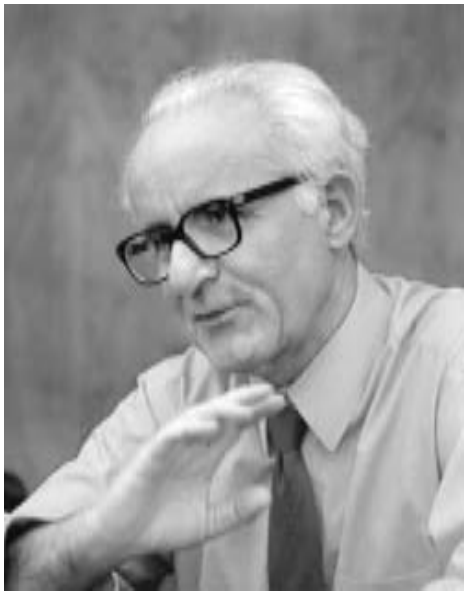
Professor Jonathan (Jon) Machta became our Department Head on July 1, 2002. He obtained his B.S. at Michigan in 1975, his M.S. at Illinois in 1976, his Ph.D. at MIT in 1980, and has been at UMass Amherst since 1982. Jon is a theoretical condensed matter physicist who specializes in statistical and computational physics. On page 2, in "A Letter from the Department Head," you can read about Jon's views on the status of and plans for the Department within the context of the fiscal conditions of the university, the state, and beyond.

Inside:

- A NEW CHANCELLOR -

On July 1, 2002, a dynamic and forceful new chancellor with a refreshing manner and a marvelous sense of humor took over the reins of our campus administration: **Dr. John V. Lombardi.** His broad academic administrative experience as the former President of the University of Florida, the Provost of Johns Hopkins University, and the Dean of International Programs and of Arts and Sciences at Indiana University should serve us well. He received his B.A. degree from Pomona College, his M.A. and Ph.D. from Columbia University, and specializes in Latin America history with an emphasis on Venezuela.

He is not a man to mince words. He emphasizes his trademark three points: (1) money matters, (2) performance counts, and (3) time is the enemy. He has urged the campus to focus on teaching and research as its core activities. But to excel in those areas, the University needs to dramatically increase its efforts in raising private funds. It also needs to compete in the academic marketplace for research grants and outstanding faculty. He has said, when it comes to money, "The Commonwealth loves us, but not enough." We can't rely on state monies.



As for performance, he serves as co-editor of a national project to measure academic performance, and he emphasizes that the campus needs to measure its forward movement. As for time, being a "romantic pragmatist," he heartily dislikes "strategic planning."

Our department gives a warm endorsement to Chancellor Lombardi and his views. We have excelled in the past, and we pledge to continue to do so under his administration.

The Academic Imperative

"Teaching and research lie at the heart of the academic imperative, and must be preserved and protected above all else. Without them, universities cease to exist."
—John V. Lombardi

On February 6 and 7 the campus community offered a series of events showcasing the array of teaching, research, and learning activities on our campus. They were days of celebration highlighting student and faculty accomplishments, honoring our supporters, and seeking additional outside support to assure us a bright future. The capstone event was the inauguration of John V. Lombardi on the 7th as chancellor of our flagship campus of the University of Massachusetts system.

- A NEW ERA -

A Letter from the Department Head

Greetings from Amherst! For much of this semester the view from my office window on the 11th floor of the Graduate Research Center Tower was of snow-covered grounds and buildings. It was a particularly hard New England winter—both meteorologically and fiscally. Our Department, however, is thriving. We have hired excellent young faculty, and our grant funding, the number of undergraduate majors, and the number of applicants to the graduate program have all increased. I am both excited and inspired by the privilege of guiding the Department for the next few years.

These are indeed perilous times for Massachusetts and UMass Amherst. Like many other states, Massachusetts faces a budget shortfall whose magnitude is unprecedented since the Great Depression. Physics has already been forced to take budget cuts for this fiscal year and there will likely be additional cuts next year. In the midst of this budgetary crisis we are grateful to welcome a dynamic and visionary new Chancellor in **John Lombardi**. He has energized the campus with an optimistic vision of the future backed by a cogent analysis of how to proceed. One of Lombardi's favorite phrases is "money matters," and he is making his first priority to bring new sources of money to the University. He points out that most first-class state universities depend far less than we on state funds and that we need to do a much better job of fund raising if we are to move ahead. Money certainly matters for our Department, and our plans for improvement depend on money that we raise from grants and from private sources. In this regard, I am extremely pleased to thank and recognize **Prof. Ed Chang** who has created a $150,000 trust for the Department and has endowed two new undergraduate prizes, one for transfer students, and the other for promising freshmen majors.

In spite of budget difficulties, and although our faculty size of 30 is smaller than it was a decade ago, our research profile is better than ever due to the addition of outstanding young faculty in high energy, nuclear, and condensed matter physics. Recent retirements have been offset by the appointment of **Alex Levine** and **Boris Svistunov**. Alex is a theoretical condensed matter and biophysicist from the University of California Santa Barbara, and Boris is a theoretical and computational condensed matter physicist from the Kurchatov Institute in Moscow.

Hard work and an entrepreneurial spirit on the part of faculty and staff have brought us several major equipment gifts. Thanks to the efforts of **Prof. Tony Dinsmore**, with the help of **Ashley Webb, Rick Wilkey, and Walt Pollard** of our shops, the Department was awarded a grant from the University President's office to acquire surplus optical and machine shop equipment valued at over $200,000. It will be used in research labs, in a new senior level optics course, and in our shops where our machinists are eager to use new computer-controlled milling machines and other equipment. In addition, computer system manager, **Joe Babcock** arranged for a gift of 100 computers for the department, and thanks to a successful proposal crafted by the Physics Education Research Group, Hewlett-Packard has donated $200,000 of mobile computing equipment to the Department for use in the *Knowledge Broker* project. Using the new equipment the group plans to develop a wireless, web-based classroom communication system that uses advanced machine learning methods. The project team includes faculty from Biology, Computer Science, Engineering, and the Isenberg School of Management.

One of our big pushes for the future is to expand our research in biophysics. **Profs. Tony Dinsmore and Alex Levine** devote part of their research effort to biophysics, and **Prof. Monroe Rabin** will continue his work in medical physics as he has done for many years. To create space for new investigators working in these areas, we are planning a major renovation of the third floor of the Hasbrouck Laboratory by adding fume hoods and new offices. We are also a participant in a large multi-department NIH grant to renovate several floors of the Graduate Research Tower to house life-science related researchers, including one biophysicist.

In undergraduate education we plan a major overhaul of our upper-level experimental courses in optics, electronics, and radiation physics. We are writing a proposal to the NSF to partly fund new equipment, but we will need substantial matching funds from private sources as well. Also, as is discussed on page 14, we intend to create an undergraduate study lounge in Hasbrouck. We welcome contributions to either of these projects.

