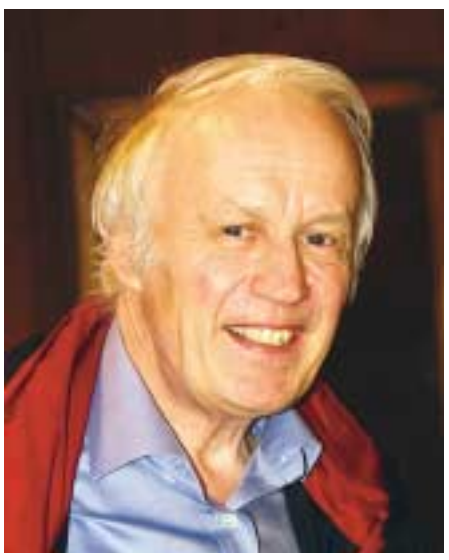
Physics Illinois News

THE DEPARTMENT OF PHYSICS AT THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN • 2003 NUMBER 2

Tony Leggett Named 2003 Nobel Laureate in Physics



Anthony J. Leggett, the John D. and Catherine T. MacArthur Professor and Center for Advanced Study Professor of Physics, has been awarded the 2003 Nobel Prize in Physics. He shares the prize "for pioneering contributions to the theory of superconductors and superfluids" with Alexei Abrikosov of Argonne National Laboratory and Vitaly Ginzburg of the Lebedev Physical Institute in Moscow.

In her announcement on October 7, 2003, University of Illinois Chancellor Nancy Cantor stated that "Tony Leggett has shaped our understanding of superfluids and set directions for research in the quantum physics of macroscopic systems and the use of condensed matter systems to test the foundations of quantum mechanics. He is a master at understanding how the most fundamental laws of nature—the weird world of quantum mechanics that tells us how atoms work—apply to the everyday world we live in. . . . He has added immeasurably to the rich intellectual development of condensed matter physics at the University of Illinois, and he has unlocked the door to discovery, that greatest of all human endeavors."

The decisive theory explaining how the helium atoms interact and are ordered in the superfluid state was formulated while Leggett was working at the University of Sussex in England. Theorists had long expected that ^{3}He would become a superfluid and predicted the transition temperature.

In 1972, Douglas Osheroff, Robert Richardson, and David Lee at Cornell discovered the superfluid state of ^{3}He through their experiments with nuclear magnetic resonance. Because there were major aspects of their data that they did not understand, they transmitted this information to several theorists, including Leggett. According to Richardson, Leggett came up with the explanation in less than three weeks, working out the complete theory from their data.

That discovery was indeed worthy of a Nobel Prize, and in 1996, the award was given to the original three experimenters. In the announcement of the 1996 Nobel Prize in Physics, Leggett was cited for assisting the prize winners in their interpretation of the experiments that led to a breakthrough in low-temperature physics.

In his statement to the media on October 7, Leggett said that he had thought about winning a Nobel Prize some day, but, "realistically, I gave myself a 10 percent chance." He noted that his work exploited and applied the Nobel Prize-winning work on superconductivity by John Bardeen and colleagues Leon Cooper and Robert Schrieffer, adding, "I'm sure without my postdoctoral year here, this work would never have been done." (Leggett worked with David Pines as a postdoctoral research associate in 1964–65.)

When Leggett came to Illinois as the John D. and Catherine T. MacArthur Chair in 1983, he was already widely recognized as a world leader in the theory of low-temperature physics. According to Ralph Simmons, professor emeritus and head of the Department of Physics at that time, the MacArthur Foundation had settled on 10 universities that were to be given endowments for professorships. The University of Illinois was one of only two public universities on the list.

"When the Department got an opportunity to compete for the MacArthur professorship awarded to this campus, we thought at once of Tony Leggett," Simmons explained. "I called him about our enthusiasm to nominate him, and he had no questions about the quality of the Department. He did comment, however, that he'd heard that all the magnificent elm trees were gone. Fortunately, he and his family consented to visit anyway. We have been extremely fortunate, ever since, to enjoy his many contributions to departmental life." ■

Physics Van Milestone—Almost 50,000 Smiles and a Van of Its Own

Now in its 10th year, the Physics Van (http://van.hep.uiuc.edu/) is one of the University of Illinois' most successful outreach programs. More than 60 undergraduate student volunteers from physics and engineering spend countless hours each semester in a traveling science road show, bringing the wonder of scientific discovery to children.

The Van will soon present Show #400. To date, more than 47,000 youngsters, parents, and teachers have experienced the adventure that is "doing physics," thanks to the ingenuity, dedication, and plain hard work of these outstanding students.

The College of Engineering recently recognized the importance of this innovative program by giving the department its very own van. No longer will the Van crew have to load and unload a vehicle from the University motor pool for every show.

Every week throughout the academic year, Van volunteers travel to elementary and middle schools throughout Illinois. They have been as far north as Madison, Wisconsin (where they performed—and won third place!—at the University of Wisconsin's Engineering Expo), and as far west as Snowmass, Colorado (where they showed the high-energy physicists attending the 2001 Snowmass Conference how to bring science to the public). They even had a two-day gig at the Adler Planetarium in Chicago in May, and they are an annual summer attraction at the University of Illinois tent at the Illinois State Fair.

Recently, two of the Van volunteers—Sara W. Pogatshnik and Jonathan D. Wilson—were recognized with the 2003 Physics Student Outreach Award. The award, which was instituted in the mid-1990s, is given annually to one or two students who have shown a special interest and aptitude for sharing their love of physics with children.

In addition to the live shows, Van volunteers also staff a web-based "Ask the Physics Van" service, answering

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Tim McArdle, a student coordinator of the Physics Van, demonstrates how nitrogen changes from a liquid into a gas—with a giant soap explosion.

Letter from the Head

We have focused this edition of *Physics Illinois News* on some of our vibrant educational initiatives and outreach programs. I'm sure you will be proud of the efforts that your department is making to ensure that all our students have the opportunity to succeed and that they are well prepared for their future careers. We also take as part of our mission encouraging more young people to consider scientific and technical pursuits and making science more accessible to the general public.

In other good news, our incoming undergraduate and graduate student numbers are up substantially; the Fall 2003 entering graduate class was the largest in several decades, and the quality of the students is outstanding.

Of all of the happenings since the last newsletter, the highlight is the announcement that came from Stockholm early in the morning of Tuesday, October 7, 2003—Anthony J. Leggett, John D. and Catherine T. MacArthur Professor of Physics and Center for Advanced Study faculty member, had won the 2003 Nobel Prize in Physics. The news was electrifying, and it is a fitting tribute to an extraordinary physicist and a colleague who is generous with his time and ideas with faculty, postdocs, and students alike. The next day at the start of Tony's class, "Superconductivity: Ancient and Modern," his students paid him a heartfelt tribute by presenting him their writing pens—a moment inspired by a scene in the movie *A Beautiful Mind.*

The faculty's harvest of awards, prizes, and accomplishments over the past year has been a rich one. In addition to Nobel and Wolf prizes won by Tony Leggett, Dale Van Harlingen was chosen for a College of Engineering Willet Professorship and elected to the National Academy of Sciences. Jim Wolfe was recognized with the APS Frank Isakson Prize. Gordon Baym was invested as a George and Ann Fisher Distinguished Professor of Engineering, and Naomi Makins and Ali Yazdani were named Willett Faculty Scholars. These are just a few highlights of the many junior and senior faculty members who have received highly competitive awards for research, teaching, and service.

A number of alumni have also been honored for their work, including Dale Compton, Richard Norberg, and Julie Ann Wade Borchers. Although these are the ones we are aware of, undoubtedly I am overlooking numerous other alumni achievements. Do keep me informed of your activities, achievements, and awards.

Another success in the past academic year was the completion in early summer 2003 of the $3 million remodeling project for the top five floors of the Engineering Sciences Building (ESB), the high-rise section of the former Coordinated Science Laboratory. The remodeling converted dysfunctional space assigned to Physics many years ago into a bright and interactive new home for the condensed matter theory group—faculty, postdocs, and students alike. The remodeling also provides larger and more attractive space for all of our junior- and senior-level laboratory courses, including a new spectroscopy lab course. Areas that have opened up in Loomis by these moves to ESB are being put to new uses, providing badly needed research space for existing and new faculty members.

