

The Wisconsin Physicist

Newsletter for
University of Wisconsin
Physics Alumni
Vol. 13 No. 1 Fall/Winter 2006



Physics Learning Center — Peer Mentor Tutoring Program

The Wisconsin Physicist



Professor Mark Eriksson visiting PPMT



Review session—Amihan Huesmann



Physics-biochemistry-chemistry coordinators planning

COVER IMAGE—From left to right, Front row: Tom Liebergen (physics), Sara Heitkamp (biochemistry), Kristen M. Jones (physics), Mike Line (physics); Second row: Katie Fitzpatrick (biochemistry), Alex Viana (physics), Ben Spike (physics); Third row: Kevin Beier (biochemistry), Paul Buske (biochemistry), Jackie Fretz (biochemistry, PMT coordinator), Susan Nossal (physics, PMT coordinator), Bill Dirienzo (physics); Top row: Ted Gries (biochemistry, PMT coordinator), Brad Nelms (physics), Jeremy Ott-Holland (physics), Rown Parola (physics), Larry Watson (Physics, PMT coordinator). Not pictured: Tanya Lai (physics), Eric Hooper (physics, PMT coordinator)

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The Wisconsin Physicist
University of Wisconsin–Madison
Department of Physics

Vol. 13 No. 1 Fall/Winter 2006

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This publication is made possible by generous gifts to the physics department

CORRECTION FROM Vol. 12 No. 1

Top picture on cover: man on the left is Mohammed Fayyaz, director of UW–Madison Botany Garden and Greenhouses; man on the right is Peter Flannery, “wave” sculptor.



Susan N. Coppersmith,
professor and chair

I am delighted to report on a great many positive and exciting developments in the Physics Department over the past year. Perhaps the biggest single development is that the department recruited seven new faculty members during the 2006–2007 academic year. Hiring new faculty was a priority for us because of the large number of recent faculty retirements—Professors Al Erwin, Willy Haeberli, Martin Olsson and Don Reeder retired after the 2004–2005 academic year; Professor Fred Roesler retired in December 2005; and Professors Don Cox and Bob Morse retired at the end of the 2005–2006 academic year. We will very much miss and are deeply indebted to our retired and retiring faculty for their enormous contributions to the research, teaching, and daily life of the department. But we very much look forward to the excitement, energy, and new directions that our new faculty will bring to the department and to the scientific community here at UW–Madison.

Our new faculty hires span a broad range of physics subfields. They are:

- **Stanislav Boldyrev**, a theorist working at the interface of plasma physics and astrophysics;
- **Lisa Everett**, a theorist who bridges string theory and phenomenology;
- **Karsten Heeger**, who does reactor-based experiments probing the fundamental nature of neutrinos;
- **Robert McDermott**, an experimentalist working on nanoscience, SQUID quantum computing in particular;
- **Bruce Mellado**, a high-energy experimentalist who is making important contributions to the ATLAS collaboration;
- **Maxim Vavilov**, a condensed-matter theorist who studies the fundamental properties of strongly interacting and driven electronic systems;
- **Deniz Yavuz**, an experimentalist in atomic physics and nonlinear optics.

Detailed descriptions of the research programs of all the new hires are in this newsletter and on the Web at www.physics.wisc.edu. Stas Boldyrev joined the faculty in January 2006, and the other six joined the faculty in fall 2006.

Our successful recruiting efforts would not have been possible without truly remarkable support by the College of Letters and Science, and we are tremendously grateful to Dean Gary Sandefur and to Associate Dean Herb Wang. But we are also extremely grateful to you, our friends and alumni, whose financial support was critical in our recruiting efforts. Your gifts are enormously valuable. For example, our contribution of \$100,000 of departmental gift funds convinced the College of Engineering to

make an investment worth over \$1.2 million in research infrastructure that is critical to the experimental nanoscience efforts in the department.

In addition to our successful faculty recruiting effort, we are excited about the work we have done over the past year to enhance the educational activities of the department. Jim Reardon has joined the Physics Department as an academic staff to coordinate the undergraduate courses and improve the continuity and uniformity of the course offerings. A major new initiative is under way to revamp the Physics 207–208 calculus-based introductory sequence to improve the sequence's relevance to students majoring in the biological sciences. These efforts were spearheaded by Don Cox, Mark Rzchowski and Peter Timbie, in collaboration with Lillian Tong and others at the Center for Biology Education. The effort has attracted support from the Provost's office via the Assessment Grants program.

Two faculty members will be enjoying sabbatical leaves in the upcoming academic year. Bob Joynt will work with collaborators at Hong Kong University at the intersection of quantum computing and solid state physics during the fall semester. During the spring semester Jim Lawler will restructure the graduate course *Introduction to Atomic Structures* to make it more relevant to astronomy grad students and will visit collaborators at the University of Texas at Austin.

The Sixth Annual Awards Banquet was held in May. In addition to presenting awards to outstanding undergraduate and graduate students, three Distinguished Alumni Fellow Awards were presented. The first was presented to Dr. Daniel Z. Freedman, who is a distinguished mathematical physicist who is now a professor of physics and applied mathematics at MIT and a recent winner of the Dannie Heineman Prize of the American Physical Society. The second Distinguished Alumni Fellow Award was presented to Dr. Thomas K. Holley, who has had an extremely successful career at the Shell Oil Company and who has been a loyal supporter of the UW–Madison Physics Department. The third Distinguished Alumni Fellow Award was presented to Dr. Thomas J. Weiler, an accomplished theoretical particle physicist who is a professor at Vanderbilt University.

At the Awards Banquet, Distinguished Faculty Fellow Awards were presented in recognition of their outstanding and productive careers to former UW faculty members Professor Emeritus Wilmer Anderson and Professor Emeritus Willy Haeberli. Professor Emeritus William "Bill" Kraushaar was also named a Distinguished Faculty Fellow, but was unable to attend the banquet.

Finally, we are working with the Chancellor's Office and with Facilities Planning to arrange for the installation of a plaque commemorating the Sterling Hall bombing when its renovation is completed. We are grateful to the alumni who have offered financial support for this effort.

Susan N. Coppersmith, Chair

The Physics Learning Center at UW–Madison

Striving to Promote the Success of all Students



Peer Mentor Tutors

Together, Susan Nossal and Larry Watson coordinate the Physics Learning Center. Both are passionate advocates for the Peer Mentor tutors and students who use this program. Introductory physics is a required course for access to many professions including pharmacy, medicine, nursing, physical therapy, secondary education science teaching, engineering, and physical and biological sciences. Introductory Physics can be an intimidating course, especially for students whose last formal math course was ten years ago and/or for students who may be feeling isolated and hence have trouble finding study partners.