Please keep in touch with us either through a visit to campus, an e-mail message, a phone call, or a visit to our web-site. Best wishes to all of you.

University of Massachusetts

Department of Physics Newsletter

Editors: Bob Krotkov
Tony Papirio
Gerry Peterson
Monroe Rabin
Hajime Sakai

This third issue of our newsletter is being sent to more than 1,175 of our alumni and alumnae who received degrees in physics from the 1940's to the present, and to former staff and faculty. For more information about our department, visit our website at **http://www.physics.umass.edu** Comments about the newsletter or information about yourself may be e-mailed to us at **newsletter@physics.umass.edu** or sent to the address on page 14. This newsletter was assembled by the capable hands of **Kris Reopell.**

Research

Gravity/High Energy

Two of our Physics faculty, **David Kastor** and **Jennie Traschen**, a husband and wife team, have research programs focused on gravity and its role in a unified theory of fundamental physics. In recent years this has meant studying how gravity works in the context of String Theory, currently our best candidate for a unified theory. An introduction by David and Jennie to this fascinating field of research follows.

It is often said that progress in physics is driven primarily by experiment. Historically, however, the demand for theoretical consistency has been an equally important driving force in the development of fundamental physics. Einstein's great achievements, Special and General Relativity, provide beautiful illustrations. Special Relativity came from demanding that classical mechanics and electromagnetism should work together. General Relativity then arose from the demand that Newtonian gravity be made consistent with Special Relativity.

Our current understanding of fundamental physics has two parts, the Standard Model of Particle Physics, which successfully describes the results of experiments at high energy accelerators, and Einstein's General Relativity. These two parts coexist, but fail to make a satisfying whole. The Standard Model is quantum mechanical, while General Relativity is a classical theory. We are missing an understanding of Quantum Gravity. This creates no practical problems for experimentalists because Quantum Gravity effects, which grow with energy, only become important at a fantastic16 orders of magnitude beyond the reach of current high energy accelerators (called the "Planck scale"). For theorists, however, understanding Quantum Gravity is central to the search for a unified theory. In nature, Quantum Gravity is important where spacetime curvature is very large, i.e. in the very early universe, soon after the Big Bang, and near the centers of Black Holes.

Black Holes turn out to be fertile ground for thought experiments in Quantum Gravity. Some 30 years ago, Stephen Hawking discovered that quantum effects cause Black Holes to emit thermal radiation and presumably evaporate away. Black Holes turn out to be governed by a set of laws much like those of ordinary thermodynamics. It is a longstanding problem in Quantum Gravity to understand the microscopic states of a black hole that underlie Black Hole entropy.

Rather unexpectedly, String Theory turns out to include Quantum Gravity and also the ingredients necessary to build the Standard Model. String Theory, of course, has many complications. For example, it demands that there be a total of ten spacetime dimensions. The extra six dimensions (beyond the usual one time and three spatial dimensions) must be tightly curled up so that we have not yet detected their presence. A few years ago, it was discovered that String Theory includes more than just strings. Membranes, or "Branes" of different spatial dimensions can interact via the exchange of strings and appear like higher dimensional Black Holes. In certain cases, the Black Hole entropy can then be calculated within string theory and shown to agree with Black Hole Thermodynamics.

At UMass, Professors Kastor and Traschen are currently working on a number of Brane related projects. One long term project studies how the internal six-dimensional space of string compactification is deformed when various types of branes wrap around non-contractable surfaces inside it. Another project involves a careful study of how brane tension is defined in General Relativity, with the goal of understanding the role it plays in Black-Brane thermodynamics.

There is one more aspect of the experience of Professors Kastor and Traschen that mirrors a current problem in many departments at UMass and other universities. This involves the way that universities treat couples, both of whom are engaged in university-level research. It is becoming difficult to attract and/or keep faculty members with spouses who also wish to have university appointments. UMass and other universities have not yet dealt with this in a systematic way, but to get and keep high-quality faculty in the future, they will have to.

Condensed Matter Physics

A New Faculty Member

"What is the stuff that you are made of?" is a question that many people have discussed from a variety of points of view. **Alex Levine**, a new assistant professor from the University of California Santa Barbara tries to take a physicist's approach to the problem in his theoretical work at the boundary of soft condensed matter physics and biological physics.

Upon reflection, it is not surprising that themes of soft condensed matter and statistical physics can play an important and perhaps fundamental role in elucidating the material properties and structural organization of living systems. The stuff of life is a complex mix of polymeric macromolecules, lipid membranes, and protein gels. All of these soft, fragile materials interact with each other in the strongly fluctuating environment of an aqueous solution. In fact, it is amusing to recall that these "Brownian fluctuations" were readily conflated with the irregular motion of single-celled organisms, a point that the discoverer of such fluctuations was quick to refute[1]. Almost a hundred years would pass before the true, intimate connection between statistical physics/soft condensed matter and biology began to be revealed. Today we live in a particularly exciting time in which experimental physicists can reach into the stuff of life to manipulate single molecules on the scale of nanometers (billionths of meters) pulling at these fragile, elegant structures with forces on the scale of piconewtons. The realm of the very fragile is perhaps as far beyond our everyday experience as the realms of the very large or very small - for instance, the weight of a single dollar bill is ten-billion piconewtons.

Based on these experiments, Professor Levine is currently developing theories regarding the polymeric "skeleton" of the cell, a continuously evolving network composed primarily of filamentous actin and associated molecular motors. In addition he is working on the mechanical properties of single proteins - a type of nanoscale mechanics problem - and he is studying the motion of proteins and other inclusions in lipid membranes. Understanding the material properties of the stuff of life may help us to better understand biology and to build new materials/devices based on biological design principles.

1."In the first place, I have to notice an erroneous assertion of more than one writer, namely, that I have stated the active Molecules [particles in a more modern language] to be animated." From Additional Remarks on Active Molecules by Robert Brown, 1829.

Low Temperature Physics

One of our department's most productive long-term research efforts is the experimental low temperature program directed by **Prof. Robert Hallock**. It began in 1970 when Bob was hired as an Assistant Professor, and has received continuous support from the National Science Foundation since 1972. Bob has a long history with the University. He was an undergraduate here (B.S. '65) when North Pleasant Street had many magnificent elm trees, and the south wing of Hasbrouck was being constructed, as shown on the back page.

Research in this program, primarily in liquid helium films, has been the basis of 28 Ph.D. theses. Currently four graduate students and one postdoctoral research associate continue this research by investigating waves on films of superfluid helium a few atomic layers thick (third sound). Graduate students **Justin Herrmann** and **Dwight Luhman** are studying waves on surfaces with random and patterned disorder purposely introduced to scatter the waves so as to test theoretical ideas about localization in two dimensions. **John Cummings** is studying the behavior of helium in aerogel, a glassy material that is 98% empty space, while also developing third sound apparatus to ultimately search for a new superfluid transition predicted for thin films made from mixtures of the two isotopes of helium, i.e. ^{3}He and ^{4}He. In rather different work, **Yung Ho Kahng** is studying the adsorption behavior of helium in carbon nanotube bundles that may provide a good one-dimensional substrate and open a new area of investigation**. Dr. Hikota Akimoto** is measuring the specific heat of helium mixture films designed to understand the interaction of ^{3}He that floats on ^{4}He films at low temperatures.