In the midst of our successes, however, is the ongoing concern about our financial well-being. A second year of reductions in State of Illinois' recurring funding for the University of Illinois has created budgetary crises at all levels in the system. Fortunately, the effect on the Department of Physics—while significant—was somewhat less than the reductions at the College of Engineering and overall UIUC levels.

We were able to provide modest raises for faculty, staff, and graduate TAs and RAs. These increases were essential to retaining our competitiveness, given the salary freeze of the preceding year. We were also able to make a superb new hire in the atomic, molecular, optical area, thereby expanding our thrust in quantum information research. Additional faculty searches are underway this year.

Sustaining the excellence and competitiveness of the Department of Physics in the future will require new sources of funds and additional space. There is little hope that the long-term trend of decreasing state funding for the University will reverse or even halt. Private gifts, named professorships and endowed chairs, undergraduate scholarships, stipends for undergraduate summer research, and graduate fellowships will all be needed in much greater measure than in the past.

As we will rapidly saturate the newly available space in Loomis, it is apparent that additional space will soon be needed. The best solution appears to be a second building, in close proximity to Loomis, containing a mix of teaching and research functions. But funding for an adjunct building is unlikely to come from the state alone.

Through these times, as in the past, "excellence and collegiality"—the legacy of Wheeler Loomis—will guide us as we address the challenges of the future.

Jeremiah D. Sullivan

More Nobel Excitement for Physics

On October 6, 2003, University of Illinois Professor Paul Lautebur and former Physics postdoctoral research associate Sir Peter Mansfield were awarded the 2003 Nobel Prize in Medicine or Physiology. Mansfield was a postdoctoral research associate with Charles Slichter from 1962–64. Lauterbur is a Center for Advanced Study professor of chemistry and holds appointments in the bioengineering program and the UI Center for Biophysics and Computational Biology. In the prize announcement, Lauterbur and Mansfield were lauded for "seminal discoveries concerning the use of magnetic resonance to visualize different structures. These discoveries have led to the development of modern magnetic resonance imaging, MRI, which represents a breakthrough in medical diagnostics and research." ■

Physics Alumni Association "March Meeting" Reception

Join fellow alumni and faculty for a festive Physics Illinois reunion at the 2004 APS March meeting. Learn about the latest developments at Illinois while you greet old friends and meet new ones. All Illini welcome!

Tuesday, March 23, 2004 • 6:00 to 8:00 p.m.
Marquette Room of the Fairmont Queen Elizabeth Hotel
900 Rene Levesque Quest • Montreal, Canada

For more information contact Celia M. Elliott at cmelliot@uiuc.edu.

Dale Van Harlingen Elected to the NAS

Congratulations to Professor Dale Van Harlingen, who was elected to the National Academy of Sciences (NAS) on April 29, 2003. He was one of 72 new members and 18 foreign associates from 11 countries recognized for their distinguished and continuing achievements in original research.

Van Harlingen is a professor of physics and investigator at the Frederick Seitz Materials Research Laboratory. In 1998, he received the prestigious Oliver E. Buckley Prize in Condensed Matter Physics from the APS, and he was elected a member of the American Academy of Arts and Sciences in 1999.

Election to the NAS is considered one of the highest honors that can be accorded a U.S. scientist. The Academy was established in 1863 by a congressional act of incorporation, signed by Abraham Lincoln, which calls on the Academy to act as an official adviser to the federal government, upon request, in any matter of science or technology.

In July, Van Harlingen was also named a Donald Biggar Willett Professor in the College of Engineering. The Willett Professorships honor the late Mr. Willett, who attended the UI from 1916–22. As a result of a bequest by his wife, Elizabeth Marie Henning Willett, the College of Engineering established the Willett Research Initiatives Fund in 1994, which is used to support scholarships, fellowships, research awards, and other activities. The purpose of the Willett Professorships is to increase the distinction of the college and its departments by recognizing and stimulating intellectual leadership and outstanding research. ■

Alumni News

More 2002 APS Fellows!

We regret that we overlooked two new APS Fellows in the last newsletter:

Alumna Julie Ann Wade Borchers (M.S. '85; Ph.D. '90) was cited "for her insightful neutron investigations into interlayer exchange interaction phenomena in magnetic thin films and superlattices." Dr. Borchers works at the Center for Neutron Research at the National Institute of Standards and Technology.

And our colleague Dr. Martin Gruebele, professor of chemistry, physics, and biophysics at Illinois, was cited "for pioneering the field of the study of the early events in protein folding using laser temperature jump initiation and fluorescence lifetime detection." Professor Gruebele received his B.S. degree in 1984 and his Ph.D in 1988 from the University of California at Berkeley. After working as a postdoctoral fellow at the California Institute of Technology, he joined the faculty of the University of Illinois in 1992. His research interests are in chemical physics and chemical biology, using energy-resolved and ultrafast lasers to probe and manipulate the dynamics of complex chemical systems. ■

Were You In the Ensemble?

At his 60th birthday party in 1968, John Bardeen was presented with a "superconductor" collage by Paul Handler (left) and J. Robert Schrieffer. The collage, which was assembled by Schrieffer (who later shared the 1972 Nobel Prize in physics with Bardeen and Leon Cooper), depicted Bardeen as the "superconductor" of his "grand canonical ensemble" of students.

The collage, which hung in Bardeen's office for many years, has recently surfaced. After it has been reframed, we would like to hang it in the newly remodeled quarters for the condensed matter theorists. Unfortunately, we have been unable to identify all those pictured, and we need your help. Close-ups from the collage are available at www.physics.uiuc.edu/Alumni/Bardeen_photo.htm. If you are pictured, or recognize someone who is, please forward the individual's name (and image number) to cmelliot@uiuc.edu. ■

This photo is courtesy of Lillian Hoddeson, co-author of Bardeen's biography, **True Genius.**

Alumnus Richard Norberg Receives the ISMAR Prize

Richard E. Norberg (A.M. '47; Ph.D. '51) has received (with his former student, Irving Lowe) the triennial prize awarded by the International Society of Magnetic Resonance (ISMAR), which recognizes outstanding achievement in magnetic resonance science. Their work was fundamental to the widespread use of Fourier transform for high-resolution NMR as well as to a wide variety of schemes using magic-angle spinning to determine molecular structures.

Norberg is a professor of physics at Washington University, St. Louis. As the first thesis student of Professor Charles P. Slichter, Norberg joins six other distinguished Illinois faculty and students who have won the ISMAR prize. They include Erwin L. Hahn (M.S. '47; Ph.D. '49), Herbert A. Gutowsky (Professor of Chemistry), Charles P. Slichter, Paul C. Lauterbur (Professor, Beckman Institute), Sir Peter Mansfield (postdoctoral research associate, 1962–64), and Alfred G. Redfield (M.S. '52; Ph.D. '53).

ISMAR is a society devoted to the advancement of magnetic resonance and its applications. Its triennial ISMAR meeting is one of the largest such scientific conferences, bringing together magnetic resonance practitioners from many countries and from all domains, including NMR, NQR, ESR, MRI, ICR, and aspects of coherent optics. ■

Compton Honored With Alumni Award

W. Dale Compton (Ph.D. '55) was honored with the 2003 College of Engineering Alumni Award at the Honors Convocation in April. He was cited for "substantive research achievements in unraveling the behavior of defects and color centers in solids, exceptional leadership in engineering practice and management, and enduring contributions to engineering education."

After earning a bachelor's degree in physics from Wabash College and a master's in physics from the University of Oklahoma, Compton began his professional career as a research physicist for the United States Navy at the U.S. Naval Ordinance Test Station at China Lake, California. In 1952, he came to the University of Illinois earning a Ph.D. in experimental condensed matter physics before continuing his research efforts at the Naval Research Laboratory in Washington, D.C.

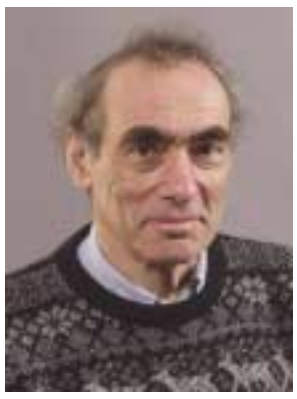
Compton returned to the Urbana-Champaign campus as an associate professor in 1961. He was promoted to full professor in 1964 and was appointed the director of the Coordinated Sciences Laboratory (CSL) at Illinois the following year. As director of the CSL, Compton expanded its interdisciplinary mission and broadened its focus, building a world-class reputation in control, computer, and communication systems. The CSL developed theories and created landmark inventions that were considered to be years ahead of their time.

