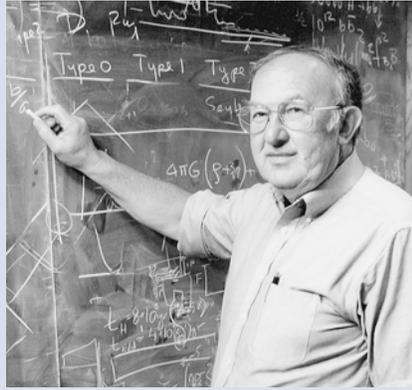




## Greetings from the Chair —

Greetings from the Physics Department at Yale. This newsletter is a joint venture of the Department and the Graduate School to keep you abreast of developments in Yale physics. Since this is the first of what we hope will be an annual publication, we include news that has accumulated over the last few years.

The Department developed a Long-Range Plan a few years ago. We recognized that, while it was important to preserve and rebuild existing strength in some core areas, the changing overall landscape of physics required us to build new strength in areas that would be important in years to come. The plan thus had three components: retaining existing strength in Experimental and Theoretical Particle Physics, Experimental and Theoretical Nuclear Physics and Theoretical Condensed Matter Physics; rebuilding strength in Atomic Physics; and building in the new areas of Astrophysics and Experimental Condensed Matter Physics. Partly as a consequence of the unanimous adoption of the Long-Range Plan, the Department has enjoyed a period of cohesion and a spirit of cooperation among the faculty. Six tenured appointments (almost one third of the tenured faculty) were made during these years – those of Professors Casten, Harris, Kasevich, Barrett, Mochrie and Urry. A total of nine junior faculty appointments were also made during this period. These appointments not only added new breadth to the department, but have added new vigor and excitement to the faculty.



This period also marked the retirement of three esteemed colleagues, Professors Frank Firk, Bill Lichten, and Jack Greenberg. Their departure represents a real loss to the department. We wish them the best in their leisure years to come.

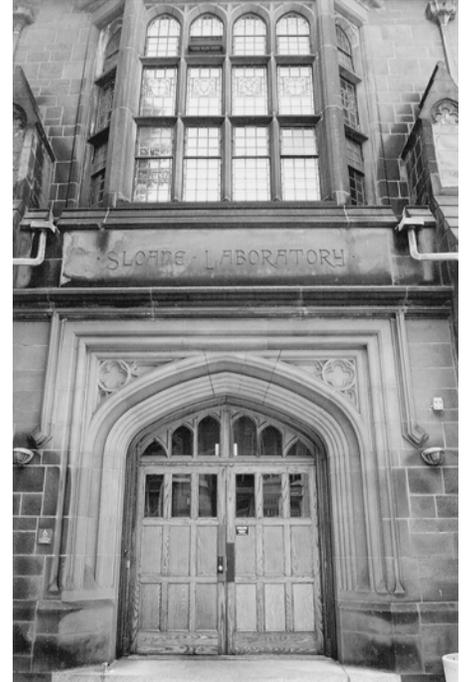
During these years we have set up two active committees to reevaluate both the undergraduate and the graduate teaching programs to keep our programs up to date in a changing world. The Graduate Studies Committee has recommended, and the faculty has adopted, some fairly substantial changes in the curriculum and requirements. The work of the Undergraduate Studies Committee is still in progress.

The Department has also paid attention to volunteer service and community outreach. In this regard the Yale Physics Olympics, held annually for the last three years, has attracted the attention of a large number of local high school science teachers and students, and has enjoyed considerable success.

During the past few years we have developed cooperative ties with our neighboring departments of Applied Physics and Astronomy. The successful building of strength in Condensed Matter Physics has been a joint effort with Applied Physics, and the building of new strength in Astrophysics has been in cooperation with the Astronomy Department. The new Yale Center for Astronomy and Astrophysics is also a joint venture of the Physics and Astronomy Departments.

We were delighted by recent renovations in Sloane Physics Laboratory. The teaching laboratories from the third floor of Sloane have been relocated in new

*continued on page 2*



## Sloane Renovations

Visitors to the Sloane Physics Laboratory may no longer recognize it. The home of the Physics Department underwent a \$1 million renovation that turned the building into a bright, comfortable place to work, study, and socialize. Many faculty and staff offices have been repainted, recarpeted, and relighted giving them a brighter, warmer feel and the old departmental lounge has been converted into new faculty offices. Remodeled student

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offices have been furnished with new desks and chairs. Overall, departmental office space has been greatly improved and expanded.

All this notwithstanding, the highlight of the renovation project is the new departmental lounge occupying the length of Sloane's third floor (see photos above). The lounge is significantly larger than its predecessor and allows the department to hold functions that would have previously required the use of outside space. Light streams through several large windows that provide views of Science Hill. The lounge is stocked with armchairs, couches, and coffee tables that allow for easy gathering and conversation. Underfoot is new carpeting and overhead is a modern lighting system. The walls are adorned with numerous scientific prints and Ansel Adams photographs. Several shelves hold journals, newsletters, and brochures available for perusal or serious consideration. Audio-visual equipment and a projection screen allow for presentations and colloquia. A kitchenette – with ample shelving and cabinet space, a refrigerator, microwave, and coffee makers – is located at one end of the lounge. All in all, the renovations of Sloane Laboratory have assured its place as the beloved home of the Physics Department for years to come.



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## **Chair's Message** *continued from page 1*

space on the sixth floor of Gibbs Labs. The third floor of Sloane was then renovated to house a beautiful new departmental lounge and new space for graduate student offices. We are grateful to the university for these wonderful new facilities.

This academic year marks the end of my second term as chair of the department. We are all delighted by the appointment of Professor Ramamurti Shankar as the new Chair. We look forward to productive and prosperous years ahead.

*Charles Baltay*

Charles Baltay '63 PhD, Chair  
Eugene Higgins Professor of Physics  
and Professor of Astronomy

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Newsletter to be published annually by the Department of Physics and the Graduate School of Arts and Sciences.

**Your comments, suggestions and news are most welcome!**

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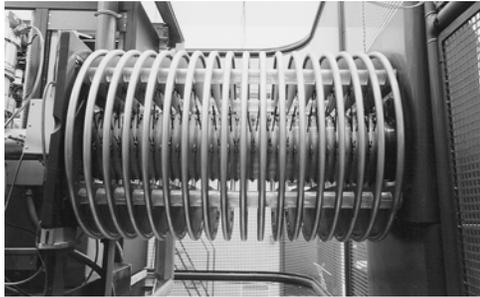
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## Symposium of Northeastern Accelerator Personnel

The Wright Nuclear Structure Laboratory at Yale sponsored the 33<sup>rd</sup> meeting of the Symposium of Northeastern Accelerator Personnel (SNEAP) October 8-11, 2000. Each year, SNEAP assembles a wide spectrum of individuals to discuss the construction, operation and application of electrostatic accelerators and boosters. The organizers and hosts of the meeting were Jeff Ashenfelter of WNSL accelerator operations; John Baris, director of WNSL computer facilities for physics; and Tom Barker of WNSL research support for physics. Corporate sponsors provided continental breakfasts and periodic repasts for symposium participants. Guests stayed at the OMNI New Haven Hotel, which also served as the site for most of the week's activities.