Bob has had a very productive career at the University and he attributes this to the many talented students he has had the pleasure to work with over the years. His first student was **Ephraim Flint** who studied dynamical effects of

superfluid film flow, and who has since had a very productive career at I.B.M.'s Watson Laboratory. The program's most recent graduate is **Adrienne Wootters**, who studied the filling and draining of superfluid helium from nanoporous materials, and who now is an Assistant Professor at Massachusetts College of Liberal Arts in North Adams. A picture of Bob's group in 1992 is shown below. More information about all of the graduates from the Hallock group may be found at http://www-unix.oit.umass.edu/~rbhome/Students.htm.

In 1992, Bob received the Chancellor's medal for research as well as a Guggenheim Fellowship. In 1998 his fine teaching was recognized with the University Distinguished Teaching Award. In 2001, after serving the University in many capacities, including Department Head and Acting Dean, he was named a Distinguished Professor.

Bob Hallock's Group, Summer '92: *Back Row (L to R)*: Geoffrey Zassenhaus (B.S. '92) Mackenzie Corp.; Donald Sprague (Ph.D. '93), Microsoft, Seattle; Peter Sheldon (Ph.D. '96) Prof. and Dept. Chair, Randolf-Macon Womens' College; Richard Rahn (Ph.D. '96) Medical Imaging, Seattle; William Tiernan (Ph.D. '92) Prof., Mesa College, Colorado; Christopher Bauerle, German Exchange Student, CNRS, France; Suwen Wang (Postdoc), Senior Scientist Gravity Probe B, Stanford University; *Front Row (L to R):* Theresa Moreau (Ph.D. '00) Visiting Asst. Prof., Amherst College; Nadir Alikacem (Postdoc), Dallas Medical School Staff; Kurt Ketola (Ph.D. '95) Raytheon, California; Michael Lilly (Ph.D. '97) Sandia Corp., Albuquerque; Bob Hallock.

Teaching

Undergraduate Program

The Undergraduate Labs

In a 1984 survey sent to our alumni about their undergraduate experiences, a common response was "the labs were the most useful classes I took at UMass." This was surprising, because students complain about having to take labs. Well, the undergraduate labs are still going strong, thanks to Lab Director **Tony Papirio** and Technical Specialist **Jeff Kmetz**. It's a full time job for the two of them to coordinate the courses, maintain the facilities and set up the experiments.

Although the fundamentals of physics haven't changed, Tony is always working to keep up with advances in technology, making sure the labs stay relevant for the undergraduates. One main trend is toward increased use of computers for data collection and analysis. Working with faculty on the one hand, and with Jeff on the other, Tony has updated many experiments including a new one on Heat and the Greenhouse Effect.

Former TA's will remember some of the "old technology" experiments taught in the physics labs here. In particular, the Millikan Oil Drop experiment was modernized by the introduction of a video microscope, and a calibrated optical system. These improvements allow oil drops to be observed live on a TV monitor and their velocities measured directly off the screen, allowing a much more accurate determination of the quantum charge of the electron. Anyone who has spent hours peering through the optical microscope at tiny oil drops in a dark lab, while coordinating the timing of the drop's velocity with a lab partner using a stopwatch, will appreciate this improvement. First developed in 1995, by Tony with Professors **Jimmy Sakai** and **Claude Penchina**, the results were published, in the January 2000 edition of The Physics Teacher as an article entitled "A Novel Approach to the Oil Drop Experiment."

Tony (on left) and Jeff (on right) set up the Millikan oil drop experiment.

Undergraduate Curriculum Revision

As always, the Physics Department is in a state of flux, with many recent faculty retirements, but with not all of those faculty being replaced. This situation, coupled with the desire to improve our course offerings, has resulted in changes to the freshman and sophomore level physics curriculum so as to coordinate the introductory sequence for engineers with that for the physics majors. This will give students more flexibility as to when they can take these courses. An honors section for engineering students will no longer be offered, but instead, the engineers will be encouraged to take the physics majors' courses. The modern physics course for chemists and electrical engineering majors will no longer be offered, but instead we will begin to offer our sophomore modern physics course both semesters. Most physics majors will take that course in the spring, but other majors will have access to it both semesters. These changes will make it easier for students who begin their careers in other fields to switch to a major in physics.

The old dichotomy between "theory" and experiment" is breaking down and numerical simulation is playing an ever larger role in research. Our Department has a new course in computational physics, to be taken mainly by sophomores; it was developed primarily by **Prof**. **Jon Machta** and is being taught jointly with the Astronomy Department. Two old courses are being extensively revised: "Radiation Physics", to be given by **Prof. Ross Hicks**, and "Optics", which will include many new experiments being developed by **Prof**. **Narayanan Menon**.

Graduate Program

Graduating 1982

Top row: Julie Yaple (M.S. ‘80), Frank Canning (Ph.D. ‘82), Carlos Condat (Ph.D. ‘82), Donald Ewen (M.S. ‘82)
Bottom row: Chris Haydock (Ph.D. ‘82), Jonathan Maps (Ph.D. ‘82), Remo Masut (Ph.D. ‘82), Stan Pulchtopek (M.S. ‘80)

Entering 2002

Front Row (L to R): Koushik Dutta, Josef Wenzler, Christian Guerlich, Bernhard Fischer, Andrew Barnum, Gunes Soyler,
Rear rows (L to R): Elizabeth Clark, Judith Roller, Karsten Koeneke (back), Derek Chace, Surachate Kalasin, Juan Jose San Cillero, Michael Thorn, Barbara Capogrosso, Yu Fu.

Graduate Program Review

All academic departments receive periodic reviews. Last year the Department underwent an "Academic Quality Assessment and Development Review" and received strong affirmation from the visiting committee with regard to its faculty composition and record of research productivity. The Review did, however, take note of the fact that the graduate program had suffered disproportionately as a consequence of recent University budget difficulties. This has spurred an effort to reinvigorate the graduate program. As a result of recent excellent faculty hires and reallocation of internal resources, we have restored, and in some instances created, several state-of-the-art research-oriented graduate courses, such as Advanced Statistical Physics, General Relativity, String Theory, Nanostructures, and Soft Condensed Matter Physics.

We have also revised many of our graduate program rules in order to be more responsive to student needs. The structure and timing of the Comprehensive and Qualifying Exams has been changed so as to encourage students to begin research as soon as possible. Aggressive recruiting efforts have resulted in larger entering classes with a smaller percentage of foreign students. As faculty retire and are replaced, new opportunities and resources for student research involvement become available. All of these factors together have enabled the Department to maintain a high quality graduate program.