In 1970, Compton joined the Ford Motor Company in Dearborn, Michigan, as director of its Chemical and Physical Sciences Laboratory. He was named executive director for research in 1972, and later served as Ford's vice president for research from 1973 to 1986. There he promoted innovations in modeling and simulation of the design and manufacture of automotive components and systems, leading to a number of technological breakthroughs that enabled Ford to develop superior products and produce them successfully worldwide.

Since 1988, Compton has been the Lillian M. Gilbreth Distinguished Professor of the School of Industrial Engineering at Purdue University. He has been active in the oversight of the School's Center for Cooperative Manufacturing, undertaking research on the unit processes of manufacturing and focusing on improving the productivity and quality of manufacturing systems. He also served as the interim head of the School of Industrial Engineering from 1998 to 2000.

Compton's research and professional achievements led to his election to the National Academy of Engineering (NAE) in 1981, where he was named the first-ever NAE Senior Fellow in 1986. He served the Academy as its director of industrial and education-related activities from 1986 to 1988, and chaired an NAE panel to assess U.S. engineering practice and to address competitiveness issues. Compton was elected to a four-year term as the NAE's home secretary in 2000. He is a fellow of the American Physical Society, the American Association for the Advancement of Science, the Engineering Society of Detroit, and the Society of Automotive Engineers. He received the American Society of Mechanical Engineers' M. Eugene Merchant Manufacturing Medal in 1999. ■

Gordon Baym Named George and Ann Fisher Distinguished Professor of Engineering



At a special investiture ceremony on October 15, 2003, Gordon Baym was named the first holder in physics of the George and Ann Fisher Distinguished Professor of Engineering. Now in his 40th year as a member of the faculty, Baym has also been a Center for Advanced Study Professor of Physics since 1993.

A leader in the study of matter under extreme conditions in astrophysics and nuclear physics, Baym has made original, seminal contributions to our understanding of neutron stars, relativistic effects in nuclear physics, condensed matter physics, quantum fluids, and most recently, Bose–Einstein condensates. His work is characterized by a superb melding of basic theoretical physics concepts, from condensed matter to nuclear to elementary particle physics.

Baym received his bachelor's degree in physics from Cornell University in 1956, his A.M. in mathematics from Harvard in 1957, and his Ph.D. in physics from Harvard in 1960. He joined the Department of Physics at the University of Illinois as an assistant professor in 1963.

His current projects include evolution of ultrarelativistic heavy-ion collisions, studies of dense matter applied to the problem of neutron star interiors, and other problems in astrophysics; correlations between nucleons in nuclei and of subnuclear degrees of freedom, as seen in high-energy lepton scattering; studies of nuclear vibrational modes applied to scattering experiments on nuclear bound states, giant resonances, the quasi-elastic region, collective motion at finite temperature, and Bose–Einstein condensation of trapped atomic gases.

Baym is a member of the National Academy of Sciences (where he has served as chair of the Physics Section), a member of the American Philosophical Society, a Fellow of the American Academy of Arts and Sciences, a Fellow of the American Association for the Advancement of Science, and a Fellow of the American Physical Society. ■

George M. C. and Ann Fisher

George M. C. Fisher, a native of Anna, Illinois, earned a bachelor's degree in civil engineering from the University of Illinois in 1962. After receiving master's and doctoral degrees from Brown University, he began his career at AT&T Bell Laboratories and later joined Motorola, Inc., eventually becoming the company's chairman and chief executive officer. He assumed leadership of Eastman Kodak Company in 1993.

Fisher, with his wife Ann Wallace Fisher, has funded two George and Ann Fisher Distinguished Professorships and two Ralph M. and Catherine V. Fisher Professorships—the latter in honor of his parents—in the College of Engineering. ■

Carolyn Wright Retires

On March 31, 2003, the Department bid farewell to Carolyn Wright as she began a well-deserved retirement. Carolyn began working for the Physics Department as a clerk-typist in December 1973. She worked in the graduate office for a number of years before joining the business office, where she was promoted to program administrative assistant, responsible for visas, payroll, and grant applications.

Carolyn's friendly smile and quiet professionalism will be sorely missed by all of us in the Department, but we wish her well as she enjoys spending more time with her children and grandson. ■

Paul Selvin Receives Second Award from the Biophysical Society

Paul Selvin has received the Biophysical Society's 2004 Michael and Kate Bárány Award for Young Investigators. Established by the Biophysical Society in 1992 and renamed in recognition of the endowment gift from Michael and Kate Bárány in 1998, the award recognizes outstanding contributions to biophysics by a person who has not yet achieved the rank of full professor at the time of nomination. Selvin also won the 1999 Fluorescence Young Investigator Award of the Biophysical Society.

After joining the Department in 1997 as an assistant professor, Selvin was promoted to associate professor in 2000. Selvin studies the structure and dynamics of biological macromolecules using biophysical techniques—particularly fluorescence. Specific biological systems of interest include molecular motors (conventional and unconventional myosins, kinesins), voltage-controlled ion-channels (Shaker potassium), and ligand-gated ion channels (GABA, Acetylcholine). His work focuses on both technology development and biological applications. Selvin has pioneered new luminescent lanthanide probes, single-molecule fluorescence methods, and new forms of fluorescence resonance energy transfer. ■

Benjamin Wandelt Named 2003–04 NCSA Faculty Fellow

Ben Wandelt, assistant professor of physics and of astronomy, is among eight Illinois faculty chosen by the National Center for Supercomputing Applications (NCSA) to participate in the fifth annual NCSA/UIUC Faculty Fellows Program, which extends opportunities in advanced computing and information technology to Illinois researchers. Faculty Fellows have access to NCSA's high-performance computers and visualization and virtual reality environments and have opportunities to collaborate with colleagues at NCSA and throughout the National Computational Science Alliance.

Wandelt plans to use his fellowship to develop parallel algorithms for cosmological statistics, building production-quality parallel implementations of his group's advanced computational methods to analyze cosmic microwave background (CMB) data taken by the Wilkinson Microwave Anisotropy Probe (WMAP). Wandelt believes that his codes will be uniquely capable of handling the complexities of future CMB data sets, promising an enduring role for NCSA at this fast-moving frontier of cosmology. ■

Vijay Pandharipande Named CAS Professor

Vijay R. Pandharipande was appointed to the Center for Advanced Study in August. Professors are permanent members of the Center, selected from the faculty on the basis of their outstanding scholarship. These appointments are among the highest forms of faculty recognition on the Urbana campus.

Much of Professor Pandharipande's research is aimed toward developing a unified theory of all nuclear systems, ranging from the lightest nuclei to the heaviest neutron stars. With several graduate students and collaborators, he developed realistic models of nuclear forces and methods to solve the quantum nuclear many-body problem. Some of these methods have found applications in other branches of physics and chemistry.

In 1999, Pandharipande received the Bonner Prize of the American Physical Society. He has served as chair of the Advisory Committee of the National Institute of Nuclear Theory and is a member of the joint National Science Foundation and Department of Energy Nuclear Science Advisory Committee. He received his doctorate from Bombay University in 1969 and joined the Department of Physics in 1973. ■

Outreach and Education

Steve Errede Shows Children that Physics Can Be Fun!

The old Orpheum Theatre in downtown Champaign, listed on the National Register of Historic Places, found new life in the 1990s as the home of a museum where kids can explore the wonders of science in an informal setting. Billing itself as a "hands-on children's science center where science takes center stage," the Orpheum Children's Science Museum hosted Professor of Physics Steven M. Errede on March 1, 2003, as part of *Sound Wizard Weekend*.

Using a bronze Tibetan bowl to generate sounds, Steve Errede shows children how the sound creates a waveform on an oscilloscope and displays the harmonics on an HP 3561A Dynamic Signal Analyzer.

Never one to do anything by half, Steve prepared several demonstrations on the physics of music and spent a Saturday explaining them to children and their parents. Although he claims "my impedance match is not so good with little kids," Errede clearly wowed his audience, showing them that although physics is challenging, it is also interesting and a lot of fun.