Opening remarks came courtesy of Yale's Peter Parker and Reiner Kruecken. The first day consisted mainly of laboratory presentations from such notable institutions as the University of Notre Dame, Israel's Weizmann Institute of Science, Western Michigan University, and Kansas State University. The evening's main event was a special tour of the Wright Nuclear Labs during which guests enjoyed hors d'oeuvres washed down by select Connecticut wines. The following day, the Brookhaven and Oak Ridge National Laboratories, along with the University of Georgia, continued the laboratory presentations. Papers by SUNY-Albany's Arthur Haberl and Oxford University's Richard Hyder were delivered in the morning. That afternoon, guests were treated to a foliage excursion to historic Litchfield County, Connecticut, where they enjoyed a tour of the Hopkins Vineyards and visited majestic Kent Falls, at 250 feet, the state's highest waterfall. The final day's schedule consisted of several papers presented by Alfred Priller of the Vienna Environmental Research Accelerator, Karl von Reden and Robert Schneider of the National Ocean Sciences Accelerator mass spectrometry facility at the Woods Hole Oceanographic Institution, Greg Harper of the University of Washington's nuclear physics laboratory, and Marco Poggi of Italy's National Institute of Nuclear Physics. In the afternoon, James D. Larson

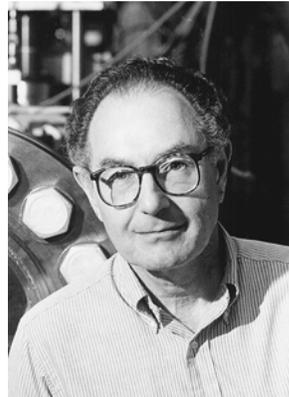
led two optics workshops. The guests later enjoyed a classical music trio as they dined at New Haven's historic Quinnipiack Club. The evening was capped off with an address given by D. Allan Bromley, Sterling Professor of the Sciences. SNEAP 2000 came to an end the following day with two open-forum group discussions.



Bottom left: *The ESTU-1 Tandem Van de Graaf Accelerator (also in detail directly left).* Above: *Anasoba Ezeokoli, research development technician.*

## Two Yale Faculty Honored with Symposia

### Symposium in Honor of Jack Sandweiss



In March 2001, friends of the Physics Department gathered in New Haven to celebrate the seventieth birthday of Professor Jack Sandweiss. The festivities included an opening reception, a special symposium, and a dinner during which participants honored the life and work of the Donner Professor of Physics.

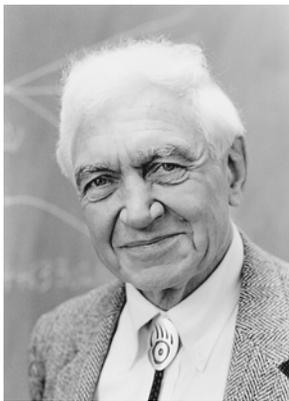
The celebration began in the newly remodeled Physics Department lounge on the third floor of the Sloane Labs. Yale faculty and students, as well as visitors who made the trip for the special occasion, attended an evening welcoming reception. The symposium was held the next day in Luce Hall and was titled "Perspectives in Physics and Physics Technology." The morning session began with Charles Baltay, "Status of the Standard Model and Prospects for the Future" and continued with "Electrons in Cryogenic Liquids" by William J. Willis '58 PhD of Columbia. Yale's Thomas Appelquist continued the program with "Particle Theory: Status and Future Directions." Columbia's T. D. Lee followed with "Theoretical Frontiers in Quantum Physics." Lunch was followed by Brookhaven National Laboratory's Thomas Ludlam '69 PhD and his talk "RHIC and Its Future." Peter Braun-Munzinger of Germany's GSI-Darmstadt then told the audience about a new collaboration building a dedicated heavy-ion detector to exploit the unique physics potential of nucleus-nucleus interactions at LHC energies in his talk, "ALICE, Plans and Pros-

*continued on page 4*

pects.” Next came Maury Tigner of Cornell who discussed “Accelerators Beyond the LHC” and Martin Blume of the *Physical Review* who talked about “The Future of Scientific Publishing.”

The events concluded with a dinner at the New Haven Lawn Club. Yale’s Robert Adair served as the master of ceremonies and Brookhaven National Laboratory’s past director Nicholas Samios delivered the keynote address, “What Lies Ahead for Particle and Nuclear Physics?” His talk was a fitting conclusion to the symposium, as attendees were invited to consider the future of a field just as they recalled its past and the work Jack Sandweiss has done to shape both.

### **Vernon Hughes Symposium**



The life and work of Professor Vernon W. Hughes were celebrated at a special symposium on May 11, 2001. In honor of the eightieth birthday of Hughes, the Sterling Emeritus Professor of Physics, friends from around the country and the world gathered in the Sloane Physics Laboratory to deliver and hear lectures and to enjoy the company of a man whose friendship and work have touched many lives.

The afternoon began with a warm welcome from Professor Charles Baltay '63 PhD, current chair of the Physics Department. His welcome was followed by an address entitled “Muonium” by Gisbert zu Putnitz of the University of Heidelberg who has worked and published on muon physics in collaboration with Professor Hughes and other scholars. Next came Cornell’s Toichiro Kinoshita, who has also worked with Hughes and Putnitz in muon physics, and his address “Theory of Muon  $g-2$ .” The ensuing coffee break allowed for socializing and catching up with old friends. Robert Jaffe, professor of physics and director of the Center for Theoretical Physics at MIT, kicked off the afternoon session with his lecture, “Nucleon Spin Structure.” CalTech nuclear physicist Emlyn Hughes followed with an address on the Stanford Linear Accelerator Center entitled “Parity Violation at SLAC.” Guests of the symposium then enjoyed cocktails and a lavish banquet in the Kline Biology Tower. Dinner was followed by an address by another international visitor, Waseda University Advanced Research Institute for Science and Engineering’s Kunitaka Kondo who spoke of scientific collaboration between Japan and the United States. Professor Kondo has written, among many other things, a chapter discussing the collaboration of Professor Hughes and Japanese scientists in the study of spinning particles. William Marciano of the Brookhaven National Laboratory ended the evening with his forward-looking lecture, “The Future of Muon Physics.”

Ten years ago, a distinguished group of scholars collaborated on *A Festschrift in Honor of Vernon W. Hughes* to mark their esteemed friend’s seventieth birthday. With this year’s successful symposium in celebration of another decade in the life of Professor Hughes, the bar has been set impressively high for the future planners of his ninetieth birthday festivities.