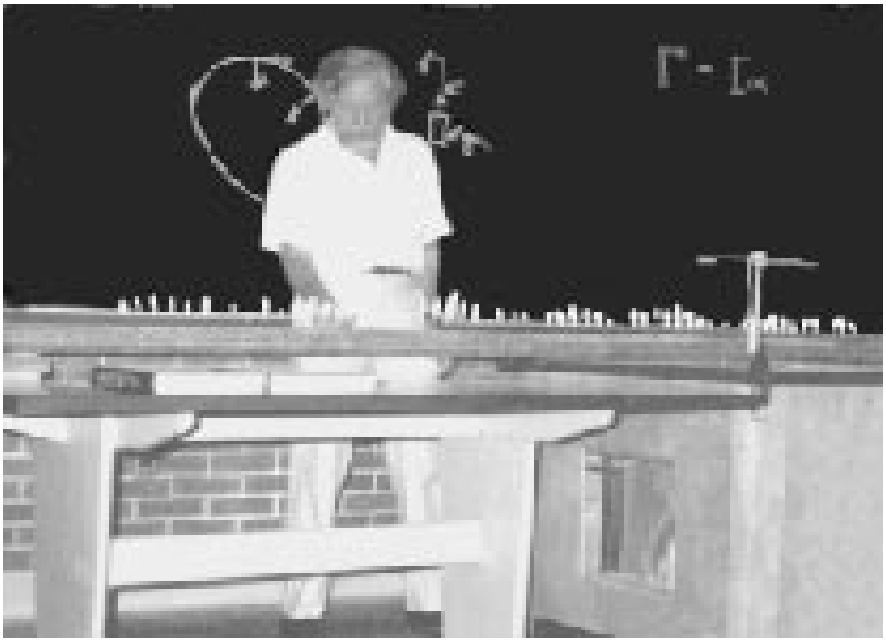
Service and Outreach

A Student Visit

In November of 2002, Ms. Sheila Stephan's class from the Hampshire Educational Collaborative visited the Physics Teaching Labs in Hasbrouck for an introduction to the physics of Sound and Waves. Physics doctoral student **Michael Thorn** and Lab Director **Tony Papirio** explained the wave nature of sound to students and demonstrated how microphones and loudspeakers convert sound waves into electrical waves and vice versa. The students used oscilloscopes, and computers equipped with sound analysis software, to explore sound waves. They made "voice prints," capturing their voices on a digital oscilloscope then printing them out to take home. The grand finale of the afternoon's activities was a demonstration created by Mr. Papirio which used sound waves to smash a glass beaker. This was a big hit with everyone!

Conferences

The Gordon Conferences take place every summer in New England and bring together active researchers in a field to exchange notes and to learn of new developments in their field. This summer, **Prof. Barry Holstein** has been honored to head the prestigious Nuclear Physics Gordon conference at Colby College, July 20-25.



Professor Arthur Quinton shows the "Dancing Flames" demonstration in Hasbrouck 20. This was taken in the Summer of 1984 during one of **Professor Roy Cook's** Summer Workshops for High School Teachers.

People

Faculty Honors

Prof. Barry Holstein has received the Natural Science and Mathematics **Outstanding Researcher Award**. He was recognized as being one of the leading theorists at the interface of Nuclear and Particle Physics, and in particular for his work on Parity (P) and Charge-Parity (CP) symmetries. Recently this pioneering work has been extended to one of the "hidden" symmetries: chiral symmetry. ("chiral" refers to the symmetry between right- and left- handedness, while "hidden" means "spontaneously broken." For example, the DNA molecules of living things could be all right-handed or all left-handed, as far as the physics is concerned. Somewhere, at some time, a choice was made, and the DNA molecules we all see are left-handed.) We congratulate Barry for this honor.

Prof. Morton Sternheim (Emeritus) has been inducted into the Massachusetts Hall of Fame for Science Educators. The honor is reserved for teachers who have distinguished themselves as dedicated, exemplary educators over a long period of time. Prof. Sternheim was recognized for his career in physics education and his service as director of the Science, Technology, Engineering, and Mathematics Teacher Education Collaborative (STEMTEC). As the Hall of Fame announcement noted, "His interest and kindness to all students is well known and he has done much to bridge the gap between the university and other teaching levels in our state."

Physics Administrators

Prof. Jose Mestre now serves as Associate Dean for Academic Affairs for the College of Natural Sciences and Mathematics effective January 2003. He joins other physics professor administrators: **Fred Byron**, Vice Chancellor for Research; **John Dubach**, Deputy Chancellor; and **Jim Walker**, Acting Dean of the Graduate School. **David Scott,** our former Chancellor, returns to our department.

Faculty Retired

Kenneth Langley.....06/30/02
Claude M. Penchina.....12/31/02

Exchange with Oxford

Jonathan Dick '04, was accepted at Trinity College, Oxford University, as the recipient of the David and Kathleen Scott Scholarship that provides for one year of study to a student who has shown extraordinary academic excellence and social responsibility. The award was made through the International Programs Office. This speaks well for the quality of our students and our undergraduate program. Congratulations Jonathan!

In Memoriam

Benjamin C. Crooker Jr., 78, an alumnus and physics professor in our department for 40 years before retiring in 1987, died August 2, 2002. He was a Massachusetts native, born in Milford and raised in Upton. During WWII, he served as a meteorologist in the Army Air Corps, during the cold war he was Hampshire County's civil defense director, and, as is characteristic of New Englanders, he partook in local government as an Amherst town meeting member for many years. He leaves his wife of 58 years, Dorothy (Colburn) Crooker, two sons (one son, Benjamin C., followed in his father's footsteps and also graduated from our Department), four daughters, 15 grandchildren, and two great-grandchildren. We will all miss Ben who flawlessly conducted such department business as scheduling and pre-med advising in addition to his teaching duties.

Carol J. Van Pelt (Jan Peene) died June 25, 2002 in Nashua, N.H. For many years, Jan was secretary on the fourth floor of Hasbrouck; she retired in 1992. Jan was an enthusiastic gardener and was active in animal shelter programs: It is not often that a kitten is abandoned in the 4th floor office, but it did happen at least once, and she knew just what to do.