He is currently working on an installation for the museum that would enable children to observe the waveforms associated with the sounds that they generate and hear. Although the setup must be robust, easy to maintain, and safe for children to operate, we're betting that the experimentalist in Errede will come up with an engaging solution.

Illinois students have also benefited from Errede's wide-ranging musical interests. He has developed two undergraduate courses, a "discovery" course for freshmen and a hands-on "physics of electronic musical instruments" for advanced undergraduates. The freshman course features lab demonstrations and experimental setups for "learning by doing." Topics include the physics of sound (propagation of sound waves), the physics of hearing (psychoacoustics), the physics of music (all musical styles, and music in the natural world—living organisms and physical processes), and the physics of musical instruments (brass, wind, strings, percussion, song, electronic, computer and beyond).

The advanced course, which allows students to build their own electronic musical instruments or amplifiers, explores the physics of electric stringed instruments, keyboard instruments, and amplifiers—how and why they work the way they do—and how the characteristic sounds of rock and roll, blues, and jazz music were and are created. The history of scientific and technological advancements that lead to the development of electronic musical instruments is also covered. ■

Saturday Physics Program Celebrates 10 Years

After 10 years of fun and enlightenment, the Saturday Physics Honors Program has become an institution. On December 6—after the last lecture of the Fall 2003 season—we celebrated the beginning of the new decade of the Saturday Program with some liquid nitrogen ice cream and a birthday cake.

The Program, administered by physicists Professor Kevin Pitts and Dr. Inga Karliner, with Program Coordinator Nicole Drummer, consists of a series of lectures on modern aspects of the physical sciences held every other Saturday beginning in September and ending in early December. Although designed for high school students, the Program is open to the general public and regularly attracts college students, teachers, and community residents who take advantage of this unique opportunity to meet world-class researchers in a relaxed, interactive setting. Participants learn about recent advances in the physical sciences, see how physics inspires modern technology, and view its impact on our everyday lives. One of the lectures is traditionally followed by a guided tour of many Physics Department research groups and their laboratories.

Program Coordinator Nicole Drummer cuts the SPH Anniversary cake. Nearly 250 people helped us celebrate ten great years of physics on December 6.

In 10 years and 70 sessions, 53 different lecturers have made presentations to approximately 7,000 individuals! Many recent alumni worked on the Program as members of the Society of Physics Students, helping high school students in the audience get to know the University. The lecturers who volunteer for the program have included new faculty members—together with equally enthusiastic members of the National Academy of Sciences—and distinguished visitors. They share their interests and explain how things work—from MRI, transistors, liquid crystals, and the global positioning system to neutron stars, quarks, gluons and black holes. ■

George Gollin Receives Third Nordsieck Teaching Award

George D. Gollin received the third annual Arnold Nordsieck Award for Teaching Excellence in Physics for developing innovative honors sections for the introductory calculus-based physics courses to challenge undergraduates and to share with them the excitement of physics.

Gollin began by creating an honors section to complement the introductory electricity and magnetism course, Physics 112. Students now have the option of enrolling for an extra discussion section (and an additional hour of credit), where they can explore a limited range of topics at a deeper level. In weekly meetings, students work together in small groups to solve problems created by Gollin and then discuss the conclusions that can be drawn from their results. Students thus derive for themselves some of the surprising features of our postclassical physical world. Topics covered range from using Mathematica® to visualize fields and potentials to the electrodynamics of barbecuing.

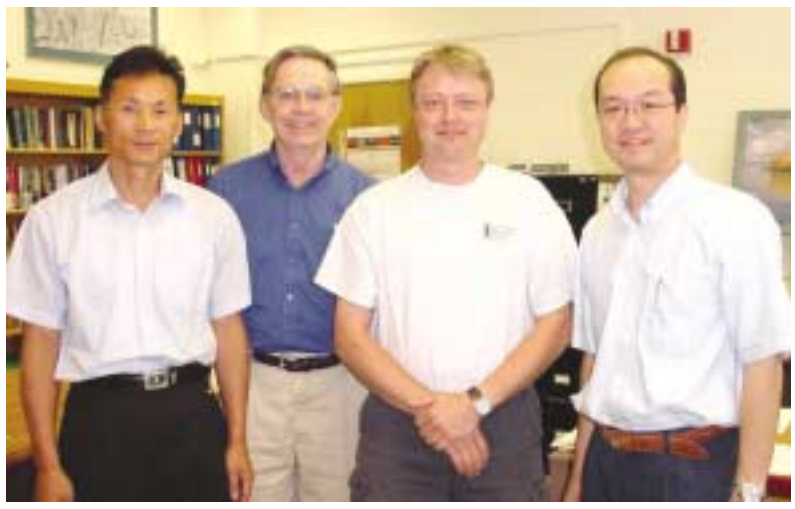
Gollin's initiative, and the extremely positive student response, have nucleated the creation of honors sections for Physics 111—General Mechanics, Physics 113—Thermodynamics, and Physics 114—Quantum Mechanics.

Arnold T. Nordsieck, a professor of physics at Illinois from 1947 to 1961, was a brilliant theorist with an uncommon affinity for experiment. A specialist in the mathematics of computation, he (with Hicks and Yen) successfully solved the full nonlinear Boltzmann equations for computational fluid dynamics and rarefied gas dynamics. He proposed the first electrostatically supported gyroscope and build the first computer to be used at Lawrence Livermore National Laboratory, the Nordsieck Analog Computer. The Nordsieck Award is made possible by a gift from the Nordsieck family. ■

Educators Come from Korea to Learn about Physics Outreach

Dae-Eun Kim, a professor of mechanical engineering at Yonsei University in Seoul, South Korea, and Jong-Heon Kim, Hwasung Elementary School, Seoul, visited Urbana to learn more about the successful outreach programs pioneered by the Department of Physics.

Professor Kim stated that dropping enrollments in the sciences, engineering, mathematics, and technology is a matter of great concern to Korean leaders, and educators there are very interested in U.S. methods of encouraging young people to pursue science careers. Just as the United States saw many of its core domestic manufacturing industries move offshore in the 1970s and 1980s, Korea now fears that without technology leaders, it will see its burgeoning electronics and high-tech industries move to countries with lower labor costs, such as the Republic of China.



From left, Jong-Heon Kim, Jeremiah Sullivan, Mats Selen, and Dae-Eun Kim.

Physics Van faculty adviser Mats Selen presents a "Van Crew" tee shirt to Korean visitor Jong-Heon Kim, Hwasung Elementary School, Seoul, South Korea.

While at the University of Illinois, the Korean educators met with Physics faculty and staff, learned about the Physics Van, the Saturday Physics Honors program, and the "Whys Guy." They also spoke with Physics Head Jeremiah Sullivan and attended a physics session of the G.A.M.E.S. (Girls' Adventures in Mathematics, Engineering, and Science) Camp. The G.A.M.E.S. Camp, held each summer at the University of Illinois, provides academically talented girls with the opportunity to explore math, engineering, and science through demonstrations, classroom presentations, hands-on activities, and contacts with professionals in the technical fields. Mats Selen has assisted with G.A.M.E.S. for the last three years. ■

Welcome to Brian DeMarco

photo by Bill Wiegand

RESEARCH: Atomic, molecular and optical physics with an emphasis on quantum information science.

TEACHING: Laboratory sections of Physics 102—General Physics; faculty coordinator of all lab sections of Physics 102.

Assistant Professor Brian DeMarco joined the Department of Physics in August 2003. He received his B.A. in physics, with a mathematics minor, from the State University of New York at Geneseo in 1996, graduating *summa cum laude*. As an undergraduate researcher, he worked on calibrating and developing neutron detectors for laser-driven inertial confinement fusion experiments.

He earned a Ph.D. in physics from the University of Colorado at Boulder in 2001, where he extended magnetic trapping and evaporative cooling techniques used to produce atomic Bose–Einstein condensates to create the first quantum degenerate Fermi gas of atoms. This achievement merited *Science* magazine's imprimatur as one of the "top ten scientific discoveries of 1999," earning DeMarco the first JILA Scientific Achievement Award. In 2002, he received the American Physical Society's DAMOP Thesis Award.

From 2001 to 2003, he was a National Research Council postdoctoral research fellow, working with David Wineland at the National Institute of Standards and Technology (Boulder) on quantum computing experiments with trapped atomic ions. DeMarco's work with the Ion Storage Group focused on developing improved quantum logic elements and "scaling-up" the complexity of quantum information processing tasks with trapped ions.