## **Faculty News —**

### **Physics Department’s Newest Senior Faculty Member: Megan Urry**



The Physics Department’s newest senior faculty member arrives with an impressive scientific record and an inspiring sense of service to the discipline. In the department’s long-range plan, the faculty recognized the need to strengthen research in several key areas, among them astrophysics. In hiring Professor Meg Urry, the department has taken an important step in that direction. Professor Urry comes to Yale straight from her work at the

Space Telescope Science Institute (STScI) – which carries out the science program of the Hubble Space Telescope for NASA – where she has worked since 1987. Her research concerns active galaxies, those with unusually luminous cores that are likely powered by massive black holes. She has identified one of the principal causes of this extreme activity: relativistic jets probably formed in the vicinity of supermassive black holes at the heart of active galaxies. In addition to her own research, Professor Urry has headed the STScI Science Program Selection Office that solicits, reviews, and approves observing proposals for the Hubble Telescope. Urry arrives just in time for the opening of the new Center for Astronomy and Astrophysics at Yale and says she is excited to be in the department at such a dynamic time.

Professor Urry’s involvement with the sciences goes beyond her astronomical research. Perhaps more than anyone else, she has brought to the scientific community’s attention the relative scarcity of women scientists in graduate school and in teaching and research. She was the chief organizer of the 1992 Women in Astronomy conference out of which grew the historic Baltimore Charter that addressed “the need to develop a scientific culture within which both women and men can work effectively and within which all can have satisfying and rewarding careers.” In a 1994 resolution, the American Astronomical Society (AAS) threw its support behind the charter. Since then, the issue of women in the field has received much attention and Professor Urry has led the way. In 2000-2001, she was chair of the AAS’s Committee on the Status of Women in Astronomy, edited the committee’s biannual newsletter, and helped maintain a database of women in the profession.

In the fall, Professor Urry will bring her exciting research and sense of service to New Haven, where she will be the first tenured woman in the history of physics at Yale.

## Faculty News — Recent Additions to the Senior Faculty



**Sean Barrett** was promoted to tenure from within the department in 1999. He joined the department in 1994 having earned his PhD from the University of Illinois two years earlier. In his work with the Experimental Condensed Matter Physics group, he has been using OPNMR (optically pumped nuclear magnetic resonance) to study electron-doped GaAs quantum wells in the presence of large magnetic fields.

In recognition of his work, his graduate alma mater conferred on him the 1995 William L. McMillan Award, a prize given annually to a young condensed matter physicist for distinguished accomplishments in the field. That same year, the National Science Foundation presented him with a Faculty Early Career Development Award. Professor Barrett has been the leader of a research team, consisting of physicists from Yale and Lucent Technologies' Bell Labs, that has developed new, non-invasive techniques to study electron spin states deep inside semiconductors. Their research in the relatively new field of spintronics may lead to improvements in the speed of computer chips and to the development of more efficient semiconductor lasers. Before coming to Yale, he spent a two-year term as a postdoctoral fellow at Bell Labs. He has served as the department's Director of Undergraduate Studies since 1999 and is a recipient of an Alfred P. Sloan Research Fellowship.



**John Harris** joined the department in 1996 following a distinguished term as senior scientist at the Lawrence Berkeley Laboratory at the University of California. His research interests are focused on understanding the behavior of nuclear, hadronic, and partonic matter at high energy densities. He was involved in the original proposal to initiate a nucleus-nucleus experimental program at CERN to search for a possible QGP (quark-gluon

plasma) phase transition, and has been an active member in the planning, conceptual design, construction, data acquisition and physics of two ultrarelativistic nucleus-nucleus experiments at the CERN Super Proton Synchrotron. He has been spokesperson for the STAR (Solenoidal Tracker at RHIC) experiment since its inception in 1991. After earning his PhD in 1978 from SUNY Stony Brook and serving as a research associate at the Berkeley Lab for two years, Professor Harris was a senior guest scientist at GSI Darmstadt (Gesellschaft fuer Schwerionenforschung) in Germany. In 1984, he returned to Berkeley where he would remain until 1996 and his move to New Haven. He has been Visiting Scientist at the University of Heidelberg and at CERN, and an Alexander von Humboldt Foundation Fellow at the University of Frankfurt. In 1995, Frankfurt awarded him its Senior U.S. Humboldt Prize.



**Mark Kasevich** was hired as a fully tenured associate professor in 1997 with a mandate to help restore the department's eminence in the field of atomic physics in light of the departure or retirement of several key scientists. After receiving his PhD from Stanford University in 1992, Professor Kasevich joined the Stanford faculty as an assistant professor. There, he was the recipient of two Young Investigator Awards (one from the National Science Foundation, the other from the Office of Naval Research), an Alfred P. Sloan Fellowship, and a Frederick E. Terman Fellowship from Stanford. Since coming to Yale, the former Rhodes Scholar has led an atomic physics group whose interests include atom optics and interferometry and the study of quantum many-body effects in dilute atomic vapors. The group's current experimental efforts include the development of a precision gravity gradiometer based on atom interference techniques; the development of a precision atom-interferometer gyroscope for tests of General Relativity; the study of the properties of Bose-Einstein condensed  $^{87}\text{Rb}$ ; and the atom counting statistics of quantum degenerate bosonic ( $^7\text{Li}$ ) and fermionic ( $^6\text{Li}$ ) sources.

**Simon Mochrie** came to Yale in 2000 as a full professor specializing in experimental condensed matter physics. A native of London, he earned a bachelor's degree from Oxford and completed his PhD work at MIT in 1985. He then did a postdoc at MIT before becoming a member of the technical staff at AT&T Bell Laboratories in New Jersey. He is a guest scientist at the National Synchrotron Light Source at the



Brookhaven National Laboratory and has been a guest scientist at the Riso National Laboratory in Denmark and a research collaborator in the physics department at Brookhaven. In 1990, he was awarded an Alfred P. Sloan Fellowship. He was a professor of physics at MIT from 1987 until coming to New Haven. Professor Mochrie's work has primarily consisted of experimental studies of the phase behavior and phase transitions of soft matter, surface and biomaterials, using high-resolution x-ray scattering methods. His most recent work has focused on long chain polymers and polymer films and he is currently the leader of a collaborative access team at the Argonne National Laboratory.

## 2000 Yale Physics Olympics — Physics is Fun!



Last October, thirty-eight teams from twenty-two different high schools visited Science Hill to compete in the 3<sup>rd</sup> Annual Yale Physics Olympics. Con Beausang, associate professor of

physics, organizes the Olympics each year in order to demonstrate that “physics is fun.” Students from public and private schools in Connecticut, Massachusetts, Rhode Island, and New York came to New Haven to learn and to demonstrate their knowledge of physics in an enjoyable environment. They came in teams of four accompanied by teachers and, in some cases, cheerleading squads to compete for a spot on the winners’ stand.

The day was split into morning and afternoon sessions. The morning’s competition consisted of three events, each scheduled for 30 minutes. The

events are conceived by faculty and graduate students in the physics department and are practiced several times before the competitors arrive in order to determine the correct or most efficient solutions. These efforts



notwithstanding, according to Professor Beausang, the high school students invariably derive more accurate results than their Ivy League colleagues. One event, for example, required the Olympians to gauge the height of paper stars taped to a top-floor window of Gibbs Laboratory. Beausang said that members of the physics faculty were amazed at the accuracy of their results – the teams that scored highest in the event came within centimeters of the actual height! Another event required students to construct a boat from tin foil and swizzle sticks. The goal was to shape a hull with the capacity to carry the maximum number of nuts and bolts. At least one team of students was able to build a boat capable of carrying much more weight than that constructed

by any of the organizers in their practice runs. Yet another event asked the students to find a way to move frisbees along a string suspended between two columns of the Kline Biology Tower. They were given two frisbees, a weight, string, and masking tape. The resulting solutions were not always the same as those con-



cocted by the event organizers, but were often first-class and in some cases exceeded the organizers’ expectations.