Gwendolyn Mae Ewart. Wendy, as she was known to all, was born in Moncton, New Brunswick on May 30, 1944, and attended Mt. Allison University in Sackville before entering UMass for graduate studies (Ph.D. '73, Thesis topic: "Effects of ^{208}Pb Core Vibrations on Shell-Model Calculations for A=211 Isobars"). Subsequently, she conducted research at McGill, at U. of British Columbia, and at the National Research Council in Ottawa. She also had interludes of teaching physics at Dawson College in Montreal and Trent University in Peterborough, Ontario. Ironically, one of her projects at the NRC involved calculations to improve the effectiveness of cancer radiation treatments, since she died of breast cancer on Oct. 1, 2000 at the age of 56. Wendy enjoyed downhill skiing, curling, figure skating (which she taught while at UMass) playing the pipe organ, and cultivating orchids and friendships. Wendy was a very kind and thoughtful person, who wore her considerable intelligence very modestly, and who maintained friendships along her way from her earliest childhood through UMass and beyond. She leaves her husband Jean Lesperance and three teenage daughters. Jean welcomes anecdotes about Wendy for his mini-biography of Wendy. (jean.lesperance@rogers.com tel:613-837-6524).

Fritz E. Tidlund Jr., who supervised the Introductory Physics Labs from 1958 until his retirement in 1984, died in August 2000. Born in Shutesbury in 1915, he attended Amherst schools. Fritz worked at UMass his entire career, a period of 41 years. A certified numismatist, he continued on as a coin dealer and coin collector after retiring. An avid horticulturist, Fritz was well known locally as the cultivator of award winning irises, of which he grew 35 different varieties.

Staff News

Computing and Electronics

Some of you may remember departmental electronic repair as a one man show by **Norman Page**. Then the job was taken over, first by **Don Boettger**, then by **Steve Svoboda**. Over the past few years, however, the effort has transformed into a full computing, networking and electronics shop, staffed by **Joe Babcock**, **Steve Svoboda,** and **Al McConkey**.

Recent projects have included rewiring the entire department, located in both Hasbrouck and the Graduate Research Center, for 100Mb computer networking. The two buildings are connected by a pre-existing fiber cable where all networking traffic from Hasbrouck comes to the Graduate Research Center, and then network traffic from both buildings joins the greater campus computer network.

Although everybody has their favorite computers and operating systems, creation of standards in operating systems, hardware, and usage, has made group support of the department's computing needs much more manageable. The donation by another state agency, the Department of Revenue, of 100 computers, has allowed the placement of computers on each department member's desk.

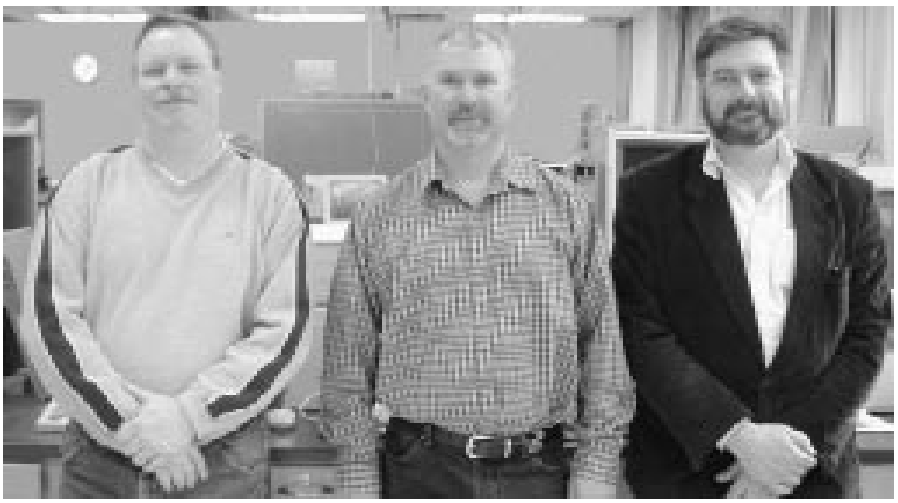
Operating systems have been standardized to include Windows NT and XP, Red Hat Linux, and MacOS.

This group also maintains services such as a departmental web server (www.physics.umass.edu) and offers some centralized file sharing and printing services for the entire department. The research groups provide their own computing and printing hardware, which the staff supports and maintains. Licensed software such as Microsoft Office, Mathematica, and other physics related software are distributed by the staff.

Electronic repair of test equipment and specialized circuit boards continue at a steady pace, but now repairs such as to disk drives, network cards, and other computer components have been added to the list of duties, along with user support of all types in computing and electronics.

Kate (Kathy Kelly) **Ryan** writes: I was the secretary for the Nuclear Physics Group from 1974 to l977. I am currently working at North Carolina State University in the Dept. of Nuclear Engineering as the Program Assistant for the Nuclear Reactor Program. Mike and I have three wonderful daughters, one attending University of North Carolina at Charlotte, one taking a break from Appalachian State University and the last a junior in high school. I took 20 years off, and have been back at work for the last three years. I would love to hear from my old friends at UMass. (kryan@eos.ncsu.edu)

Al Mathieson ("Matty") writes: "For many years I was the business manager in the Physics & Astronomy Dept. After the GRC Tower was built, I was ably assisted by Stella Rewa and Selma May. They were both careful bookkeepers, but Selma is also remembered for her baked "goodies." (Several years ago she fell and broke her hip, and she is now at 18 Belmont, Ludlow, MA 01056-1913.) I remember special purchases, such as the telephone poles to support the first wire dish antennas out at the Quabbin, but that is the subject of another newsletter." (almat76@hotmail.com)



Networking staff (left to right): Al McConkey, Joe Babcock, Steve Svoboda

Undergraduate Awards

(See picture on page 15)

Kandula Award
Jonathan Dick '04, Jennifer Niedziela '03, Jennifer Joyce '03

Hasbrouck Scholarship
Diwakar Turaga '04, Stephen Mirigian '04

Chang Freshman Award
Chris Serino '06, Ed Slavich '06(Second Place Mathematics Competition)

Chang Transfer Award
Caleb Mills '04

Field Award
Jonathan Dick '04

International Programs
David and Kathleen Scott Oxford Exchange
Jonathan Dick '04

Graduate Student Awards

Arthur R. Quinton Awards
Derek Chace
Mike Thorn

William Barowy (Ph.D.'86) finished his Ph.D. thesis in atomic physics, and went to the Boston area to continue research in molecular physics. He returned to UMass as a postdoc in physics education research, and currently holds a teaching position at Lesley University in Cambridge, Massachusetts. He writes: "The inquiry for greater knowledge practiced and modeled at U Mass is something I took up and made my own, carrying it over to the study of human development in cultural circumstance. This interest is exceptionally fitting with a background in science and science education, as science is the long time achievement of many people across many cultures. A child learning science encounters all those people not only through the methods and theories created, but those that have been built upon them, intermediated by today's scientists and science teachers." He maintains a tie to UMass: Of his two sons, one graduated from here in 2002, while the other is a freshman in engineering.
(bill@barowy.net)

Kwo-Ray Chu (M.S. '68) writes: " I was happily surprised to receive my first Physics Newsletter. Thank you for being able to find me. The pictures and names (Engelsberg, Ford, Gluckstern, Jones, Mullin, Shafer, Sternheim) brought back memories. Thanks to them I am now a physics professor at National Tsing Hua University in Taiwan."
(krchu@phys.nthu.edu.tw)