"Brian is an outstanding addition to the UI faculty because of his strong interests in teaching and his demonstrated excellence as a scientist," said Jeremiah D. Sullivan. "He already has received prestigious awards recognizing his research accomplishments. In addition, he plans to include undergraduate students at Illinois in his research program, knowing first-hand how stimulating that experience can be." ■

Congratulations Graduates!

On May 17, faculty and staff celebrated with family and friends of the Class of 2003 in the annual Physics and Astronomy Commencement Convocation. Matthew Rakher (LAS Physics, 2003) presented the welcome address and introduced David Hertzog, professor of physics, who was selected by the graduating students as the Convocation's featured speaker.

One of the most highly regarded instructors in the department, Hertzog has won nearly every teaching award given by the College of Engineering at Illinois.

Jeremiah Sullivan, head of the Department of Physics, recognized individually the 43 physics graduates. He was followed by Astronomy Department Chair Lewis Snyder, who recognized the two astronomy graduates in this year's class. The Convocation, which was held in 141 Loomis Laboratory of Physics, was followed by a reception in the lobby. ■

Matthew Rakher and Department of Physics Head, Professor Jeremiah Sullivan

David Hertzog was the Convocation's featured speaker

Beth Bye (Astronomy, 2003) introduced Astronomy Department Chair, Professor Lewis Snyder

Physics Is Hard, Not Impossible

By Tina Prow

Physics is one of the most challenging course sequences many engineering students take. For too many, the first physics class is the last. They not only drop the course, but also leave the engineering program. Determined to keep more good students in engineering, physics faculty developed a preparatory course—now they just have to convince students to take it.

"Failure in physics has little to do with how bright students are. It has to do with the fact that physics is hard," said Gary Gladding, professor and associate head of the Physics Department. "It takes time to understand physics, and students who are not at the right level of preparation can get in trouble."

On average, 20% of students fail or withdraw from introductory physics each semester. That percentage increases for minority students—almost double for Hispanics and more than triple for African-American students.

Those numbers could change as more students take advantage of Physics 100, a new course designed to prepare students for their first physics sequence. The course is part of a broad curriculum revision under way in physics. In the past few years, faculty members have adopted new classroom instruction techniques, used more collaborative learning, Web-based interactive instruction, and introduced more experience- and concept-based problem-solving strategies. Students are reacting positively, and more faculty and teaching assistants have made campus teaching excellence lists than ever before.

The Physics 100 course recognizes that students arrive with a variety of backgrounds in math and science. Although introductory physics starts at the beginning, the pace is fast and students who have not seen the material before often fall behind. Physics 100 fills those gaps and brings students up to the level expected for the Physics 111 and 112 sequence. In addition, the course continues to support students as they take the physics sequence by providing supplemental materials and small classroom instruction—a tutoring environment of sorts.

"I've come to understand that it's important to have not only good instruction, but also a good support structure for the transition as students navigate changes in their environment. It's also important for students to come together to sort out common problems. We're hoping that takes place in Physics 100," Gladding said.

Data from four years show Physics 100 works—for those who enroll. The class is not required and draws only about 120 students, but more could benefit from it, Gladding said. A voluntary self-evaluation test on the Web can help students find out if they should enroll.

To encourage students from underrepresented groups to take advantage of the course, the college recently began providing financial aid for enrollment. The program is supported by a grant from the National Science Foundation, administered through the college's Minority Engineering Program.

Teaching Assistant Sara Wright moves between the tables as part of the "tutoring environment."

According to Gladding, "We know these student are good, or they wouldn't be here. So the question becomes this: is there enough support and appropriate structure for them to be successful? It's just not enough to admit students and say 'good luck'."

The course is not static, he added. It is one of several components of a larger research project that the Physics Education Research Group has under way to evaluate new techniques for teaching and learning. Researchers will look at indicators for success and make adjustments as needed to improve the course.

"We've been successful for other students and have an expectation that this course will work for minority students as well. We'll look at data and try to figure out what we might need to do differently, if anything," Gladding said. "If we can remove the barrier of this first physics sequence, then maybe we'll have larger retention—that's a critically important goal." ■

David Hertzog Recognized for Innovative Instruction

Professor of Physics David W. Hertzog received the 2003 BP Amoco Award for Innovation in Undergraduate Instruction for his novel approach to preparing advanced undergraduate students for careers in physics. During the last three years, he has developed an integrated three-semester sequence of classroom instruction and research training that emphasizes communication and teamwork skills. As one of the most able and most highly regarded instructors in the Department of Physics, Hertzog has won nearly every teaching award given by the College of Engineering.

Physics 398IPR differs considerably from the conventional "lecture with readings" style of instruction. Hertzog meets with prospective participants individually to determine their interests, previous research experience, and aptitudes. He then carefully matches each student with a research adviser, who agrees to supervise the student on a summer research project.

The course itself emphasizes "learning by doing." For example, students begin with five-minute talks on a research paper they have read or a one-paragraph abstract that they have written. Communicating in science, to different audiences on a variety of subjects, is emphasized. As part of the teaching team, Celia Elliott, director of external affairs and special projects for the Department of Physics, contributes her expertise as a science writer and technical editor.

Students begin with "Introduction to Physics Research" in the spring semester of their junior years, undertake an intensive 10-week independent research project in the summer, and come back in the fall semester for "Senior Thesis," when they produce a 40–50-page thesis on their research.

Broad themes covered in the Physics 398IPR sequence are "doing science" (documentation of research, intermediate reports and studies, proposals, reviewing), the ethical conduct of science (sharing credit, treatment of data, avoiding bias), communicating in science (preparing figures and visual aids, oral presentations, publications), and pursuing a physics career (research opportunities in various subdisciplines, applying to graduate school, nontraditional careers).

The new course sequence provides not only a very valuable experience for our students, but research has shown that the opportunity to do hands-on research is also a determining factor in attracting and keeping women and minorities in science careers. Indeed, 30 percent of the students completing the 398 sequence have been women—more than double their representation in our overall undergraduate ranks. Thus, the new program is becoming an important step in our broad goal of increasing the diversity of our department and our discipline.

Hertzog's innovative approach is already attracting national attention. In addition to the Amoco Award, he was invited to make a presentation on the course to the American Physical Society/American Association of Physics Teachers biennial Physics Chairs' Conference in June 2002. ■

Summer Research Prepares Students for Science Careers

by Erin Carlson

While many college students spend their summers at the pool or on the beach, some prefer to spend their breaks in the laboratory. Students involved in the 2003 Physics Research Experience for Undergraduates (REU) program at the University of Illinois forgo fun in the sun for an intense summer of research projects and real-world training they said prepares them for future careers in physics.

"It's really good to get research in as an undergrad," said Jake Simon, an REU participant from Collinsville and a senior in physics. "(The program) gives you a real taste of science. It's different from class. It's a whole new experience."

The REU program is hosted by the Physics Department and supported by the National Science Foundation. It gives students the opportunity to do experimental and theoretical research, belong to a research group, attend weekly talks, write a formal paper, and give presentations about their research.

The program began June 2 and ended August 9. Students are assigned to specific research projects, where they work closely with faculty members and other researchers. This year, 20 students participated, including 9 from the University of Illinois. The students are granted $4,000 stipends, and those from other universities receive assistance with campus housing.

Simon, who participated in the program last year, said he returned this summer to work with Charles Gammie, an assistant professor of physics and astronomy, on the evolution of circumstellar disks, or disks that form around young stars.

"These disks could be very important in the formation of planets," Simon explained. "In fact, it is thought that planets come from these disks. So, specifically, this is why the project is meaningful . . . and the study of these disks is another corner of exploration of the universe.

"The model is a slowly developing project, so I will probably not be able to finish it. But my goal is to contribute significantly to it and learn a lot about physics and research in the process." He said his research will give him a volume of experience and that could help him get accepted into graduate school for astrophysics.

"In the classroom, you work through problems and you know there's an answer," said Simon, who values one-on-one time with physics professors in REU and would like to be a professor someday. "This research is brand new. It's not been done before. You have to make sure it's right before you publish."

"For U of I students, the program is broken up into three semesters," said Keri Dixon, an REU participant from Champaign and a senior in physics. "They take Introduction to Physics Research during the spring semester, where they learn to give presentations and write papers. They apply those skills during the summer semester while working on projects where professors expect them to present research regularly. During the fall, students take a senior thesis course where they give presentations about their REU experiences."