While the teams were treated to a tour of the Wright Nuclear Science Lab, event organizers tallied the scores.

Every team was awarded t-shirts, mugs, water bottles, and a physics book for their school libraries. The physics department machine shop made “gold” (brass), “silver” (aluminum), and “bronze” (copper) medals for the top teams. But the most coveted prize was the Yale Physics Olympics perpetual lightguide trophy, which currently resides at Connecticut’s Branford High School thanks to the efforts of their Team Atom. A special prize was also awarded to the team with the best costumes.



According to Professor Beausang, the rewards of the Physics Olympics extend well beyond prizes and recognition of individual students and schools. Many of the physics teachers who bring teams to the event have returned to their schools with new teaching ideas to be used in their ongoing efforts to convey the excitement of physics to an up-and-coming generation of scholars. The Yale graduate and undergraduate students who help organize the event benefit from the opportunity to deploy their knowledge of physics as teachers and guides for the competing students. Finally, the entire physics community benefits from the excitement generated by the event and from the formation of a group of young physicists who may go on to shape the future of the sciences.

The next Physics Olympics will be held October 13, 2001. If past experience is any guide, about 75% of participating schools will return with teams. The competition has proven so popular, in fact, that within two weeks of mailing out the invitations for the next Olympics, 26 teams had accepted! Anyone interested in establishing a similar event at his or her own institution is welcome to contact Con Beausang ([cornelius.beausang@yale.edu](mailto:cornelius.beausang@yale.edu)).

## Faculty News for 2000-2001

**Yoram Alhassid** published or submitted fourteen papers, including an invited review on quantum dots for *Reviews of Modern Physics*. He also made numerous presentations associated with his work on Monte Carlo methods for nuclear structure and on quantum dots. Teaching duties involved graduate courses in advanced dynamics and statistical physics.

**Thomas Applequist** is completing a two-year appointment with the National Research Council where he has chaired a committee of fourteen physicists preparing an overview of the field. In addition, he was elected to a three-year term as chairman of the board of the Aspen Center for Physics. Professor Applequist offered a graduate course in quantum mechanics this year.

**Charles Baltay** '63 PhD, in addition to his duties as chair of the department, served as co-spokesman of the SLD Experiment at the Stanford Linear e+e- Collider, as well as the co-leader of the United States and International Study of the Physics and Detectors of High-Energy e+e- Collider. He served as the leader of the QUEST Project to study gravitational lensing to measure cosmological parameters of the universe. As such it was his team that discovered a new plutino this past year. Professor Baltay taught courses in classical field theory and general relativity.

**Sean Barrett** has served as the department's director of undergraduate studies since July 1999. In addition to several publications and talks, he is the recipient of an Alfred P. Sloan Research Fellowship that has just been extended for another year. This past year, Professor Barrett taught the undergraduate General Physics Lab and Introduction to Mathematical Methods of Physics.

**Cornelius Beausang** has led the development of the YRAST Ball array that has drawn increasing attention to the largest university-based gamma-ray spectrometer in the world. He also played a major role in the development of the nuclear structure program at the Wright Nuclear Structure Lab. Professor Beausang also served as the chairman of the Yale Physics Olympics committee and taught Classical Mechanics and General Physics.

**D. Allan Bromley** has worked this past year to endow the Thomas J. Golden Professorship in Engineering. In addition, he has been working to obtain industrial support for the Combustion Research Center. Professor Bromley has also worked with the Senate Science Census to stabilize and increase federal funding for engineering and the physical sciences.

**Richard Casten** '67 PhD continued his tenure as the director of the Wright Nuclear Structure Lab. In addition to his numerous advances in his research of nuclear structures, Professor Casten has written twenty-one journal publications and delivered twelve invited conference talks. His teaching duties involved graduate courses in introductory nuclear physics and advanced topics in nuclear physics. He has also been working on a revision of his textbook *Nuclear Structure from a Simple Perspective*.

**David DeMille's** achievements this past year included three publications, six talks, two grants from the National Science Foundation, and an Alfred P. Sloan Fellowship. He taught undergraduate Experimental Research Studies II and General Physics Lab.

**Colin Gay** was appointed the Horace Taft Assistant Professor of Physics. In addition to numerous journal publications, Professor Gay taught courses in classical mechanics and introductory particle and nuclear physics.

**Kurt Gibble** has continued his work with atomic clocks, increasing the precision with which they tell time. He has been working with grants from NASA and from the National Science Foundation. This past year, he taught a required graduate-level laboratory and advanced general physics for undergraduates.

**John Harris** served as spokesperson of the STAR (Solenoidal Tracker At RHIC) experiment that commenced operations in the summer of 2000. This international scientific collaboration of 430 scientists is conducting an experiment to recreate conditions that occurred several microseconds after the beginning of the universe and may occur in the cores of the densest stars. Professor Harris has formed and is leading at Yale one of the premier STAR groups. He has reported their findings in numerous publications and lectures that have taken him all over the world. He has also worked to revise the teaching of Physics 110 – Themes in Modern Physics – to encourage student participation and interaction and has taught graduate students Topics in Modern Physics Research.

**Franco Iachello** initiated a program to study symmetries of differential equations with discontinuous potential functions. He has continued the development of algebraic methods in physics with the following major results: the introduction of the concept of symmetries and its application in nuclear physics, the development of an algebraic model for clustering in nuclei, and the completion of a project on strange baryons. In addition to thirteen publications and six lectures in the U.S., Mexico, Europe, and Australia, Professor Iachello taught the graduate course in group theoretical methods in physics.

**Mark Kasevich** has been working on the experimental observation of squeezed atomic states. He was also a Frew Fellow of the Australian Academy of Sciences and a NASA Jet Propulsion Laboratory Distinguished Visiting Scientist. This past year, he taught the graduate-level introduction to atomic physics.

**Reiner Kruecken** has been conducting nuclear structure research using gamma-ray spectroscopy with a special focus on the measurements of transition matrix elements using Doppler-shift techniques. He is the leader of the project to install the gas-filled magnetic separator SASSYER (formerly SASSY 2) at the Wright Nuclear Structure Lab Extended Stretched TransUranium (ESTU) Tandem Accelerator. Professor Kruecken pro-

duced thirteen journal publications and served as the instructor in charge of the undergraduate general physics laboratory.

**Gerd Kunde** took the first Relativistic Heavy Ion Collider (RHIC) dataset at Au+Au at 130 GeV/c as project leader of the STAR-RICH subsystem. He was also the head instructor of the undergraduate physics lab sequence in modern physical measurement.