Paul Eugenio (Ph.D. '98) joined the Medium Energy Particle Physics Group at Carnegie Mellon University as a post-doctoral research associate after leaving UMass. In the fall of 2001 he became an Assistant Professor at Florida State University in Tallahassee and works in their Experimental Nuclear Physics Group. Thus Paul's research interests span both nuclear and particle physics, and in particular, deals with the understanding of

the non-perturbative regime of quantum chromodynamics (QCD). He is devoting much of his time in searching for new forms of hadronic matter in experiments at Brookhaven National Laboratory and at the Thomas Jefferson National Accelerator Laboratory.
(eugenio@phy.fsu.edu)

Breck Hitz (M.S.'69) sent us this response to the picture on the back page of the Spring '02 Newsletter: "Hey, what a kick it was to see that picture of my 1966 classmates on the back of Issue 2 of the UMass Physics Newsletter! All those people whose names sound familiar! Even today, every time I see a 9V battery, I think of Mike Belanger (bottom right in the picture). He told the story on himself about how he learned the hard way not to test a 9V battery with his tongue. I've crossed paths with several people in the picture since leaving UMass — John Campbell, Pat Manzo, and Jon Weiner among others. I've also seen Ed Sapp, a member of the class who was not in the photo. Where am I now? San Francisco. One wife, two kids, aged 10 and 14. I guess I've pretty much left physics ... for a lawyer-like career. For the past 15 years I've been executive director of LEOMA, the Laser and Electro-Optics Manufacturers' Association. It's a non-profit organization concerned with the welfare of U.S. laser companies, and it involves a lot of work with federal regulations, international standards, market surveys, and so forth. Even though I don't deal with differential equations on a daily basis, my UMass physics experience is often useful to me in my non-physics career."
(breck@leoma.com)

David Huse (B.S. '79) writes: "UMass was a great place for me to learn physics and to begin my career in research. As an undergraduate, I was able to be seriously involved in research, first in Gerry Peterson's nuclear physics group (where I also learned to work in the machine shop), and then, in my senior year, with Bob Guyer. In the classroom, I particularly remember learning quantum mechanics from Fred Byron and mathematical physics from Gene Golowich. On the great advice of Guyer and Golowich, I continued my physics studies as a graduate student at Cornell, earning a Ph.D. under the direction of Michael Fisher in the theory of phase transitions and critical points. After Cornell, I was at Bell Labs, Murray Hill, NJ, in the theoretical physics research department until 1996, and since 1996, I have been professor of physics at Princeton. My research is in theoretical condensed matter physics and statistical mechanics. One major area I have worked in has been magnetism and magnetic materials. Two specific focuses of this work have been spin glasses and frustrated antiferromagnets. Since the discovery of the high-temperature superconductors, the statistical mechanics of vortices in superconductors has been another major interest of mine. P.S. I am from a UMass family (at least in my generation): my wife, brother, sister, and two sister-in-laws are all also UMass alumni."
(huse@princeton.edu)

Donald Kaplan (B.S.'01) writes: "I was

pleased to read the Spring 2002 Newsletter. Of course, I miss UMass and I am glad to see the continued high level of productivity, involvement, and enjoyment. I thought I would share in my pleasure of starting graduate studies in physics at Case Western Reserve University this fall. It is great that we are able to keep track of our classmates as we all go our separate ways and do exciting things. Here's to a wonderful year for physics students, past and present."

Justus Koch (Ph.D. '72) wrote to one of our Editors (Prof. Gerry Peterson): "I saw your photo and the report about your retirement in the Physics Newsletter. All the best wishes to you! Recently I've been in touch with a lot of physics graduates that started with me around 1966: Ravi Bhatia, Martin Purvis, Floyd Peterson (Astrophysics), Andy Walsh ... About the photo on the back page of the Newsletter: Did you know that Wendy Ewart died about a year ago of cancer? (Ironically after a quite successful career in radiation and cancer research in Canada.) At the moment I'm heavily involved in the preparation for the International Conference in Amsterdam on High Energy Physics (the 31st 'Rochester Conference'). I was glad to see a UMass representation among the speakers in the parallel sessions: Eugene Golowich and S. Willocq. In case there's room for a mini-CV in the 'Alumni News': after my Ph.D. in 1972 under the supervision of Mort Sternheim, I was a postdoc at Stanford and then at MIT. In 1977 I went to NIKHEF (National Institute for Nuclear and High Energy Physics) in Amsterdam. Since 1987 I am also a professor at the University of Amsterdam. My recent interests are lattice gauge theory and finite temperature field theory."
(justus@nikhef.nl)

Gerald Lemay (B.S. '71): "Thanks for providing a wonderful newsletter. I really enjoyed life at UMass Amherst and have fond memories of Drs. Gluckstern (freshmen physics majors party at his house), Bob Gray, John Brehm, Stan Hertzbach, Alan Hoffman, Gerry Peterson, Dick Kofler, Claude Penchina, Tom Arny, Joe Taylor, T-S Liu, and Richard Huguenin (Five College Radio Astronomy at Quabbin Reservoir). After 3 years in the Fiji Islands as a Peace Corps volunteer, I returned to the study of physics and electrical engineering and have been teaching at UMass Dartmouth since 1980. In 1988 I obtained a Ph.D. from the University of Rhode Island. I am passionate about sustainable living and renewable energy and have my own offsite power generation station selling electricity to the utility. Other interests include martial arts (Aikido Shodan, Tai Chi, sport fencing instructor), traditional Japanese massage (licensed bodyworker), and music (play solo keyboard at a restaurant in New Bedford). e-mail contacts are welcome!"
(glemay@umassd.edu)

Joanna Levine (B.S. '97) writes: "Since graduating from UMass, I have been toiling away in graduate school in the Department of Astronomy at the University of Florida. Along my journey, I received my M.S. in 1999, won two Amelia Earhart fellowships, and managed to spend nearly 100 nights observing on telescopes around the world. (I'd have to say Hawaii is my favorite place to hang out after observing, and Gemini South is my favorite telescope.) Now, after all this, I am focused on graduating before the end of 2003. Happy New Year!"
(levine@astro.ufl.edu)