Dixon said REU prepares students because a career in science is gauged by how well you write your papers and how often you go to other universities to give presentations.

"I thought (the program) would be a good idea because I need to go to grad school," said Dixon. "It's geared for people who want to do research later in life."

Dixon works with George Gollin, a physics professor, on a Fourier series kicker for the Tera Electronvolt Superconducting Linear Accelerator (TESLA) that will be built in Germany. She said if the kicker works, it will condense groups of electrons into a smaller area so that "the required size for the damping ring component of the accelerator will be reduced by possibly a half. This could reduce the cost of building the accelerator by millions of dollars.

"At this point, we're not sure if it'll work or not, but we're going to spend the summer trying to figure it out," said Dixon, who is using Mathematica® and other programming languages, writing code, and conducting simulations to test the kicker. "Personally, I am modeling the effects of series of rf cavities, which would make up the kicker for the TESLA design, on a bunch of electrons. This modeling is done with the ultimate goal of deciding whether this Fourier series kicker design will work and what will make it better."

Students do not spend the entire summer cooped up in laboratories and offices, though. REU offers field trips to Fermilab in Batavia, Illinois, and excursions to St. Louis and the *Taste of Chicago* festival, Simon said. Simon said he and other students in the program get along well because they share a love and fascination for science. "There's a scientific community feeling," he said, "all these kinds of people working together toward a common goal." ■

Editor's note: A University of Illinois journalism graduate, Erin Carlson is working on a master's degree at Northwestern University.

Four Receive Lorella Jones Summer Research Fellowships

Thanks to the vision and generosity of the family and friends of former Professor Lorella M. Jones, four outstanding undergraduate students were able to pursue hands-on independent research projects this summer.

Shahzeen Attari of Dubai, U.A.E., studied the effects of leaf damage on photosynthesis using fluorescence lifetime imaging microscopy under the direction of Robert Clegg. Shaz is a senior in engineering physics.

Keri Dixon, Urbana, Illinois, hopes to pursue an academic career in physics. This summer she worked with George Gollin on a Fourier series kicker for TESLA, a TeV superconducting linear accelerator proposed for the Deutches Elektronen-Synchrotron in Hamburg, Germany. Keri is a senior in LAS physics.

Shahzeen Attari

Keri Dixon

Tim Hartman is a double major in mathematics and physics. Tim worked with Kevin Pitts on why bottom quark production observed experimentally at the Fermilab Tevatron is far greater than that predicted theoretically by quantum chromodynamics. Now a senior, Tim originally majored mechanical engineering but switched to engineering physics to follow his interest in the more theoretical field of physics. Tim plans to study theoretical particle physics in graduate school.

Tim Hartman

Christopher Lesher

Christopher Lesher's summer research project with Laura Greene on planar tunneling spectroscopy into oriented $YBa_2Cu_3O_7$ thin films represented a new research direction. He had previously worked with Susan Lamb on simulations of colliding galaxies. Chris is an amateur astronomer.

Lorella Jones, an outstanding theoretical high-energy physicist, was the first woman to attain tenure and a full professorship in the Department. She died in 1995. ■

Congratulations to our 2003 Bronze Tablet Scholars

Randall L. Cooper

Bradley S. Hagan

Soojin Kwon

Christopher P. Michael

Jeffrey R. Olsen

Matthew T. Rakher

A tradition at the University of Illinois at Urbana-Champaign since 1925, Bronze Tablet honors consistent academic achievement by the institution's finest undergraduates. Students selected for this award must have maintained at least a 3.5 (out of 4.0) grade point average for all work taken at the University of Illinois and must rank in the top 3 percent of their college's graduating class. ■

Nobel Laureates Head List of Colloquium Speakers

Leon Lederman on Improving Science Education

"I now believe that I know what must be done to bring American education into the 21st century," remarked Dr. Leon Lederman, featured speaker at a colloquium on February 27, 2003. His colloquium was part of the Department of Physics' on-going commitment to improve the introductory physics curriculum and teaching methods.

According to Lederman, "There are many others who also know but, probably, not as objectively. The problem is not what to do but how to get it done." The Nobel Laureate summed up "about a dozen years of deep involvement in science education" in the title of his presentation, "A Physicist in Science Education: Mired but Triumphant."

Dale Van Harlingen, Leon Lederman, Gary Gladding, and Jim Wolfe.

Lederman is director emeritus of Fermi National Accelerator Laboratory in Batavia, Illinois. He chaired the State of Illinois Governor's Science Advisory Committee and is a founder and the inaugural resident scholar at the Illinois Mathematics and Science Academy, a three-year residential public high school for gifted students. He is also a founder and chair of the Teachers Academy for Mathematics and Science, an organization active in the professional development of primary school teachers in Chicago.

A Nobel laureate in Physics (1988, jointly with Melvin Schwartz and Jack Steinberger for the discovery of the muon neutrino), Lederman has been honored with the National Medal of Science (1965), the Elliot Cresson Medal of the Franklin Institute (1976), the Wolf Prize in Physics (1982), and the Enrico Fermi Prize (1993). He served as a founding member of the High Energy Physics Advisory Panel of the United States Department of Energy and the International Committee for Future Accelerators. ■

Leon Cooper on Learning and Memory

On April 17, 2003, Nobel Laureate Leon Cooper of the Brown University Departments of Physics and Neuroscience spoke on "Matrices to Molecules: Towards a Physiological Basis for Learning and Memory Storage."

A postdoctoral research associate with John Bardeen, Cooper received the Nobel Prize in Physics in 1972 (with Bardeen and J. Robert Schrieffer) for their jointly developed theory of superconductivity. By the time he received his Nobel prize, some 15 years after the theory's development, Cooper had already shifted his scientific interests to neuroscience. "As a theoretical physicist," Cooper said, "once a problem had been solved, it was no longer mine."

photo by John Abromowski, Brown University

Cooper is currently the director of Brown University's Center for Neural Science, founded in 1973 to study animal nervous systems and the human brain with the aim of understanding memory and other brain functions, and thus formulating a scientific model of how the human mind works. Now, at the age of 70, he is also one of the leaders of the broadest collaboration of theoretical and experimental study: the Brain Science Program.

In his talk, Cooper retraced the career path that took him from the abstract mathematical expressions familiar to physicists to the biochemical pathways that provide the likely cellular and molecular basis for learning and memory storage.

"The journey was marked by an interaction between theory and experiment, the norm in physics since Galileo, but still novel and not universally accepted in neuroscience," Dr. Cooper stated. "These interactions have proven extraordinarily fruitful. Theory has suggested experimental directions that have uncovered new phenomena. Experiment has confirmed specific theoretical postulates and predictions. Possibly most significant, theory has clarified connections between seemingly unrelated observations in different parts of the brain." ■

PHYSICS ILLINOIS NEWS

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MISSION
The mission of the Department of Physics of the University of Illinois at Urbana-Champaign is to serve the people of the State of Illinois, the nation, and the world through leadership in physics education and research, public outreach, and professional service.

EDITOR Celia M. Elliott

COPY EDITOR AND PROUCTION COORDINATOR Rick Kubetz

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If you have suggestions for stories or features that you would like to see, comments about this edition, or requests for an electronic version of the newsletter, please write to us. We're listening!

Physics-Astronomy Library Survives Budget Cuts—Barely

This has been a difficult budget year for the University Libraries, and in an effort to consolidate service points within its 43 departmental libraries, Library administration suggested the possibility of moving the Physics-Astronomy Library into the Grainger Engineering Library.

In March 2003, the University Librarian issued a call for input on the proposal. The overwhelming response of faculty and students was to maintain the separate Physics-Astronomy Library. Their argument that proposed cost savings would be minimal was accepted by the University Librarian and the Provost.

While the Physics-Astronomy Library remains, there are significant problems. To meet the budget reduction and absorb the inflation of its existing titles, the Library had to cancel 10 subscriptions to physics and astronomy journals this year. An additional librarywide reduction in the student wage allocation has resulted in shortened hours of operation.