**Dimitri Kusnezov** continued his research in the areas of nuclear structure and many-body physics, complex quantum systems, and exactly solvable models and symmetry methods. He has also been doing work at the Relativistic Heavy Ion Collider at BNL on physics far from equilibrium. He has also written over ten publications and delivered eleven talks in Italy, Japan, France, Brazil, and the U.S. Professor Kusnezov taught a graduate course in classical electrodynamics. His community work included work at the Yale Physics Olympics, judging projects at local middle school science fairs, and visiting local grade school and high school classrooms to talk to students about physics.

**Samuel MacDowell** has continued to work and publish on solar and atmospheric neutrinos and the determination of parameters of the Kobayashi-Maskawa neutrino matrix. He taught undergraduate advanced general physics. Professor MacDowell has also continued to be active at the St. Thomas More Soup Kitchen.

**Simon Mochrie** collaboratively carried out and analyzed experiments to investigate the motion of long chain polymers in a polymer blend and also investigated the surface dynamics of thin polymer films. He also served as the director of the Collaborative Access Team that is implementing the beamlines at Sector 8 at the Advanced Photon Source at the Argonne National Lab. As such, he leads a multi-institutional collaboration consisting of Yale, MIT, Johns Hopkins, McGill, University of Toronto, and IBM. Finally, Profes-



sor Mochrie continues to serve on the Scientific Advisory Committee for the Linear Collider Light Source, envisaged to be built at the Stanford Linear Accelerator Center (SLAC).

**Vincent Moncrief** continued his research in collaboration with other scientists on the global existence properties and asymptotic behavior of large classes of cosmological solutions to Einstein's equations and developed further the connection of this work to geometrization conjectures for 3-manifolds. In addition to numerous publications and talks, Professor Moncrief was a co-organizer of the Mathematical Cosmology Workshop held at the Erwin Schrödinger International Institute for Mathematical Physics (ESI) in Vienna. He continued as the director of undergraduate studies for the math/physics major and developed and taught a graduate course entitled "Einstein's Equations and 3-Manifold Geometrization Conjectures."

**Homer Neal** joined the BaBar experiment at the Stanford Linear Accelerator Center (SLAC) and formed a new research group at Yale to work on the task of understanding the source of matter dominance in the universe using the BaBar detector. On the OPAL (Omni-Purpose Apparatus at LEP) experiment at the European Organization for Nuclear Research (CERN), he completed the searches for the chargino and neutralino supersymmetric particles at the highest energy electron positron collision ever used. On the SLD experiment at SLAC, Professor Neal completed a search for oscillations between the matter and antimatter states of the Bs meson contributing to much more stringent limits on the rate of oscillation. In addition, he taught the undergraduate course Themes in Modern Physics.

**Peter Parker**, as a member of the nuclear astrophysics program, continued his study of breakout from the HotCNO cycle to the rp-process, and the early stages of the rp-process, using both stable-beam spectroscopy experiments and direct radioactive beam measurements. Over the past year, his work has mostly focused on locating the important resonances for key reactions in these processes. A program to determine the strengths of these resonances by measuring their alpha-particle and proton decays has been initiated. Professor Parker and his group have also continued their participation in radioactive beam experiments at Argonne and Oak Ridge National Labs and have helped in the testing of detectors for experiments that will start at the TRIUMF/ISAC (Vancouver) in 2001. His teaching duties included Fundamentals of Physics and Experimental Research Studies. He also served as the associate director of the Wright Nuclear Structure Lab.

**Erich Poppitz's** work this year included filling an important gap in the understanding of supergravity and showing the existence of dual yd descriptions in higher-dimensional gravity-localizing backgrounds. He presented this work in several publications and eight talks throughout the U.S. and in Germany and Russia. Professor Poppitz taught undergraduate Quantum Mechanics.

**Nicholas Read's** research has progressed with advances in 2-dimensional Ising model, related to disorder in superconductors and paired fractional quantum Hall states. Professor Read delivered several invited talks on his work at international meetings and taught undergraduate Statistical Thermodynamics.

**Subir Sachdev** continued his research on the theory of quantum phase transitions with applications to the high temperature superconductors and other complex oxides. Professor Sachdev designed and implemented a new curriculum for the graduate course in statistical physics, taught Quantum Many-Body Theory, had twelve journal publications, delivered eleven invited talks, conducted colloquia at six physics departments, and was visiting professor at the University of Fribourg, Switzerland, in July 2000.

**Jack Sandweiss** continued his duties as editor and chairman of the Divisional Associate Editors of *Physics Review Letters*. He continued as spokesman of experiment E-864 at Brookhaven's Alternating Gradient Synchrotron (AGS). In its search for novel forms of matter, the experiment established that strange quark matter is not produced in the high-energy heavy ion collisions studied. Professor Sandweiss also collaborated on a paper quelling fears concerning RHIC's production of strange quark matter. He joined the STAR experiment at Brookhaven National Laboratory's RHIC where he is in the process of designing an experiment which will make it possible to study the direct production of electromagnetic radiation from the initial stages of the heavy ion collision and should clearly show properties of the quark gluon plasma.

**Michael Schmidt '79** PhD has been leading the efforts of the Yale group collaborating on the Collider Detector Facility at Fermilab. The group completed, installed, and commissioned critical trigger and data acquisition electronics this year. Data taking began in the spring. Professor Schmidt served as the department's director of graduate studies and chair of the committee revising graduate curriculum and examinations.

**Ramamurti Shankar** completed a long paper summarizing nearly three years of work on the Quantum Hall Effect. His work shows in detail how one can compute a variety of quantities *ab initio*, along the more usual path taken in physics of deriving the answer within an approximate scheme. He served as acting director of the Division of Physical Sciences and Engineering in spring 1999. Professor Shankar delivered the Heinz Pagels Memorial Lecture at the invitation of the Aspen Center for Physics. His lecture was entitled, "When You Come to a Fork in the Road, You Gotta Take It: Yogi Berra's Guide to the Quantum World." He continued work on his book *Methods of Quantum Field Theory in Condensed Matter Physics* (to be published by Cambridge University Press) and gave twelve talks including the MIT Retreat Lectures in January. His teaching duties involved the undergraduate sequence in intensive introductory physics. Professor Shankar began his term as the newest chair of the department in July.



**Samson Shatashvili** continued work in the field of string theory. He was able to derive an exact equation for the tachyon field for open strings – the first known exact result in strong field theory. His publication of the results in September 2000 has drawn considerable attention and has stimulated further research. Professor Shatashvili was honored with the Department of Energy's Outstanding Young Investigator Award. He taught a graduate course in quantum field theory.

**Donald Shirer**, as the department's director of instructional labs, wrote a new introduction to statistical data analysis currently being used by students in Modern Physical Measurement and revised the lab experiments for this class, the General Physics Laboratory, and Experimental Research Studies. He continued to track down misalignments and misadjustments in the 1 MeV VandeGraff accelerator introduced during the rebuilding two years ago. In addition, Professor Shirer published four journal articles.

**Charles Sommerfield** continued his efforts to find the vacuum state of the matrix theory of M theory. He also taught courses in advanced general physics for undergraduates and a graduate class in quantum field theory.