The Physics Learning Center is designed to address these challenges. Tony Jacob and Cathy Middlecamp of the UW Chemistry Learning Center recognized that many of their chemistry students were also struggling with physics. So, in 1996 with Ruby Paredes of the Undergraduate At-risk Initiatives Program, a small pilot peer mentor program was started in physics. The Physics Peer Mentor Tutoring Program has expanded into a Physics Learning Center, offering small group academic support for students in both the Physics 103 and 104 algebra-based courses and the calculus-based Physics 207 (spring only) and 208 (fall only) sequence. The Physics Learning Center continues to have strong ties to the Chemistry Learning Center whose mentorship over the years we have greatly appreciated.

The Physics Learning Center's home is in room 2338 Chamberlin Hall, and it provides teacher-training

experiences for seven to nine undergraduate peer tutors each year, many of whom go on to become teaching assistants or secondary education science teachers. On a typical day, the room is full of students. Some are meeting in their small study groups with their tutors, and others are meeting informally together to discuss problems and concepts. Close to one hundred students participated in the Physics Learning Program this past spring semester.

Susan Nossal also works as a research scientist in the department. Her research focuses on optical spectroscopy applied to atmospheric physics and climate in the upper atmosphere. Larry Watson has a physics education background. In addition to his work in the physics Learning Center, he is working on the Symbiosis program to develop a modified Physics 207–208 course tailored to biological sciences students. Mary Anne Clarke, the Physics Department's instructional program manager, and Professor Peter Timbie, have for many years been administrative and faculty partners, respectively, to the Physics Learning Center. They have been especially instrumental in helping to secure sustainable staffing for the Learning Center. Professor Don Cox, Jean Buehlman and others in the Physics Department have been very supportive. Thanks to Jim Hanesworth and Mary Lou Herman who assist with photos, projects and the program. We also greatly appreciate the generous support of Dean Gary Sandefur and the College of Letters and Science.

Physics Learning Center staff send out invitations and partner with other campus academic support

■ ■ ■
"I have learned a great deal about physics education through the program and the individuals in it and been inspired to become a physics educator myself!"
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Small study groups led by peer tutors

■ ■ ■

“There is much more personal attention in the small groups, and I am not afraid people will judge the questions that I am asking because it is a comfortable atmosphere.”

■ ■ ■

programs to make special invitations to students who might be experiencing isolation on campus and hence have more trouble finding study partners. Such students include returning adult students, students from underrepresented racial and ethnic groups and students in the first generation attending college. The McBurney Disability Resource Center refers students with a disability. The Physics Learning Center also works closely with course teaching assistants and faculty to identify and invite students with weak math preparation and/or who are struggling in the course. Other risk factors for differential success rates include financial hardship, health challenges, and family illness. Approximately 50% of the student participants are from underrepresented racial/ethnic groups, 15% are returning adults, 3% have a disability, and 30% have had no high school physics. Many of the students are exceptionally motivated.

Undergraduate Physics and Secondary Science education majors are paired as tutors with the introductory physics students in small study groups that meet twice a week. The undergraduate tutors lead practice problems, overview core concepts, and serve as academic role models and mentors. The tutors participate in a weekly seminar with other undergraduate tutors from chemistry and biochemistry to discuss teaching and mentoring issues in the sciences and also meet weekly to discuss strategies for teaching content currently being covered in the course.

Faculty in the physics department are involved in outreach efforts through the Physics Learning Center. These activities include meeting with students in the program and with the undergraduate tutors to discuss their research activities, the importance of undergraduate research, and tips on applying for graduate school. Faculty also have contributed funding to the Physics Learning Center through the education and public outreach portions of their National Science Foundation grants. We appreciate their support for this very worthwhile program.

The base funding for the Physics Learning Center comes from the College of Letters and Science and the campus Undergraduate At-Risk Initiatives Program, with additional funding from the Physics Department, the

■ ■ ■

“My grades last semester were a C,C and F. This semester ... C, AB, B. Need I say more?”

■ ■ ■



Another small study group

IceCube project, the Plasma Frontiers Research Center, and the Nanoscale Interdisciplinary Research Teams. We wish to thank them for their continued support and outreach activities, which has helped to grow our program into what it is today.

Sample Comments from Evaluations by Student Participants:

“The small group atmosphere is very effective. It makes it possible to get to know students in the class, especially returning adults.”

“I like small study groups because I can benefit from other people’s questions as well.”

“He explains things in concise, efficient explanations. His down-to-earth approach to teaching helps to make physics less intimidating and actually possible to understand.”

“You knew how to relate the topics to daily lives and make the hard concepts seem a bit easier.”

“My last semester grade was awful. Coming into this program not only helped my grade improve, but I was having fun in physics. Can you believe it, I had fun?!”

“I enjoyed the fact that I wasn’t completely lost like I was last semester. I can actually work on and understand problems now.”

“Working with the tutor has helped me understand every aspect of the course better—this understanding allowed me to enjoy and appreciate physics, something I never thought would happen.”

“This is the only class that I’ve ever felt comfortable with answering questions or volunteering answers because he doesn’t make you feel dumb if you are wrong. He creates a very comfortable environment and is very knowledgeable.”

ALUMNI NEWS & AWARDS

News Concerning Faculty, Alumni and Friends

● **Charles H. Holbrow, (Ph.D. 1963)**, the Charles A. Dana Professor of Physics Emeritus at Colgate University, has been appointed the senior staff physicist at the American Association of Physics Teachers. This is a new position at AAPT whose goals are to aid in the development of programs of use to college and university physics faculty.

● **William M. Yen**, Graham Perdue Professor of Physics at the University of Georgia, was awarded the ICL prize for Luminescence Research at the tri-annual International Conference on Luminescence held in Beijing in July. The award recognizes "his pioneering discoveries in the dynamics of solid state optical processes and for exceptional leadership in the field of luminescence." Bill was a faculty colleague at the UW from 1965 to 1990.