Frank Lomanno (Ph.D. '80): After receiving his Ph.D. in high-energy physics in 1980, Frank continued his studies as a Research Physicist at Brandeis University. There he contributed in the data reduction and analysis of experiments at Brookhaven National Laboratory. In 1983 he joined The MITRE Corporation in Bedford, Massachusetts as a member of the technical staff, where he analyzed electromagnetic pulse effects on communication aircraft and investigated the problems associated with time-limited windowing and the FFT (Fast Fourier Transform). After moving back to Western Mass in 1986, Frank became an Assistant Professor of Physics at Saint Joseph College in West Hartford, Connecticut. There he taught Physics and Computer Science and was Chair of the Committee for Academic Computing for the College. In addition he organized and was a lecturer in the National Science Foundation Workshop for Elementary and Secondary Teachers. In 1990 Frank switched careers and became the Lead Technical Analyst at Springfield Technical Community College to administer their Federal Title III Grant program. The major portion of this grant was to create Information Systems for the Office of Institution Research including the College's Executive Information System. From 1993 to 1995 he was Director of Technical Operations and Software Support for Applied Econometrics in Amherst, Massachusetts, a company which specializes in software for the tourist and convention centers for major cities. Presently he is a Senior Systems Analyst for the President's Office at the University of Massachusetts in Hadley working on Information Systems for the University. He and his family now reside in Belchertown.
(f.lomanno@umassp.edu)

Laurel Mayhew (Ph.D. '99) lived for a while in Cambridge, MA, working as a software engineer. Afterward, she taught physics at Worcester Polytechnic Institute, where she earned an approval rating of 94% in student evaluations of her teaching, and worked on a laser tweezer experiment. After her teaching experience, she and her husband moved to Boulder, CO in 2000, and bought a house there. For two years she worked as a Senior Research Scientist, studying the propagation of infrared laser beams through the atmosphere - until last December the company she had been working for closed their Boulder operation. In this rather unfortunate situation, she wrote us: "Not to worry. As usual, I have a plan.' She also added : 'I look forward to hearing from anyone who would like to stay in touch."
(LMMayhew@netscape.net)

Margaret McCarthy (M.S. '77) writes: "Thank you very much for the Department of Physics Newsletter. I was a September 1977 M.S. graduate who continued on for a Ph.D. in another field. I have been teaching physics at Springfield Technical Community College here in Massachusetts since 1974. The Spring'02 issue is especially dear to me as in the "In Memoriam" section there were three persons whom I knew. Professor Sastry was a very special person and scientist. Arnold Sweeney,

was an excellent machinist who made my Perspex phantom, and Katherine Pope worked with my son Jonathan Ricci. On the back cover of the issue is a photograph from November 1966 in the "Where Are They Now?" section. In the upper left corner stands my old friend Wendy Ewart (only when I wanted to make a point with her did I call her "Gwendolyn," with a slow, firm pronunciation). Wendy was a Canadian who married late and had three girls, now teenagers. She carried on with a bout of cancer for years and passed away in the fall of 2001. I am in contact with her husband Jean Lespersance who lives in Ottawa, and who would like me to compile Wendy stories for a history for their daughters."
(mem@schoolph.umass.edu)

Francesc Roig (Ph.D. '77) since 1980 has been in the Physics Dept. of the University of California at Santa Barbara. He is also in their College of Creative Studies which offers accelerated courses for gifted students. The student body and the Mortar Board Society has twice voted him to be Professor of the Year.
(roig@physics.ucsb.edu)

Paul Silva (B.S. '00) has become an entrepreneur: He and **Jeremie Spitzer** (also B.S. '00) have stayed in the Pioneer Valley, and in 2000 founded "ZForm," a company developing and marketing computer games that allow the blind and the sighted to play and interact as equals. Their games use specialized audio to communicate information to blind players. (If you would like to try it and play poker with your eyes closed, the web address is www.zform.com.) In Paul's words: "Physics did not teach me how to do marketing, networking (with people), raise money, or lead a team of people (naturally). However, it DID teach me how to think, so I've been spending a lot of time teaching myself how to do all the things ZForm needs me to do. I feel my physics training helped me with that a great deal." He is "proud to have created a workplace in which six people wake up every day and love to come to their job". Paul was on the original team of students that helped found Entreclub at UMass in 2000 and now serves as the chairman of its board of advisors. The goal of Entreclub

is to help area students with their business ideas and plans. Over the past few years, Entreclub has helped launch more than fifteen businesses. Some of these have been the topic of articles and stories on CNN Headline News, National Public Radio, the Boston Globe, and many other major news sources. Laughing, Paul says that to make him leave the Pioneer valley, they will have to "drag me away kicking and screaming." When he was at UMass he was very active in SPS, the Society of Physics Students, and worked with the Medium Energy Nuclear Physics Group on research conducted at the Thomas Jefferson National Accelerator Facility, and with Narayanan Menon on granular physics: vibrating sand. He comes back occasionally to keep in touch, and we are always glad to see him.
(psilva@zform.com)

Jeremy Wise (Ph.D. '79) "Since getting my degree in experimental high energy physics with Prof. Kreisler as my advisor, I have left weak interactions with its scintillation counters and spark chambers for the world of software development. I never left Amherst, a place that I fell in love with my first day as a grad student. Computing certainly has changed since those days of mini-computers and command prompts! For many years I have worked on computerized applications of biomechanics. One such application analyzes human motion from the video of an activity. Another is computer-controlled exercise equipment. Customers for these products include NASA and the Israeli Air Force. In recent years I have also worked on educational testing software that is used to identify and treat learning disabilities in children and adults."
(jeremywise@attbi.com)

Congratulations New Alumni/Alumnae!

B.S. Graduates Winter 2003

David Bulman, Fidelity Investments, Boston
(david.bulman@us.army.mil)
Benjamin Kirstein, Graduate school
Melissa Motew, MIT Lincoln Lab
Trevor Thompson, uv xcimer lasers
(thompsonta@attbi.com)
Justin Yeslow-Finn
(jfinn@kopernekus.com)

B.S. Graduates Spring 2003

Luke W. Chapman, Marines
Kringle E. Daly, Graduate school,
Worcester Polytechnic Institute
Alden A. Johnson
Jennifer L. Joyce, Graduate school,
University of Massachusetts
Brian G. Kahl, Teaching
Matthew B. Libby
Jennifer L. Niedziela, Teaching
Timothy J. Quinn
Lawrence P. Reed
Joshua A. Reusch, Graduate School,
University of Wisconsin
Jason C. Surprise, Teaching

M.S. Graduates

Donald Blair
John Cummings
Klebert Feitosa
Martin Goebel
Lisa Kaufman
Deniz Kaya
Sankar Nair
Xiaotao Peng
Yuning Yang
Ozgur Yavuzceitn
Jing Zhou

M.S. Graduates with Thesis

Matthew Breuer, "Design and Implementation of an Electron-Electron Scattering Polarimeter for E158 at the Stanford Linear Accelerator Center"
Tobias Huber, "Chiral Nucleon Form Factors and Long Distance Regularization"
Joseph Regensburger, "Computer-Aided Three Dimensional Visualization of Ductal Carcinoma In-Situ"

Ph.D. Graduates and Thesis Titles

Adrienne Wootters, "The Nature of Superfluid Helium in Porous Structures"
Xuenan Li, "Cluster Algorithm and Computational Complexity"
Kingschuk Ghosh, "Ordering And Self Assembly In Charged Systems"
Mustafa Bal, "Nanoscale Magnetoelectronic Devices via Electron Beam Patterning of Diblock Copolymer Films"
Hang Shi, "Structure Studies on RNA Processing"
Hao Qi, "Studies of Liquid Adsorption, Condensation and Surface Conductivity in Porous Media"