**Tilo Wettig** continued research on the low-energy features of quantum chromodynamics and collaborated on an invited review article on the subject summarizing the current state of the field. He also had numerous publications and delivered eight talks in the U.S., Japan, and Germany. Professor Wettig revised and taught a course on mathematical methods in physics for first year graduate students and advanced undergraduates.

**Michael Zeller** had numerous publications accepted by journals and gave several presentations to the NSF telling of his research on the KOPIO experiment at Brookhaven that measures the decay of  $K_0 \rightarrow \pi^0 \nu \bar{\nu}$ . He also taught the undergraduate course in the fundamentals of physics.

## Graduate Student News — Entering graduate students:

### Fall 2000

[Note: The fields listed for these students are the ones in which they are working for their summer research appointment. Sometime during the next academic year, they will begin a formal association with a thesis advisor that may or may not involve the same field as their summer research.]

**Atomic:** Sarah Bickman (Amherst College); Yong Jiang (University of Science and Technology of China); Wei Li (University of Science and Technology of China)

**Condensed Matter/Experimental:** Grace Chern (UC Berkeley); Zhipan Li (Peking University); Dale Li – (UC Berkeley); Mingchang Liu (University of Science and Technology of China); Aric Sanders (University of North Texas); Veronica Savu (California Institute of Technology); Benjamin Turek (Stanford University); Qian Wan (University of Science and Technology of China)

**Nuclear/Experimental:** Betty Bezverkhny (Tufts University); Sevil Salur (UC Berkeley)

**Nuclear/Theoretical:** Sabas Abuabara (Texas A&M University)

**Particle/Experimental:** Keith Henseler (Wright State University); Chun Yang (Peking University)

**Particle/Theoretical:** Adam Hopper (University of New Hampshire)

**Undeclared:** Zhenyu Han (University of Science and Technology of China)

### Fall 1999

**Atomic:** Matthew Fenselau (Franklin & Marshall College); Russell Hart (University of Wisconsin); Ruoxin Li (University of Science and Technology of China); John Rees (Oxford University); Jeremy Sage (Brown University); Yoav Shaham (Tel Aviv University)

**Condensed Matter/ Experimental:** Minghao Shen (Peking University); John Teufel (University of Toledo)

**Condensed Matter/Theoretical:** Anatoly Polkovnikov (St. Petersburg State University of Technology)

**General Relativity:** Mary Vasu (Stanford University)

**Nuclear/Experimental:** Jonathan Gans (Vassar College); Michael Miller (Michigan State University)

**Nuclear/Theoretical:** Yuan Huang (Peking University)

**Particle/ Experimental:** Fei Du (University of Science and Technology of China); Ke Li (City College of New York); Yi Wei (University of Science and Technology of China); Haibin Zhang (University of Science and Technology of China)

**Particle/Theoretical:** Ho-Ung Yee (Seoul National University)

**Other:** Jie Lin (Fudan University and Creighton University), Yancey Quinones (UC Santa Cruz), Zhong Tao (Peking University)

## Recent Faculty Retirements —



### Jack Greenberg (2000) – Experimental Nuclear Physics

Professor Greenberg joined the physics faculty in 1956 after earning his doctorate from the Massachusetts Institute of Technology. In addition to serving as the director of graduate studies of the department, he has held visiting professorships at numerous institutions. He received the British Association Medal, the Rutherford Memorial Fellowship, a Travelling Fellowship from Canada, and the Senior U.S. Scientist Award of the Alexander Von Humboldt Foundation. Professor Greenberg's work has been wide-ranging and includes research in nuclear, atomic, and elementary particle physics. His experimental investigations have particularly focused on areas involving fundamental aspects of collective structure in nuclei, weak interactions, the development of high-energy atomic physics with very high-Z atomic systems for studies of quantum electrodynamics of strong fields, and the possible production of new low-mass lepton states and hyperon states.



### Frank Firk (1999) – Experimental Nuclear Physics

A London native who took his doctorate from the University of London, Professor Firk arrived at Yale in 1965 as a senior research associate after having worked in Harwell, Oxfordshire, at the headquarters of the United Kingdom Atomic Energy Authority and in Tennessee at the Physics Division of the Oak Ridge National Laboratory. In 1968, he was promoted to associate professor and became full professor in 1977. During these years, his work on double neutron scattering gained increasing attention from the scientific community. He has

made important contributions to the detection of neutrons, including the development of the widely used lithium-6-loaded glass scintillators. Professor Firk has been an active member of the department, serving as director of graduate studies from 1970 to 1973 and as department chair from 1980 to 1983. He was associate director, then director, of Yale's Electron Accelerator Laboratory from 1968 until 1984; director of the Summer Sciences program at Yale in 1977; and director of the university's Natural Science Center in 1978. From 1982 to 1987, he was master of Trumbull College and in 1983 he was awarded the Yale College Teaching Prize.



### Bill Lichten (1998) – Atomic Physics

Professor Lichten came to Yale in 1964 with a PhD from the University of Chicago and a strong record in the areas of experimental and theoretical atomic physics. His scholarship has been recognized with fellowships and grants from the National Science Foundation and the Alfred P. Sloan Foundation and he has been an elected fellow of the American Physical Society and a fellow at Yale's Institution of Social and Policy Studies. Professor Lichten has put to much use

his strong interests in teaching and academic testing. He has served the department on numerous committees, including the faculty advisory committee for the Teacher Training Program at Yale College and the Junior Appointments Committee. Since retirement, the Professor Emeritus of Physics, Engineering, and Applied Science has been conducting a study of the Advanced Placement exams conducted by the College Board. In his published report of June 2000, Professor Lichten demonstrates that, counter to claims made by the College Board, the average test performance level has dropped and recommends that the College Board's concentration on numbers of participants should yield to an emphasis on student performance and program quality.

## Graduate Student Dissertations, Advisors, and Job Placements —

### 2000-2001

**Hei-Chi Chan**, “Generalized Seiberg-Witten Equations”; Gregg Zuckerman; Mathematical Sciences, University of Illinois at Springfield.

**Jia Chen**, “Molecular Wire, Switches and Memories”; Mark Reed; Semiconductor Research and Development Center, IBM Corporation, East Fishkill, NY.

**Ming Deng**, “Distance Scale to Gamma Ray Bursts”; Bradley Schaefer; System Engineer, Caxton Associates, LLC.

**Michael Ibrahim**, “Molecules and Nuclei: An Algebraic Sampler”; Francesco Iachello; Safeweb, Oakland, CA.

**Pankaj Khandelwal**, “OPNMR in the Quantum Hall Regimes”; Sean Barrett; Safeweb, Oakland, CA.

**Jonathan Lenaghan**, “Effective Theories for the Chiral Symmetry Restoring Phase Transition in Quantum Chromodynamics”; Tilo Wettig; Niels Bohr Institute, Denmark.

**Shichang Liu**, “Monte Carlo Methods for the Nuclear Shell Model and Their Applications”; Yoram Alhassid; Software Engineer, Tradeworx Inc, New York City.