● Many of us who were in Madison during the late '60s and early '70s know of its attraction to unconventional thinkers. You may be reassured that the tradition continues—as reported in June by Professor **Bob Parks** in his weekly column "What's New":

CONSPIRACIES: PHYSICIST'S NEW THEORY IS AS GOOD AS HIS FIRST

A few weeks ago a cab picked me up at the University of Wisconsin Physics Dept. to take me to the airport. The driver began, 'You a physicist? I like physics. You know this guy Steven Jones? He's a physicist. He proved the World Trade Center couldn't have fallen that fast on 9/11 unless it was rigged with explosives.' I'd heard it before. Today there's a good story about Jones and the 9/11 'conspiracy' by John Gravois in the Chronicle of Higher Education. Seventeen years ago Steven Jones imagined that cold fusion is responsible for Earth's molten interior. That's what led Fleischmann and Pons to rush into print with their dumb idea.

● The regents have approved the promotion of **Gary Shiu** to associate professor. Gary joined the department in 2002 as the first of our String theorists and has been active and productive in connecting formal quantum string theories to the real world—an activity better known, perhaps, as string phenomenology.

● The regents also have approved the promotion of **Cary Forest** to full professor. Cary joined the department in 1997. He is an outstanding experimenter in plasma physics and magnetohydrodynamics.

● **Daniel Zissel Freedman (M.S. 62, Ph.D. 1964)**, a professor of applied mathematics and physics at MIT, is one of three recipients of the 2006 Dannie Heineman Prize for Mathematical Physics awarded jointly by the American Physical Society and the American Institute of Physics. The honor is in recognition of "constructing supergravity, the first supersymmetric extension of Einstein's theory of general relativity and for their central role in its subsequent development." Professor Freedman received his Ph.D. in physics from UW- Madison under the direction of Professor Raymond Sawyer. Dan was also awarded the department's 2006 Distinguished Alumni Award.

Distinguished Alumni Fellows

● **Daniel Zissel Freedman**—M.S. '62, Ph.D. '64

● **Thomas Kennedy Holley**—M.S. '76, Ph.D. '82
Thomas Holley received his Ph.D. in 1982 while working with Professor Chun Lin. He did his undergraduate work at the University of Missouri at Rolla. After his doctoral degree he took a job at the Shell Oil Company in Houston and has enjoyed a very successful career there, both in research and administration. He directs a large research group and has tackled numerous projects on geophysics. Holley developed a powerful method, based on the Born Approximation he learned in quantum mechanics, to analyze seismic waves. This method has been extensively used. For some years, he conducted short courses for training new research workers at Shell and enjoyed the reputation of being an excellent teacher. He is a loyal supporter of the Physics Department and has been instrumental in obtaining a \$10,000 yearly donation from Shell to our department. His contributions to his alma mater extend even beyond the Physics Department. Holley has been on the Visiting Committee to the Department of Geology at UW-Madison for several years and will present a Special Colloquium in the department this fall.

● **Thomas Joseph Weiler**—M.S. '72, Ph.D. '76

Tom Weiler arrived at UW-Madison in 1971 from his undergraduate studies at Stanford. He completed his Ph.D. thesis with Professor Vernon Barger on new physics from charm quark production in neutrino experiments. Following his Ph.D. in 1976, he held research positions at the University of Liverpool, Northeastern University, SLAC and University of California-San Diego. He has been a faculty member at Vanderbilt University since 1984. Weiler has been a frequent visitor at the leading research centers around the world, and spent a sabbatical in 1997 at our Phenomenology Institute. He serves on the Fermilab Board of Overseers and is a Fellow of the American Physical Society. His research is supported by both the Department of Energy and NASA, which is highly unusual.

Weiler has made pioneering contributions to several areas of particle theory. In an early landmark paper, he made one of the first applications of the theory of quarks and gluons to be verified by experiment. He is also highly respected for his important contributions to neutrino physics and particle astrophysics, including the physics of ultra-high energy neutrinos.

Weiler's proposed mechanism to detect the cosmic background of neutrinos is a prime example of the impact of his research. This mechanism is the only way to discover those all-important relics of the Big Bang and is known as the "Weiler Z-burst Mechanism." Weiler's paper was solely written by him, so there is no question of who originated the idea. It is a brilliant piece of scholarship and Professor Weiler's international fame for this work is well deserved.

Wisconsin Science Olympiad

The Physics Department participated in the Wisconsin Science Olympiad, a statewide high school competition, on Saturday, April 22, 2006. The Olympiad is a high school team competition composed of 28 different events that



cover most areas of science. It strives to elevate science education and learning to a level of enthusiasm and support that is normally reserved only for varsity sports programs. The event is a non-profit, volunteer-based organization that relies heavily on donations of time, money and supplies to generate enthusiasm for science. College faculty and student volunteers benefit by having evidence of community service for their resumes and science community members experience the satisfaction of inspiring young people to aspire to a career in science. This year's Wisconsin Science Olympiad involved students from 45 high schools around the state.

The Goals of the Wisconsin Science Olympiad are:

- Ensuring all students have equal opportunities to high-quality science and technology education regardless of their ethnicity and socioeconomic background
- Providing a tool to help teachers address the National Science Standards in their classrooms
- Nurturing students' interest, enthusiasm and motivation for science and technology
- Getting students interested in pursuing science and science-related careers
- Increasing parent, business, and community involvement in schools
- Providing recognition for outstanding achievement for both students and teachers

Two physics faculty members, Professor **Dan McCammon** and Professor **Bob Joynt**, each supervised an event this year. They were assisted by graduate students **Mike Larsen** and **Annie Malkus**, who generously volunteered their time. Thanks go to **Bill Grogan** and **Joe Sylvester**, who helped move equipment over to Engineering Hall.

Tours of the L.R. Ingersoll Museum in the Physics Department

The L.R. Ingersoll Museum has moved to Room 2130 Chamberlin Hall. We are currently in the process of reconstruction.

- The museum is open to visitors from 8:00 a.m. until 4:15 p.m. Monday through Friday.
- If you would like to arrange for a tour of the museum, please contact Elaine Holub at (608) 262-2356 or email her at holub@wisc.edu
- Tours can accommodate groups of up to 20 and back-to-back tours can be arranged. Duration of a tour is about 45 minutes. Please contact us two weeks before desired date(s).



Upcoming Wonders of Physics Presentations

The next public presentations of **The Wonders of Physics** are:

February 11, 2007 @ 1 and 4 p.m.
February 17, 2007 @ 1 and 4 p.m.
February 18, 2007 @ 1 and 4 p.m.