"The Library continues to explore new methods for the delivery of information to the students, faculty, and staff of the UIUC campus, including low-cost, timely document delivery of articles from journals to which we no longer subscribe," explained Physics-Astronomy Librarian Greg Youngen. "In many cases, we are opting for electronic access to articles rather than ownership of the paper editions of non-core titles. The fact remains that every library's buying power is greatly reduced by budget cuts, inflation, and the current paper/electronic transition period, where information must be supplied in both formats."

Youngen emphasized that gifts to the UIUC Library Friends Fund and through the Departments of Physics and Astronomy are essential to maintaining the quality of the collection. These supplemental funds help purchase big-ticket items (such as electronic journal backfiles) and meet user requests for specific items outside the normal book acquisition practices. ■

Physics-Astronomy Library "wish list":

- Kostorz, Gernot (ed.) *Phase Transformations in Materials*. Weinheim, Wiley-VCH, 2001. ($265)
- Beoer, K.W. *Survey of Semiconductor Physics*. 2nd ed. New York: Wiley, 2002 ($545)
- Lifshin, Eric. *X-ray Characterization of Materials*. Weinheim: Wiley-VCH, 1999. ($180)

If you would like to donate one of these volumes or contribute to the Library Friends Fund, contact: Greg Youngen (youngen@uiuc.edu) or Celia Elliott (cmelliot@uiuc.edu).

Student Awards

Departmental Endowed Awards

2003 Felix T. Adler Fellowship

Charles C. "Chris" Polly is the 2003 recipient of the Felix T. Adler Award, which recognizes outstanding work by a graduate student in nuclear physics. Chris, a student in David Hertzog's group, is working on the groundbreaking *g*–2 experiment at Brookhaven National Laboratory, which has measured the anomalous magnetic moment of the muon to 0.7 ppm.

An undergraduate math major at the University of Missouri–Rolla, Chris enrolled in physics courses, which influenced his strong interest in the application of mathematics over theory. Pursuing an advanced degree in physics has allowed him to combine his two passions.

The Adler Award was endowed by the family and friends of the late Professor Felix T. Adler, a theoretical nuclear physicist who was instrumental in making Illinois a center for reactor science and engineering in the 1960s. Adler, who held a joint appointment in Physics and Nuclear Engineering, served the Department with great distinction from 1958 until his untimely death in 1979. His work spanned the development of nuclear energy—reactor control theory, reactor kinetics and stability, neutron transport theory, chemical physics, operational calculus in electrodynamics, accelerator physics, and theoretical plasma physics. He was also an exceptional teacher, noted for his infectious enthusiasm for physics and his painstaking patience with students.

Scott Anderson Award

The 2002 Scott Anderson Outstanding Teaching Assistant Awards, which recognize superlative performance in teaching by graduate students, were awarded to Benny R. Brown for his Physics 102 work in the Spring 2002 semester, and to Michael L. Scott for his Physics 100 contributions in the Fall 2002 semester. Both Benny and Mike are superb teachers who are regulars on the University's "Incomplete List of Teachers Ranked as Excellent by Their Students."

The award is named for Physics Illinois alumnus Scott Anderson (Engineering Physics, M.S. '37, Ph.D. '40), who founded Anderson Physics Laboratories in Urbana in 1944. A creative and prolific entrepreneur, Anderson developed metal halide lighting systems. It was through Anderson's initiative as president of the Physics Alumni Association and his generous philanthropy that the Anderson Award was endowed.

Benny R. Brown, a student of Alfred Hubler, did his undergraduate work at Carnegie Mellon University and worked as an electrical engineer at Motorola near Chicago before entering the physics program at Illinois. His research involves complex systems, where he is studying the experimental realization of one- and two-dimensional cellular automata using simple electronic elements. He is particularly interested in nanoscale implementations and possible natural occurrences in biological and condensed matter systems, as well as potential commercial applications. In the future, Benny would like to spend time teaching or working in a third-world country.

Michael L. Scott, who is a student in Gary Gladding's physics education research group, graduated from the University of Indianapolis. Pursuing a career in physics to better understand the nature of the world, he hopes to teach physics in an intellectually stimulating environment.

2003 Bobone Award

The Renato Bobone Award, which recognizes the year's outstanding European graduate student based on academic achievement, was awarded for 2003 to Markus Dittrich of Crailsheim, Germany. Markus received his *diplom* in physics from the University of Regensburg, where he completed a thesis in theoretical condensed matter physics. At Illinois, he has joined Klaus Schulten's group, where his thesis research involves the computational study of catalytic control in molecular motors.

This award was created by Physics Illinois alumnus Renato Bobone (Ph.D. '60). A student of Hans, Bobone spent his entire career (1960–1987) at the General Electric Knolls Atomic Power Laboratory in Schenectady, New York, working on several aspects of naval reactor design. When he endowed the award in 1985, Bobone wrote: "Interest in physics and the education I have been privileged to receive in Italy, first, and then in this country, have carried me over many obstacles and will be with me forever. I look on the award as another bridge between countries already joined by many ties of people, culture, and friendship."

2003 Drickamer Research Fellowship

The 2003 Drickamer Research Fellowship in Physics, which recognizes significant achievements in research, has been presented to Tzu-Chieh Wei, a student of Paul Goldbart. A graduate of National Taiwan University, Tzu-Chieh completed two years of obligatory military service before enrolling in graduate school at the University of Illinois. At Illinois, his thesis research focuses on quantum information science, particularly on the geometry of entanglement and maximal entanglement vs. entropy for mixed quantum states.

Although he is a theory student, Tzu-Chieh seeks interactions with experimentalists; "I find I benefit a lot from discussions with people doing experiments, especially with 'Kwiat's clan'. I get more from them than I can actually help…a point that all theory students should keep in mind and take advantage of." Tzu-Chieh was honored earlier this year with a Mavis Memorial Fund Scholarship Award from the College of Engineering.

Professor Harry G. Drickamer, for whom the Drickamer Fellowships were named, was a distinguished member of the Departments of Physics, Chemical and Biomolecular Engineering, and Chemistry at Illinois who contributed extensively to the understanding of the physics and chemistry of matter at high pressure. A summary in his own words of his research accomplishments in the field he established, pressure tuning spectroscopy, can be found in *Ann. Rev. Mater. Sci.* **20**, 1–17 (1990). Drickamer died May 6, 2002, at the age of 83.

Jordan S. Asketh Fellowship

Dimitrios Galanakis was selected to receive the 2003 Jordan S. Asketh Fellowship, which recognizes the work of an outstanding European graduate student. Dimitrios enrolled at Illinois in 2001 after graduating from Aristotle University of Thessaloniki, Greece. His thesis work is on the Hubbard model with Philip Phillips. He hopes to pursue an academic career, initially in the United States, but eventually in Greece.

Bardeen Award

The Bardeen Memorial Award is given annually to recognize outstanding research achievements in condensed matter physics or the physics of electronic devices by a Physics graduate student.

Shashank Misra was selected for the 2003 award for his work with Ali Yazdani on nanoscale phenomena in the cuprate superconductors. For the first time, a single copper-oxide plane at the surface of one of the high-T_c cuprates was imaged.

Shashank's work has not only uncovered some surprises in the nature of electronic states in these planes, but it has also created a new methodology for probing electrons in these unusual materials. His research was featured in the Spring 2003 edition of *Physics Illinois News*. Shashank is a graduate of the University of Wisconsin, Madison.

Richard K. Cook Scholarship

The 2003 Richard K. Cook Scholarship—recognizing a meritorious undergraduate engineering physics student at the end of his or her sophomore year—was presented to Jonathan A. Van Schelt. Jon has been active in Physics Society and is a regular crewmember of Physics Van.

The annual award is made possible by the generous gift of Richard K. Cook, a 1935 Ph.D. alumnus who spent his entire career at the National Bureau of Standards, now the National Institute of Standards and Technology (NIST). Dr. Cook specialized in ultrasonics and acoustics.

Laura B. Eisenstein Award

The 2003 Laura B. Eisenstein Award, recognizing the outstanding woman undergraduate physics student, was presented to Soojin Kwon of Incheon, Korea. Soojin worked on two separate independent research projects while at Illinois—one with Susan Lamb developing simulations of colliding galaxies, and one with John Stack on properties of the Lie group G2 and its application to strong interactions.

In 2003, Soojin was also one of 100 recipients of the inaugural Samsung Lee Hun Kee Graduate Fellowships. Soojin intends to pursue a research career in theoretical physics. She is enrolled in graduate school at the University of California, Berkeley.