**Michael Mahoney**, “The Computational Statistical Mechanics of Simple Models of Liquid Water”; William Jorgensen; Postdoc, Department of Chemistry, Columbia University.

**David Mitchell**, “Statistical Processes in Many Body Problems”; Dimitri Kusnezov.

**Bruce Roscherr**, “Select Radiation Transfer Problems in Astrophysics”; Paolo Coppi; Princeton Consultants (PCI), Princeton, NJ.

**Dimitrios Tsimpis**, “Aspects of Branes in String Theory”; Gregory Moore; Postdoctoral Fellow, Chalmers University of Technology and Göteborg University, Sweden.

**Mei Wang**, “Synchrotron Resonance Maser: Experimental and Theoretical Studies”; Jay Hirshfield; Software Engineer, CA.

**Rodney Yoder**, “Design and Operation of an Inverse Free-Electron-Laser Accelerator in the Microwave Regime”; Jay Hirshfield; Physics Department, University of New Haven.

### 1999-2000

**Daniel Bardayan**, “Explosive 17F ( $p,\gamma$ ) 18Ne Burning Through the 3+ State in 18Ne”; Peter Parker; Wigner Fellow at Oak Ridge National Laboratory, Oak Ridge, Tennessee.

**Alan Chen**, “The Structure of 22mg and Its Implications for Explosive Nucleosynthesis”; Peter Parker; TRIUMF, Canada’s National Laboratory for Particle and Nuclear Physics, Vancouver.

**Hanh Do**, “Improved Limit for the Decay  $K^+(\pi^+\mu^+e^-)$ ”; Michael Zeller; Postdoctoral associate, Yale University, Experimental Particle Physics.

**James Hormuzdiar**, “QCD and Hadronic Matter Under Extreme Conditions”; Alan Chodos; Centre for High Energy Physics, McGill University.

**Nicholas Kuzma**, “Optically Pumped NMR Study of Electron Spin Dynamics in the Fractional Quantum Hall Regime”; Sean Barrett; Postdoc, Princeton Atomic Physics Group.

**Thomas Moore**, “B Mixing with Inclusive Leptons at SLD”; Charles Baltay; Postdoc, University of Massachusetts, Physics Department.

**Stephen Pappas**, “Polarization of Decays of B Mesons to Two Vector Mesons”; Michael Schmidt; Postdoctoral Scholar, Physics, CalTech and Visiting Fellow, Nuclear Studies Laboratory at Cornell University.

**Jazmin Schwartz**, “Coulomb Excitation of a Radioactive Beam of 78Rb”; Peter Parker; Argonne National Laboratory.

**Kevin Walsh**, “Quantitative Characterizations of Co-flow Laminar Diffusion Flames in a Normal Gravity and Microgravity Environment”; Marshall Long; Mars & Co. Consulting.

**Qiang Wu**, “Imaging Spectroscopy of a Narrow GaAs/AlGaAs Quantum Well Using a Solid Immersion Lens Microscope”; Robert Grober; IBM Corporation.

### 1998-1999

**Seongsik Chang**, “Lasing Characteristics of Deformed Microcavities”; Richard Chang; Postdoctoral Associate in Applied Physics, Yale University.

**Kedar Damle**, “Turning on the Heat: Non-Zero Temperature Dynamical Properties of Quantum Many Body Systems”; Subir Sachdev; Postdoc, Harvard University.

**Evan Finch**, “Invariant Multiplicity of Neutrons in 11.5 A GeV/c Au-Pb Collisions”; Jack Sandweiss; postdoctoral research scientist, Yale University with the STAR experiment at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory.

**Nigel George**, “Kinematic and Centrality Dependencies of Light-Isotope Production in Relativistic Au-induced Nucleus-Nucleus Reactions”; Jack Sandweiss/B. Shiva Kumar; postdoctoral research scientist, Argonne National Laboratory, stationed at Brookhaven National Laboratory on the PHOBOS experiment at the Relativistic Heavy Ion Collider (RHIC).

**Ilya Gruzberg**, “Supersymmetry Method in the Study of Disordered Systems”; Nicholas Read; Institute for Theoretical Physics, University of California, Santa Barbara.

**Junseong Heo**, “Quantum Field Theory and Gravity: Black Holes and Dark Matters”; Thomas Applequist; Research Associate, University of Colorado.

**Andras Kaiser**, “Symmetry Breaking in Curved Spacetime”; Alan Chodos.

**Ronald Legere**, “Quantum Scattering in a Juggling Atomic Fountain”; Kurt Gibble; MIT Lincoln Lab.

**Sergei Redin**, “Preparation and First Result of BNL Experiment E821: A New Precision Measurement of the Muon (G-2) Value”; Vernon Hughes; Associate Research Scientist, Yale University.

**Jun Xie**, “Factors Affecting Nuclear Magnetic Resonance Measurements of Apparent Diffusion”; John Gore; Timber Hill LLC.

**Zhangbu Xu**, “Strange Quark Matter Search and Measurements of Light Nuclei Production in Relativistic Heavy Ion Collisions at the AGS Energies”; Jack Sandweiss; staff physicist at Brookhaven National Laboratory, STAR experiment at RHIC.

## Alumni Notes —

**Robert Birgeneau** ’66 PhD, president of the University of Toronto, delivered the fourth talk in the Yale Graduate School’s Tercentennial Lecture Series, “In the Company of Scholars” in April 2001. His talk was titled “High Temperature Superconductivity: Why Is It So Interesting and So Intractable?”

**Carmen A. Catanese** ’70 PhD was promoted to executive vice president for corporate strategic development at the Sarnoff Corporation in Princeton, New Jersey, where he has worked since 1970 on a number of key projects, including the development of digital satellite-to-home TV service; the reation of COTY, the world picture tube standard; and the development of multi-layer ceramic circuit boards for low-cost electronics.

Two Yale physics alumni have been awarded Yale Graduate School’s Wilbur Lucius Cross Medal in recent years. **David M. Lee** ’59 PhD, professor of physics at Cornell University and a 1996 Nobel Prize winner for his contributions to the discovery of superfluidity in helium-3, returned to Yale to receive the Wilbur Cross medal in 1998. **Allen Lee Sessoms** ’72 PhD, president of Queens College of the City University of New York from 1995–2000, was a Wilbur Cross medalist in 1999.



## Two Rutgers Awards Named for Yale Physics Alumni

*Editor's Note:* Upon being notified of the death of Richard T. Weidner '48 PhD and learning more about his life and work, the editors of this newsletter learned that the physics department at Rutgers University had established an undergraduate prize in his name. It was then that we discovered that another Yale physics graduate – Mary Wheeler Wigner '32 PhD – had also been so honored. The following are brief accounts of their work and lives.