Gifts

On the Use of Your Gifts:

An Undergraduate Study Lounge

Studying physics is demanding and generally requires of the student more time than many other subjects. Undergraduate physics majors often have to work on their courses when their friends in other disciplines are out having a good time. Having a special place for our physics majors to study together provides them with the opportunity to meet with their peers, to establish friendships, and to maximize the opportunity to learn from one another. It could also serve as a meeting place for our Society of Physics Students. With these thoughts in mind, there are plans to refurbish a room in the Hasbrouck Laboratory to serve as an "undergraduate study lounge." Since most undergraduate classes and laboratories are held in Hasbrouck, and since many professors have offices there, the new room should be an improvement over the 10th floor lounge in the Lederle Graduate Research Center Tower that was to serve as a stopgap measure over a decade ago. However, the new room will need to be refurbished and equipped with computers. Your gifts will help to make this a reality.

An Optics and a Radiation Physics Laboratory

We are planning to refurbish and equip Room 313 in the Lederle Graduate Research Center Tower to serve for two upper division laboratory courses: 1. An optics course with many new experiments being developed by **Professor Menon**, and 2. A modernized radiation physics course to be taught by **Professor Hicks**. The latter course will be a revision of the radiation physics course that was taught by **Professor Sastry** for many years before he passed away in 2001, and which influenced so many former students to take up radiation and medical physics professionally. A proposal will be written to the National Science Foundation to partially fund the needed new equipment, but we will need substantial matching funds from private sources. We welcome your contributions.

Graduate Students

Travel funds are needed to send graduate students to American Physical Society meetings and other meetings.

Other Uses

As we hope this Newsletter and previous ones have pointed out, there are a large variety of activities and investigations in progress in our dynamic Department at both the undergraduate and the graduate level that your gifts, if unspecified, could help to support.

Money Matters

As our new Department Head and our new Chancellor have pointed out on page 1, "Money matters!" You can help our department to extend its mission of teaching, research, and public service by making a tax-deductible donation. If you wish, you may contribute directly to the Department of Physics by writing your check to the University of Massachusetts, but mailing it to

Department of Physics
University of Massachusetts
710 North Pleasant St., Ofc C
Amherst, MA 01003-9337

Please state that your gift is "Restricted to the Department of Physics." If your gift's use is not specified, allocations may be made where they are most needed to support a wide variety of activities. On the other hand if you wish to specify how your gift is to be used, we will honor your request. Furthermore, if you give to the Annual University Fund, you may indicate the Department of Physics. For your convenience, you can also make your gift online by visiting **www.umass.edu/development**, choosing "Make a Gift Now" and selecting **Physics** Department from the gift allocation menu. Every gift, no matter how small, will be greatly appreciated.

Honor Roll

The following "Honor Roll" lists those who contributed last year. We apologize for any omissions and request that you bring them to our attention.

Victor and Patricia Amurgis
Bruce Armstrong
Karen Johnson Armstrong
Michael T. Azure
Walter and Elaine Bearse
Mary Bell
Matthew A. Bonn
Herbert M. Brody
Walter R. Buchwald
Mary Celli
Bernard J. Cesarone
Edward S. Chang
Scott B. Chase
Motoaki Chinone
Laurence G. Cote
Kevin W. Cronin
Benjamin C. Crooker
Christopher A. Davis
Edward F. Demski
John F. Donoghue
Thomas A. Dundon
Ronald Eckhardt
David T. Ekholm
Christopher and Carol Emery
Peter and Theresa Fimognari
Stephen M. Fuqua
Robert Galkiewicz
Rebecca Galkiewicz
Paul C. Gardner
Margaret G. Gralenski
Nicholas M. Gralenski
Robert and Nancy Hallock
Leroy W. Harding
Francis Harrington
Evan K. Heller
Carolyn M. Holstein
Pamela D. Houmere
Robert and Kristina Huffman
Julie A. Y. Johnson
Neal F. Kalechofsky
Margaret W. Latimer
Darlene Keefe-Murphy
Joseph R. Kinard, Jr.
Per and Linda Kirstein
Christopher T. Koh
John H. Kudukey
Richard and Denise Lammi
James M Leas
Roger J. Legere
Mark B. Leuschner
Theodore R. Lundquist
Raymond D. MacWhinnie
Lewis and Caden Mainzer
William Anthony Mann
Eileen Maroney
Charles S. Mayo
Donald R. McAllaster
Katherine R. McCall
Barbara Merrill
Mark N. Messier
John Murphy
Andre I. Nasr
William E. Nelson
David H. Parsons
John K. Pribram
Keith P. R. Quinton
Arthur R. Quinton
Randall and Kristen Rogers
Peter A. Sheldon
Ker-Li Shu
Scott J. Simenas
Thomas J. Slavkovsky
Peter and Kathryn Smith
Arthur and Alice Swift
Michael T. Takemori
George P. Theofilos
Shahin Toutounchi
Albert J. Tucker
Edward D. Weinberg
Stephen W. Whittey
Jeremy Wise
Janet Klausner-Wise
John and Lynn Yeslow Finn

Companies : Matching Gifts:
American Chemical Society
Fidelity Foundation
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Minnesota Mining & Manufacturing Co.
Raytheon Company

Gluckstern Professorship
Dr. Steven Gluckstern gave the second installment to endow the Robert L. Gluckstern Distinguished Professorship that honors his father, who as our Head in the 1960's developed our modern research department. Thus it is most fitting that our first chaired professorship bear his name. Steven's generous gift is matched by funds from the President's Distinguished Professorship Initiative. Recruitment will begin next academic year.

Chang Bequest
We call special attention to the bequest of Professor Edward Chang who has created a $150,000 trust for the Department and has endowed two new undergraduate prizes, one for transfer students, and the other for our promising Freshmen majors.

As this goes to press,
the fate of the University of Massachusetts system hangs in the balance. In a cost-cutting effort, Gov. Mitt Romney's administration has moved to eliminate the President's Office, the Board of Trustees, and dismantle the five-campus system. The flagship Amherst campus would become an independent research university that would retain tuition monies instead of their being reverted to the Massachusetts General Fund. Other campuses would be realigned regionally with state colleges and community colleges. In the next Newsletter you will be updated on this important matter.

Undergraduate Awardees
(see page 10)
Front Row (L to R): Diwakar Turaga '04, Chris Serino '06, Ed Slavich '06
Back Row (L to R): Undergraduate-Program Director Ed Chang, Stephen Mirigian '04, Jennifer Joyce '03, Jennifer Niedziela '03, Caleb Mills '04, Jonathan Dick '04.

Construction of the Hasbrouck Addition, ~1962

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