The award is named for the late Laura B. Eisenstein, a distinguished biological physicist who made important discoveries using a variety of techniques, including time-resolved

Ahmet Yildiz Wins 2003 Foresight Institute Award

Physics graduate student Ahmet Yildiz has won the 2003 Foresight Institute Distinguished Student Award, which recognizes the graduate or undergraduate student whose work is deemed most notable in advancing the development and understanding of molecular nanotechnology. The award was presented at the Feynman Awards Banquet during the 2003 Foresight Institute Conference on Molecular Nanotechnology, which was held October 11 2003 in San Francisco, California.

Ahmet, who was nominated by his thesis adviser, Paul Selvin, was recognized for his contributions to unraveling the motion of the molecular motor myosin V. Their work was featured as the cover article of the June 27, 2003, issue of *Science*.

Christopher Michael Named Gates Scholar

Christopher Michael, a 2003 graduate in physics and materials science and engineering, was one of 42 U.S. students chosen from 500 applicants to receive a merit-based scholarship funded by an endowment from the Bill and Melinda Gates Foundation of Seattle. The awards, valued at approximately $32,000 each, cover the full cost of studies at Cambridge University in England as well as some travel and living expenses for a period of one to four years.

Chris, who completed in just four years a five-year undergraduate engineering program at Illinois, enrolled at Cambridge this fall for a one-year master's degree program in microelectronics engineering and semiconductor physics. He plans to study microelectronic circuit fabrication and design for interfaces with neural networks, with a goal of improving the effectiveness of neural implants. In addition to earning a perfect grade-point average while participating in the Campus Honors Program, Chris did hands-on independent research, both on- and off-campus, beginning in his freshman year. He was also a regular on the "Incomplete List of Teachers Ranked as Excellent by Their Students" as an undergraduate teaching assistant in physics.

Administered by the Gates Cambridge Trust since 2001, the scholarship program is open to students outside the United Kingdom. Awards are given to students who demonstrate outstanding academic merit and leadership and who are committed to serving their communities. By October 2003, about 250 Gates Cambridge Scholars from more than 50 countries are expected to be at Cambridge pursuing advanced degrees. Chris is the second physics student from Illinois in two years to receive a Gates Scholarship; Harish Agarwal (B.S. '02) was a 2002 Gates Scholar.

Edgar Larios Receives 2003–04 IBM Graduate Research Fellowship

Edgar Larios received one of 54 graduate research fellowships awarded in 2003 by IBM Corporation as part of its IBM Ph.D. Scholars Program. Edgar was one of only three graduate students majoring in physics to be selected in the international competition.

Edgar received a B.S. in engineering physics in 1998 from ITESM, Campus Monterrey, in Mexico. As an undergraduate, he attended the University of Colorado at Boulder for one year as an exchange student. He started to work with Martin Gruebele and Klaus Schulten in the Theoretical and Computational Biophysics Group in 1999 and received his M.S. degree in physics in May 2000. Currently, Edgar is performing molecular dynamics, optical, and NMR experiments on ubiquitin. He is interested in the folding properties of this protein as functions of both temperature and pressure.

The IBM program honors exceptional Ph.D. students in disciplines of traditional interest to the company, including chemistry, computer science, electrical engineering, materials science, mathematics, mechanical engineering, and physics, as well as emerging technical fields, such as e-commerce and nanotechnology. All IBM Ph.D. Fellows are matched with an IBM mentor according to their technical interests, and they are expected to intern at an IBM research or development laboratory under their mentor's guidance. Internship assignments are designed to strengthen and broaden the awardee's technical experience and contacts.

resonance Raman and X-ray absorption spectroscopies, of the mechanism of light energy transduction by biomolecules.

Guilio Ascoli Award

Christopher Sedlack, a student of Mats Selen, is the 2003 recipient of the Guilio Ascoli Award, which recognizes the year's outstanding graduate student in experimental high-energy physics. Chris is involved with the search for charm mixing in semileptonic decay channels at the CLEO experiment. He has been a regular on the "Incomplete List of Teachers Ranked as Excellent by Their Students," and is a deadly adversary in Trivial Pursuit®. Chris got to show off his trivia knowledge in 1998 as a contestant on the television game show *Jeopardy!*

The Ascoli Award is made possible by the generosity of the family and friends of Guilio Ascoli, who served the Department with distinction from 1950 until his retirement in 1986. During his career in high-energy physics, Ascoli participated in the design and fabrication of hardware and in the development of algorithms for data analysis for experiments at CERN, Argonne National Laboratory, and Fermi National Accelerator Laboratory.

Ernest M. Lyman Prize

The 2003 Ernest M. Lyman Prize, which is awarded to the outstanding senior physics student, was shared this year by Randall L. Cooper and Matthew T. Rakher.

Beginning in his sophomore year, Randy Cooper worked with the Center for Theoretical Astrophysics undergraduate research team under the direction of Stuart Shapiro and Fred Lamb. He previously won a Barry M. Goldwater Scholarship for academic achievement and independent research. He is in graduate school in astronomy at Harvard this fall.

Matt Rakher worked with Paul Kwiat's quantum information group, where he studied the feasibility of using a commercial liquid crystal display as a spatial light modulator for optical quantum research. He is currently a physics graduate student at the University of California, Santa Barbara.

The award is named for Ernest M. Lyman, a distinguished researcher and teacher who served on the faculty for 36 years. In addition to making seminal contributions to experimental nuclear physics—he was a world expert on electron scattering—Lyman maintained great interest in teaching undergraduate physics and was one of the early proponents of computer-assisted physics education.

Robert A. Stein Scholarship in Physics

Mike Ferraro of Chicago received the 2003 Stein Scholarship, which allows the department to recruit outstanding undergraduate physics students. A freshman majoring in LAS physics, Mike is active in Physics Society. He did hands-on research at the UNICAT facility at Argonne National Laboratory as a high school student.

The Stein Scholarship was endowed by the family and friends of former Physics alumnus Robert Stein after his untimely death in 1998. Mr. Stein greatly valued the education he received in engineering physics at the University of Illinois, and his family thought the best tribute to his memory would be to provide that opportunity to other Chicago youths.

Bristow Scholarship

Rebecca Jo Rosenblatt, a freshman, received the 2003 Commonwealth Edison/Beryl Bristow Endowed Scholarship for Women in Physics Award. The scholarship supports an outstanding freshman or sophomore woman physics student and is named after Beryl Love Bristow (B.S.'18, M.S.'19), the first woman to receive a master's degree in physics from the University of Illinois.

The scholarship was established by Commonwealth Edison as part of its commitment to women in math, science, and engineering. After graduating from Illinois, Bristow worked for CommEd as a data analyst until her marriage.

Physics Van Milestone, continued from page 1

children's questions on such burning issues as "Why do tennis balls lose their bounce?" (Michael, age 13, Lost Mountain Middle School, Acworth, Georgia); "How do you get electricity out of a lemon?" (Justin, age 8,

UI student Rachel Williams pours liquid nitrogen into a cork cannon that will later result in an intense "cork launch."

Connecticut); and "Do shadows have mass?" (Natasha, age 11, Fort Collins, Colorado). Questions come from all over the world—Hoopeston, Illinois, PS 153 in New York, the United Arab Emirates, Korea, Republic of Ireland, and Hong Kong.

Huge thanks to the College of Engineering and to the many alumni donors and friends who contribute to the Excellence in Physics fund that makes the Van program and many other department initiatives possible. And special thanks to all the dedicated student volunteers who share their knowledge and enthusiasm, introducing the nation's next generation of scientists to the wonder of physics. (If you'd like to support the Van program, go to www.physics.uiuc.edu/Giving/whyEIP.html.) ■

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(right) Students at Martin Luther King Elementary School in Urbana pull as hard as they can on a set of Magdeburg hemispheres, demonstrating the power of air pressure.

Note: The Department of Physics is planning a special celebration to recognize the 10th Anniversary of the Physics Van. A reunion for Van alumni is tentatively scheduled for the weekend of April 2–3, 2004. To receive updates on the planned festivities, send your contact information to Celia Elliott (cmelliot@uiuc.edu). If you are interested in helping with the reunion—locating fellow Physics Van alumni, on-site coordination, etc.—contact Celia.

Physics Van

not a place, a habit of mind . . .

Physics Illinois

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