The **Richard T. Weidner** Physics Prize is awarded annually to one or more Rutgers undergraduates who, in the judgment of the physics faculty, have demonstrated outstanding academic performance in physics. Weidner joined the Rutgers physics department in 1948, after serving in the U. S. Navy as a physicist at the Naval Research Laboratory in Washington, D.C. He received his PhD from Yale in 1948. In addition

to his accomplishments in research and writing, during his 40-year career at Rutgers, Professor Weidner was acclaimed for his skill and enthusiasm in the classroom. Indeed, according to his son, Christopher L. Weidner, he would have characterized his greatest professional achievements in terms of teaching. In 1984, he received the Lindback Award for Distinguished Teaching from Rutgers. Four years later, the Rutgers Society of Physics Students named him Outstanding Teacher of the Year. He once wrote that the one basic requirement for good teaching was a passionate belief in the value of what one is teaching, and continued, “One other element is crucial, I believe, especially for physics. It is to point out to the students, regularly, sensitively, powerfully what I have come to call the ‘message of physics’: the universe does make sense, with just a few basic ideas of great power, and it is truly astonish-

ing that we mere mortals can actually see how things are put together, how they work. The most exquisite moments of my teaching career have always come when I’ve told some anecdote or application that ended with my saying something like, ‘See, that’s the message of physics!’ Such moments were charged with an almost transcendent energy, as a hush falls, and we are all for a moment— students (at least some) and lecturer alike— lost in wonder.” Professor Weidner was a recognized expert in the field of electron-spin resonance. In addition to co-authoring several textbooks, including the pioneering *Elementary Modern Physics* in 1960, he published the highly successful *Physics* in 1985. Professor Weidner retired from Rutgers in 1988, and died on January 1, 2000 (see below).

Established in 1985, the **Mary Wheeler Wigner** Memorial Scholarship is awarded to one or more Rutgers physics majors in recognition of academic excellence. A native of Vermont, Wigner graduated from Wellesley College with a degree in physics and received a PhD from Yale in 1932 after completing her dissertation, “Magnetic Susceptibilities of Alpha-Manganese and Beta-Manganese.” For the next eighteen years, she was a faculty member in the Vassar College physics department. After moving about the country for several years with her husband, future Nobel laureate Eugene Paul Wigner, the family settled down in Princeton. After a sabbatical semester in Holland in 1956-57, Professor Wigner joined the physics department at Douglass College, formerly the New Jersey College for Women and currently a college within Rutgers. She continued to teach physics at Rutgers until her retirement in 1965. She died in 1977.



### IN MEMORIAM: ALUMNI AND FRIENDS

**William Waggaman Ennis** '51 PhD on September 23, 1999. Born in Houston, Mr. Ennis graduated from the Naval Academy at Annapolis, second in the class of 1942. After serving in the Navy during World War II, he earned a doctorate in nuclear physics from Yale in 1951, and retired from the Navy in 1963 with the rank of commander. He then worked in the Washington, D.C. area for BellComm and Vitro Corporation, and in New Jersey for Bell Telephone Laboratories and RCA. He retired in 1990.

**Cellissa Norcross Gowdy** (PhD '66, Molecular Biology and Biochemistry) on February 21, 2001. She was the wife of **Robert Henry Gowdy** (PhD '68, Physics) and a good friend of his classmates and the department.

**Richard C. Morrison** '65 PhD on May 1, 1999. He received a bachelor's degree from Princeton University in 1959, and was most recently professor of physics at the University of New Haven. He is survived by his wife, Patricia, and four daughters.

**Russell A. Peck, Jr.** '45, '47 PhD on March 7, 1999. He was a retired professor of physics at Brown University, where he had taught since 1948. He conducted research in experimental nuclear physics. For the past

two decades, his work had centered on cellular biophysics and the effects of radiation on tumor cells. In 1979 he developed a project laboratory, still in use, for teaching college physics. He is survived by two children.

**Oswald F. “Mike” Schuette Jr.** '49 PhD on August 6, 2000. After serving in World War II and teaching at the College of William and Mary, he received a Fulbright Fellowship to study at the Max Planck Institute in Mainz, Germany. From 1954 to 1958, he was a science liaison officer in West Germany for U.S. Navy Intelligence and played a key role working with defecting scientists. He then worked briefly at the National Academy of Sciences and spent the early 1960s as deputy director for space research at the Defense Department. Professor Schuette joined the physics faculty at the University of South Carolina in 1963. He retired two decades later. He is survived by four siblings, three children, and six grandchildren.

**Richard T. Weidner** '48 PhD, a retired dean and professor emeritus of physics at Rutgers University, on January 1, 2000, at the age of 78 in Allentown, Pennsylvania. (Please see the above article on Professor Weidner for more information.)

## Physics Department — Recent Statistics

### Graduate Students Entering Program:

2000-2001: 18

1999-2000: 21

### Actively Enrolled Graduate Students:

2000-2001: 88

### Undergraduate Majors:

2000-2001: 32

1999-2000: 29

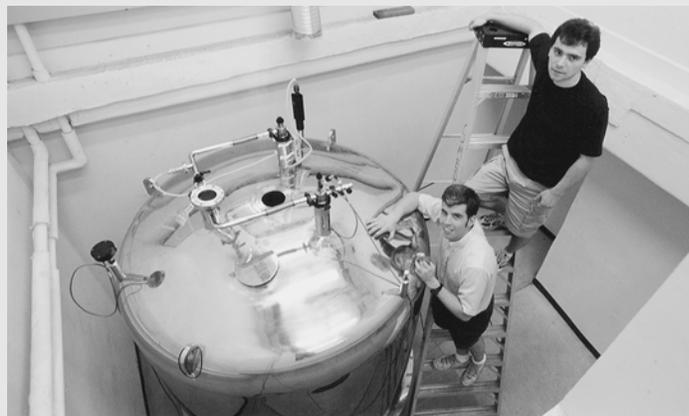
1998-1999: 39

### PhD Degrees Granted:

2000-2001: 13

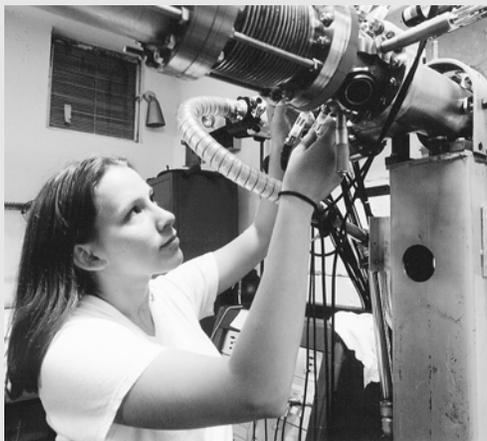
1999-2000: 10

1998-1999: 12



Above: Professor Barrett and graduate student Anatoly Dementyev pose by the department's new NMR magnet, a world-class facility unique to Yale.  
Below: Graduate student Jeff McGuirk and postdoc Greg Foster gaze into the department's gravity gradiometer.

Below: Graduate student Deseree Meyer '01 at work in the Wright Nuclear Structure Lab.



### MPhil Degrees Granted:

2000-2001: 7

1999-2000: 7

1998-1999: 9

### MS Degrees Granted:

2000-2001: 12

1999-2000: 14

1998-1999: 9

### BS Degrees Granted:

2000-2001: 12

1999-2000: 8

1998-1999: 14



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