Scheduled presentations of **The Wonders of Physics** and tours of the Physics Department laboratories are given on the UW-Madison campus for the general public in mid-February each year. Free tickets are recommended and are available after January 1st by calling (608) 262-2927 or by email to wonders@physics.wisc.edu



These presentations will be held in 2103 Chamberlin Hall, 1150 University Avenue, Madison, WI. For more information on the Wonders of Physics Show, please visit:

<http://uw.physics.wisc.edu/~wonders>

Note: Twenty-three hours of past presentations of The Wonders of Physics, dating back to 1986, can now be viewed (for free!) on the Web at: <http://sprott.physics.wisc.edu/wop.htm#videos>

New Badger Physicists

New Ph.D.'s

August 2005

Piyabut Burikham,

Physics Beyond the Standard Model and Collider Phenomenology (Han), Postdoc, Iowa State University

Baosen Cheng,

Study of Branching Ratio and Polarization Fraction in $BO_{\rho} \rightarrow K^ + \rho$* (Wu)

Withoon

Chunwachirasiri,

Structural and Optical Studies of Polysilanes (Winokur) Faculty, Thailand University

Maria Magdalena

Gonzalez, *Gamma Ray Bursts, Their High Energy Emissions as Absorbed by EGRET* (Halzen)

Thomas Wayne

Heitmann, *Investigating Two-Gap Superconductivity by Scanning Tunneling Spectroscopy* (Rzchowski), Postdoctoral Research Associate, Syracuse University

Cheng Guan Koay,

Advances in Data Analysis of Diffusion Tensor Imaging (Coppersmith/Meyerand), Postdoc, NIH

Hye-Sung Lee,

Phenomenology of the $U(1)'$ -Extended Minimal Supersymmetric Standard Model (Barger), Research Associate, University of Florida

Cavendish Quayle

McKay, *Effects of Stratification on the Variability of the Double-Gyre Wind-Driven Ocean Circulation* (Terry/L. Smith), Visiting Assistant Professor, University of New England

Charles George Tahan,

Quantum Computing and Decoherence in Silicon Architectures (Joynt)

Ping Tan,

Constraining $V_{\tau s}$: Using Radiative Penguin to $v(k^, \rho, \omega)$ gamma Decays* (Dasu)

December 2005

Geoffrey Allan

Bonvallet, *Spectroscopic Imaging of Metal Halide High-Intensity Discharge Lamps* (Winokur), Associate Professor/Instructor, South Dakota State University

Mousumi Datta,

A Search for the Rare Leptonic B Decay $C_{\tau} \tau$ Anti- τ -Neutrino (Pan), Postdoc, CDF, Fermilab

Attila Mihalyi,

Measurement of the CKM Angle Alpha at the BaBar Detector with BTO ρ rho decays (Wu)

Huican Ping,

The Observation of the Weak Radiative Hyperon Decay at KTeV/E799 (Erwin), Junior Software Engineer, Fermilab

Andrew Christopher

Plumb, *Semiclassical Methods for Dirac Particles in Curved Spacetime* (Balantekin), Adjunct Faculty, UW-Madison

Keith Stanton Thomas,

Aspects of Non-cumulative Gauge Theory and the AdS/CFT Correspondence (Hashimoto)

Yingxue Wang,

Nonlinear Self-Focusing in Cold Cesium Atoms (Saffman)

Yu Yuan, *On the Heavy-Light and Light-Light Meson Spectroscopies* (Olsson)

May 2006

R. Adam Bernell Bayliss,

Numerical Simulations of Current Generation and Dynamo Excitation in a Mechanically-Forced Turbulent Flow (Forest)

Mirela Cengher,

"Coupling to the Electron Bernstein Wave in MST Reversed Field Pinch" (Forest)

Adam Alexander

Everett, *Measurement of Event Shapes in Deep Inelastic Scattering with Zens at HERA* (Smith)

Karina Flavia Loureiro,

Accessing the Photon Energy Scale through Test Beam Data (Wu) Post-Doc Fellow, European Organization for Nuclear Research/(CERN)Geneva, Switzerland

Michele Lea Rosin,

Measurement of Event Shapes in Deep Inelastic Scattering with ZEUS at HERA (Smith)

Erik John Spence,

Turbulence-generated Modifications to Magnetic Fields Induced by Flowing Liquid Sodium (Forest)

Master's Degree Recipients

August 2005

Kelly Pellerin

December 2005

Erik Gallup Brekke

Eric Paul Nordberg

Bret James Underwood

May 2006

Karen Andeen

Bachelor's Degree Recipients

December 2005

Astronomy-Physics

William Joseph Teasdale, B.S.

Physics

Andrew James Ballard, B.S.

Bryan Michael Foster, B.S.

Thomas Andrew Kopriva, B.S.

Dustin Jeffrey Lowery, B.S.

Matthew Andrew

McLaughlin, B.S.

Mark Franklin Schneider, B.S.

May 2006

Applied Math, Engineering, Physics (AMEP)

Matthew Carl Guziewski, B.S.

Jeremiah Paul Holzbauer, B.S.

Kirt Matthew Robbins, B.S.

Astronomy-Physics

Seth Samuel Bruch, B.S.

Alexander Jonathan

Carver, B.S.

Matthew Carl Guziewski, B.S.

Alex Stephen Hojem, B.S.

Craig Michael Jacobson, B.S.

Stephen Roland

Kaeppler, B.S.

Brian Scott Page, B.S.

Adrienne Michele Stilp, B.S.

Physics

Jesse S. Beder, B.A.

Angela Rae Blissett, B.S.

Seth Samuel Bruch, B.S.

Alexander Jonathan

Carver, B.S.

Jacob Lee Harley, B.S.

Alex Stephen Hojem, B.S.

Craig Michael Jacobson, B.S.

Timothy James Joynt, B.S.

Stephen Roland

Kaeppler, B.S.

Lucas Jordan Kreuser, B.S.

Jenny Lyn Kurtzweil, B.S.

Aaron Madlon-Kay, B.S.

Shane M. McMahon, B.S.

Brian Scott Page, B.S.

David Harold Schuster, B.S.

Rebecca Ann Shapiro, B.S.

Shane Anthony Squires, B.S.

Samuel Urie Aron

Stambler, B.S.

Adrienne Michele Stilp, B.S.

Diana Maria Sulas, B.S.

Justin Webb, B.S.

NEW BADGER PHYSICISTS Aug 2005-May 2006

FACULTY NEWS & AWARDS

After a vigorous 2005–06 faculty recruitment effort led by the New Staff Committee, the Physics Department starts this fall with an unprecedented number of new assistant professors: seven. We are pleased to welcome Professors **Bruce Mellado, Karsten Heeger, Robert McDermott, Deniz Yavuz, Stanislav Boldyrev, Maxim Vavilov, and Lisa Everett** to our department. And hats off to our chair, Susan Coppersmith, and the New Staff Committee for a *fantastic* job!

● Assistant Professor **Stanislav Boldyrev** is a theorist working in the fields of plasma physics and astrophysics. His current projects concentrate on turbulent dynamo action and its role in generation of magnetic fields in our galaxy, on the structure of strong magnetohydrodynamic turbulence and its role in radio wave scattering in the interstellar medium, on the properties of compressible (transonic or supersonic) turbulence and its role in star-forming interstellar molecular clouds.



Stas Boldyrev

Professor Boldyrev received his Ph.D. from Princeton University in 1999. Before joining the faculty of the University of Wisconsin, he worked as a postdoctoral fellow at the Institute for Theoretical Physics, Santa Barbara (now Kavli Institute for Theoretical Physics), and as a research associate at the University of Chicago.

● Assistant Professor **Lisa Everett** is a theoretical high energy physicist who specializes in connecting observable physics with the domain of fundamental theory. Professor Everett received her Ph.D. from the University of Pennsylvania in 1998, specializing in the phenomenological implications of four-dimensional compactifications of string theory. In her postdoctoral research fellowships at the University of Michigan, the European Organization for Nuclear Research (CERN), and the University of Florida, she also focused on supersymmetric/braneworld model-building and phenomenology, as well as the flavor problem of the Standard Model in light of the recent experimental confirmation of massive neutrinos. The primary goal of her research program is to understand and improve the extent to which Planck scale physics can be probed by high energy colliders, neutrino detection, and cosmological data.



Lisa Everett

● Assistant Professor **Karsten Heeger** is studying the properties of neutrino mass and mixing through low-energy, underground experiments. Through the observation of neutrinos from inside the Earth, from nuclear reactors, or the Sun, Karsten is probing the particle properties of neutrinos and seeking to understand the role of neutrinos in astrophysics. The recent discovery of neutrino mass and mixing is the first evidence of new physics beyond the Standard Model, and



Karsten Heeger

the neutrinos' properties may hold the key to understanding the matter-antimatter imbalance in the Universe.

Karsten Heeger received his Ph.D. from the University of Washington in Seattle where he worked with Professor Hamish Robertson on a model-independent measurement of the solar 8B neutrino flux in the Sudbury Neutrino Observatory (SNO). The results from SNO were the first direct evidence for the flavor change of solar neutrinos and resolved the long-standing Solar Neutrino Problem. Before coming to the University of Wisconsin, Karsten was a Chamberlain Fellow and staff scientist in the Physics Division at Berkeley Lab. He is currently involved in the KamLAND neutrino experiment in Japan and part of a worldwide collaboration to measure the last unknown neutrino mixing angle θ_{13} at the Daya Bay nuclear power plant in China.

● Assistant Professor **Robert McDermott** is a condensed matter experimentalist working to develop a research-scale quantum computer based on superconducting integrated circuits. Current research directions include fundamental studies of dephasing and dissipation in superconducting circuits, and the development of scalable coupling and measurement schemes for Josephson phase qubits. Other interests include the application of near-quantum-limited amplifiers to the readout of nanoscale quantum systems, and the development of Superconducting QUantum Interference Devices (SQUIDs) for nuclear magnetic resonance and magnetic resonance imaging in microtesla magnetic fields. He received his Ph.D. from UC Berkeley in 2002, and was most recently a postdoctoral researcher at UC Santa Barbara.



Robert McDermott

● Assistant Professor **Bruce Mellado** is an experimental particle physicist. He earned his Ph.D. from Columbia University in November 2001. After his graduation he joined the effort of the University of Wisconsin in the ATLAS experiment. ATLAS is one of the two major experiments at the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland. The LHC will collide protons at the largest center-of-mass energy ever achieved in an accelerator facility and is expected to deliver the first collision in December 2007. Professor Mellado is focused on the search for the Higgs Boson, which is responsible for giving mass to particles and stands at the center of the physics program of the LHC.



Bruce Mellado

● Assistant Professor **Maxim Vavilov** focuses in the area of theoretical condensed matter physics. He studies transport and non-equilibrium phenomena in quantum many particle systems, as well as the role of disorder and chaos in the quantum limit. His research is related to problems motivated by experimental investigation of mesoscopic and nanoscale electron systems and intended for future development of electronics and quantum information technologies. He received his Ph.D. in 2001 from Cornell University and was most recently a postdoctoral researcher at Yale University.



Maxim Vavilov

● Assistant Professor **Deniz D. Yavuz** received his Ph.D. in experimental atomic physics from Stanford University in 2004. Between 2004 and 2006, he was a postdoctoral researcher at the University of Wisconsin–Madison.



Deniz D. Yavuz

He joined the physics faculty at the University of Wisconsin–Madison in Fall 2006 where he is currently setting up his laboratories. His research interests include: (1) ultrafast physics with emphasis on generating laser pulses and arbitrary optical waveforms with sub-femtosecond resolution; (2) quantum optical effects including slow light, stopped light, and refractive index enhancement; (3) nonlinear optics with emphasis on optical solitons; (4) quantum computing and quantum information processing.

Faculty Retirements

We were sad to see three more faculty retire during 2005–06. They are: Professors **Fred Roesler**, **Donald P. Cox**, and **Bob Morse**.

● Professor **Fred Roesler** received his Ph.D. from the University of Wisconsin in 1962, studied optics in Paris with a National Science Foundation postdoctoral award, and returned to Wisconsin as assistant professor of physics in 1964. He achieved the rank of professor in 1971.



Fred Roesler

His primary research achievements have been in the development and application of new optical spectroscopic techniques for atomic physics, astrophysics and space physics. His work has attracted funding (primarily from the NSF and NASA) continuously since joining the UW physics faculty. His group is recognized as a leader in optical spectroscopy and its applications. He was invited, as a visiting professor, to the University of Arizona, the University of Munich, and the University of Pierre and Marie Curie. Germany presented Professor Roesler with a von Humboldt award in 1976.

Faculty Promotion

Congratulations to **Cary Forest**, who was promoted to Full Professor, and to **Gary Shiu**, who was promoted to Associate Professor, effective August 2006.

In his early work he used Fabry-Perot spectroscopic techniques to investigate atomic hyperfine structure, the atmosphere of comets and planets and planets, and the interstellar medium. The high sensitivity and resolving power of his technique led to many advances in these areas and are documented in his numerous publications in journals, books, and conference proceedings. His instruments or their designs have been used in most major U.S. telescopes. Collaborations within the University led to projects that continue to be active in the departments of astronomy and Atmospheric and Oceanic Sciences.

Professor Roesler's recent work concentrated on his 1989 invention of Spatial Heterodyne Spectroscopy (SHS). This device achieved exceedingly high sensitivity in a small package, and could be extended into the vacuum ultraviolet, where conventional interference spectroscopic methods become impractical. His personal work with SHS included development and application of instruments for studying middle-atmosphere physics from space platforms. This work advanced interstellar medium research by investigating spectral emissions for which conventional instruments are far too insensitive, and development of all-reflection interferometers for far-ultraviolet astrophysics from space and in the laboratory.

Professional activities over his career include service to numerous national panels, committees, and funding agencies, as well as reviewer for scientific publications and proposals in his field. Professor Roesler's notable service includes work on early instrument definition teams for the Space Telescope, the second generation spectrograph team for the Hubble Space Telescope, several years helping the NSF develop its CEDAR program in Upper Atmospheric Physics, and two years service as a visiting scientist at the National Science Foundation as program director for aeronomy and acting head of the Upper Atmospheric Research Section.

In teaching, his early interests centered on improving laboratory experiments in beginning physics courses. In 1970, he began collaborating with Professor Ed Miller in developing an advanced applied optics course that many UW–Madison departments now recognize as an important introduction to optics as a research tool. Together with Miller, he wrote extensive lecture notes that have been regularly used in the course, and developed a sequence of laboratory experiments that give students from diverse fields experience with basic research optics.

Professor Roesler's research and professional work remain active and he expects to continue contributing to the intellectual life of the university for the indefinite future.

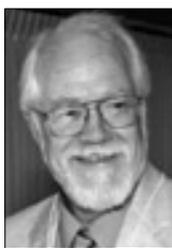
PHENOMENOLOGY SYMPOSIUM • May 15–17, 2006

For the 24th time, the Phenomenology Institute sponsored the **Phenomenology Symposium**. The 2006 version was held at the Memorial Union on May 15–17. The focus of this meeting was the new physics that can be discovered at the Large Hadron Collider at the CERN laboratory in Geneva, Switzerland, which is scheduled to begin operation in 2008. Among the 182 participants were 30 UW physics alumni, former post-doctorals and former faculty. Seventeen of these presented talks at the meeting. Former UW physics graduate students in attendance were **T. Allen, H. Baer, P. Burikham, D. Crossley, J. Friess, R. Gandhi, D. Hooper, J. Jiang, W.-Y. Keung, D. Marfattia, R. McElrath, F. Olness, D. Rainwater and K. Whisnant**. In addition to the opportunity to revisit

campus and converse with old friends and colleagues, the symposium provided an important venue for extended interactions among particle theorists and experimentalists on issues at the forefront of particle physics. This event was particularly timely in view of the Wisconsin participation in both major LHC experiments, Atlas and CMS. For more information about the conference, please visit <http://www.pheno.info/symposia/pheno06/>.



● Professor **Donald P. Cox** came to Wisconsin in 1969 with the promise of a faculty position a year before receiving his Ph.D. from University of California–San Diego. Except for an extended leave of absence at Rice University while his wife completed her degree in Houston, Professor Cox has spent his entire professional career here. He arrived in the era of a cold and quiet interstellar medium and a newly discovered and unexplained soft X-ray background. For the next four years, he and his students did much of the original work on X-ray plasma emissions from supernova remnants, combining a broad physical insight into global processes with laborious and careful compilations of the necessary atomic physics. At this time, astronomers were still searching for the source of the X-ray background, having apparently eliminated all viable production mechanisms. Professor Cox looked beyond his remnants and realized that the uniform cold medium that he had been producing them in was incompatible with their collective effects on it. He proceeded to turn astronomy's conventional picture on its head, proposing the hot, violent, and dynamic picture of the interstellar medium that is taught today as a matter of fact. Professor Cox's work ever since has been marked by a lack of respect for convention and a desire to apply basic physics principles to the complexities of interstellar dynamics and galactic evolutions. In following his own path, Don developed an international reputation as the most original thinker in his field. According to Edwin Salpeter of Cornell, he was one of the few theorists left who used their brains, and not a computer. His legacy of fundamentally new ideas is supplemented by two generations of his students who continue his work.



Don Cox

The other side of Professor Cox's career at Wisconsin has been his dedication to teaching, attested to by his many years as leader of the department's undergraduate program, his election as a fellow of the Teaching Academy, and numerous unsolicited testimonials from students. Most recently, he has been making an extended effort to develop an introductory physics course for biology majors. Prof Cox's interest in teaching is clearly fueled by a desire to share his own joy and fascination with the ideas of physics. He will spend hours with pencil and paper, solving a problem that has nothing to do with his research, just to show that some seemingly complex behavior can be derived from basic principles. He does this out of personal curiosity, but his willingness to share his enjoyment of the result is well known. Professor Cox's ability to communicate this delight and appreciation of physics to students in elementary courses has made him one of our most effective undergraduate teachers.

Professor Don Cox has contributed many years to research in his scientific field, to students with whom he works, and to the department's teaching mission.

● Professor **Bob Morse's** involvement with the Department of Physics spans over forty years, from his days as a student with Lagally, Lynch, Olsen and Wiley, to the commissioning of the first neutrino telescopes at the South Pole. During this period, Professor Morse has been a good citizen of the department and of the High Energy and Neutrino Physics groups. He has also been a very popular lecturer.

In his early career, Professor Morse applied his outstanding scientific talent and impressive technical skills to



Bob Morse

a variety of particle physics experiments, most associated with UW–Madison. These involved the physics of neutral K mesons, early electron-positron collider experiments, the tau lepton, and detector development for accelerator detectors as well as gamma ray telescopes. He collaborated with some of the great physicists of his time, such as Nobel laureates Mel Schwartz and Carlo Rubbia. Other outstanding collaborators include S. Wojcicki, D. Cline, D. Ritson, and W.D. Walker. During this period, he proposed new ideas for South Pole experiments: atmospheric gamma ray detection during the uninterrupted Antarctic winter and the detection of cosmic ray muons in shallow ice, a possibility which is still discussed to study the composition of cosmic rays.

His later years were exclusively devoted to the successful commissioning of the first neutrino telescopes. Soon after the discovery of the neutrino, the idea emerged in the 1950s to study the universe using neutrinos instead of light. Although the scientific value of neutrino telescopes for particle physics and astronomy was never an issue, the technological challenge of building a kilometer-sized neutrino detector seemed awesome. When the pioneering DUMAND project off the coast of Hawaii failed after more than 20 years, the idea of using Antarctic ice as a Cherenkov detector delivered. The result, after six years of development and construction, was a DUMAND-sized instrument at the South Pole. Professor Morse was the principal investigator on the project. It is thanks to his technical skills, as well as his previous experience working in Antarctica, that this instrument was successfully commissioned on an incredibly fast time schedule. Professor Morse had indeed been operating a gamma ray telescope at the South Pole for some time when the merger of his group with the theoreticians, who were dreaming about polar ice as a neutrino detector, turned out to be a marriage made in heaven. Professor Morse has been to the South Pole seventeen times and counting.

While AMANDA and the future IceCube are now attracting a group of excellent, and sometimes very experienced, young scientists to UW–Madison, Professor Morse's way of doing science has not changed: his research is almost exclusively performed in collaboration with experienced technicians and engineers as well as with undergraduate students. Several of his undergraduates have done stints at the South Pole and have gone on to graduate school at Berkeley and Stanford (physics) and Minnesota (MD-PhD program).

Professor Morse's passion for science comes from the heart. He belongs to a generation that did not consider it to be a job, and is unlikely to walk away from Madison or the South Pole even if he lives in Hawaii.

Physics Faculty Awards

Assistant Professor **Frank Petriello** was one of the winners of the prestigious 2006 Sloan Research Fellowship. He will collide beams of protons at the highest energies ever obtained in particle accelerators at the Large Hadron Collider in Europe. Says Petriello, "These collisions will help unravel several outstanding mysteries in physics,

including the origin of mass and the composition of dark matter in the universe." He says that he will use his fellowship to develop the calculation techniques needed to model and understand the results of these experiments.

Professor **Cary Forest**, who was on sabbatical in Germany this past year, won the 'Bessel-Award' from the Humboldt-Foundation, Germany. As a Humboldt-Fellow, he has joint students in Germany and Wisconsin to assist in collaborations and this past year received a stipend to support his stay in Germany.

Professor **Baha Balantekin** was elected a Fellow of the Institute of Physics (United Kingdom) in 2004; during the 2004–2005 academic year, he was at the 21st Century Center of Excellence as a Visiting Professor at Tohoku University (Japan). In 2005, Professor Balantekin was appointed as the Editor-in-Chief of the *Journal of Physics G: Nuclear and Particle Physics*, published in the United Kingdom. In 2006, he was elected a Councillor of the American Physical Society.

Professor **Gary Shiu** received an NSF CAREER Award in 2004 and received the Cottrell Scholar Award in 2005 for \$100,000. This follows his 2003 Research Corporation award of \$35,000. The Cottrell Scholar Award is given to younger university faculty members which enables faculty to pursue original research and teaching ideas and to help re-establish collegiality in an age of increasing specialization, according to Research Corporation. The title of his project is "Connecting String Theory to Experiment." Frederick Gardner Cottrell, the chemist for whom these awards are named, founded and endowed Research Corporation with the patent rights to his invention, the Cottrell electrostatic precipitator. The award honors his generosity as a benefactor of science through Research Corporation and his lifetime devotion to helping young scientists get their start. Cottrell forsook personal wealth by founding Research Corporation in a philanthropic gesture that still stands as an inspiration for others.

Professor **Wesley Smith** received a WARF Distinguished Professorship, for which Professor Smith was named the *Bjorn Wiik Professor of Physics*. This program provides recognition for distinguished research contributions by the UW–Madison faculty. The awards are intended to honor faculty who have made major contributions to the advancement of knowledge, primarily through their research endeavors, but also as a result of their teaching and service activities.

Professor **Susan Coppersmith**, Professor of Physics and Chair of the UW–Madison physics department, was one of five faculty members at the UW–Madison to have been elected to the American Academy of Arts and Sciences, an independent policy research center that annually honors leading thinkers in the sciences, arts, humanities, public affairs and business. Professor Coppersmith was among 175 new fellows elected to the academy in a list that includes former U.S. Presidents Bill Clinton and George H.W. Bush, film director Martin Scorsese and the Nobel Prize–winning biochemist Paul Nurse. The academy, founded in 1780, is an international learned



Frank Petriello



Cary Forest



Baha Balantekin



Gary Shiu



Wesley Smith



Susan Coppersmith

society. Professor Coppersmith, a theoretical physicist, is known for her work on “disordered” materials, in which molecules are randomly arranged rather than in perfect alignment. Her efforts to understand how such disorder might change the fundamental properties of different materials has implications for a variety of industrial fields.

Professor **Gelsomina DeStasio (now Gilbert)**, was selected to receive a 2005–06 Faculty Development Grant Award.

Professor **Peter Timbie** was awarded a Vilas Associate Award for spring 2005.

Professors **Bob Joynt**, **Mark Saffman** and **Mark Friesen** have recently received National Science Foundation Emerging Models and Technologies for Computation (EMT) grants for work on quantum computing. NSF estimated that nationwide there would be 35–45 awards, so bringing three of them home to Wisconsin physics is quite an honor!

Sabbaticals Awarded

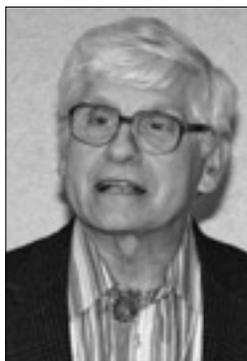
- Professors **Mark Saffman** and **Cary Forest** were awarded a sabbatical for the academic year 2005–06, and Professor **Hakki Ogelman** was awarded a sabbatical for the spring semester 2005–06 to pursue his research in Turkey.

- Professor **Bob Joynt** was awarded a sabbatical for the fall semester 2006–07 to pursue his research, and Professor **Jim Lawler** was awarded a sabbatical for the spring semester 2006–07.

Distinguished Faculty Fellows

At the May 5, 2006 Awards Ceremony, several

Distinguished Faculty Fellows were recognized:



Wilmer Anderson

Professor Anderson's professional career has been at the University of Wisconsin, where he began as an assistant professor in 1960. His research has spanned the broad field of atomic physics. His invention of an optically pumped polarized ion source for particle accelerators was recognized by an Institute of

Electrical and Electronics Engineers Prize in 1993. He has collaborated with many colleagues to pursue a variety of research interests in atomic physics. He has been a member of the UW Teaching Academy, and has a reputation for excellence in teaching.



Willy Haerberli

Professor Haerberli began his teaching career as an assistant professor at UW in 1956, and remained at Wisconsin until his retirement in 2005. During that span he has had a number of remarkable accomplishments in both research and teaching. His standing in the community was recognized by a symposium at UW in the summer of 2005, which attracted

physicists worldwide to pay tribute to him. Many of the participants were former graduate students. His contributions to nuclear physics have been recognized by the Bonner Prize of the American Physical Society, and his election to the National Academy of Sciences. His teaching achievements include the development with Professor Camerini of “Physics in the Arts,” which is one of the most popular courses in the Department.



William Kraushaar

Professor Kraushaar was unable to attend the awards banquet. He served the University with distinction from 1968, when he was appointed full professor, to 1985 when he retired. He is widely recognized for his pioneering work in X-ray and gamma ray astronomy. He is a member of the National Academy of Sciences. His contributions to the Physics Department

include the ongoing research in astrophysics, which has grown to be a large fraction of the department's research effort.

Other News

- Associate Scientist **Darren Craig** has accepted an Associate Professor position at Wheaton College in Wheaton, Illinois. Wheaton College is a Christian liberal arts school of about 2,400 students. He will begin in the physics department in the fall of 2006. Craig plans to continue to be active in plasma physics research and to make frequent visits to Wisconsin. Congratulations, Darren!

- The Department also awarded a **Special Recognition Award** to **William Crabtree**. Unfortunately, neither Crabtree nor his family could attend the award ceremony. However, we wish to recognize William Crabtree and his extended family for their wonderful philanthropy in providing us funding to create the Maritza Stapanian Crabtree Undergraduate Scholarship, which we awarded at this year's awards ceremony.

Graduate Recruiting Report

by Jim Lawler

The quality of the graduate applicant pool has improved in recent years. In fact, the applicant pool for fall 2006 admission was the most competitive applicant pool that any of us could remember. We were unable to make offers to many qualified applicants who would have been at the top of our offer list about five years ago. We have 34 new graduate students, listed below, joining our program this fall. Two other students were admitted and granted deferrals of one or two semesters.

Fall 2006 Admissions

WARF Fellows

Larissa Ejzak, University of Kansas
Carl Pfendner, University of Pennsylvania

AOF Fellow

Don Huynh, Boston University

Teaching Assistants—Domestic

Michael Baker, University of Pittsburgh
Peter Cook, Calvin College
Adam Dally, University of Minnesota
David Felker, Wheaton College
Michael Glatzmaier, St. John's University
Matthew Gonderinger,
Loyola University of Chicago
David Hover, University of Kansas
Elliot Kaplan, Columbia University
Jeffrey Klukas, Wittenberg University
Bryce Littlejohn, Principia College
Andrew Long, Cornell University
Michael McFarlane, UC–Berkeley
Paul McGuirk, UC–Berkeley
Shane McMahon, UW–Madison
Daniel Passmore, University of Tennessee
Michael Phillips, Gustavus Adolphus College
Christopher Rivard,
University of Michigan–Ann Arbor
Steven Sendelbach, UW–Madison
Daniel Sikes, North Carolina State University
Mark Stockett, Oberlin College
Alexander Stuart, Michigan State University
Jeff Waksman, Columbia University
You Yang, UC–Berkeley

Teaching Assistants—International

Ye Li, USTC–Hefei
Hao Luo, Wuhan University
Dong Zhou, Zhejiang University

Admitted with Outside Support

Kevin Buettner, US Military Academy
Masaki Kato, Akashi National College of Technology, Japan

Research Assistants

Jonathan Eisch, UW–River Falls
Peng Zhou, Peking University

Our system of hosting two group visits in March, with heavy involvement of both faculty and current graduate students, continued this last spring. Our current group of first- and second-year graduate students deserves special recognition for the effort and enthusiasm they demonstrated in assisting with our group visit events this year. They are a cohesive group that has proven to be a terrific ambassador for our graduate program. Prospective students unable to participate in the group events were given the option of an individual visit to campus.

We invite you, as alumni, to encourage prospective graduate students to consider pursuing their graduate studies at UW–Madison.

STUDENT UPDATES NEWS & AWARDS 2006

LOOKING BACK



Geyser Demonstration

Geyser demonstrations at the University Exposition, like this one performed in 1924, used to be held in the Red Gym. A similar apparatus continues to be used today. However, at about half as tall as the original, it is more cramped in the new auditoriums in Chamberlin.

Graduate News and Awards

Graduate Students Awards

Henry and Eleanor Firminhac Physics Scholarship

This is the second year for this award, which is given to undergraduates or graduates in physics with financial need as the primary consideration, with at least one-half of recipients being women. **Emily Barrentine**, a physics graduate student, is the recipient for 2006–07.

Joseph Dillinger Award for Teaching Excellence



Will Williams

Will Williams won this award in May 2006. Williams has served as a TA for several courses, and his students love him. Congratulations Will!

Williams grew up in Connecticut and moved to central New York midway through high school. In 2002, he graduated from Clarkson University with bachelor degrees in physics and mathematics, under the supervision of Dr. David Wick.

Williams' graduate research, carried out under the direction of Professor Mark Saffman, focuses on nonlinear interactions between monochromatic light and cold atoms. He is studying theoretical and experimental interactions between near resonant laser beams and clouds of alkali atoms that are held in a Magneto-optical trap and

laser-cooled to a temperature of about 100 microKelvin. They have demonstrated experimentally that light-induced forces cause spatial redistribution of the cold atoms, which leads to optical modulational instability (MI), an effect where a small intensity fluctuation on a laser beam is nonlinearly enhanced by the medium it is traveling through. Related theoretical work has demonstrated the possibility of using complex light fields created by multiple laser beams to write two-dimensional spatial patterns using cold atomic beams. This work may enable patterning of sub-micron structures with cold atoms.

In his free time, Williams enjoys reading, playing with his pets and going to the zoo. He also likes to play racquetball, volleyball and ultimate Frisbee.

Weina Peng and **Shusaku Horibe** won the **Emanuel R. Piore Award**, presented annually to recognize excellence on the Qualifying Examination.

The **Jansky Award** was given to **Amanda Kepley** of astronomy. This award goes to an outstanding graduate student pursuing an advanced degree with interest in astrophysics and astronomy. This award rotates between the departments of astronomy and physics.

Kepley is a fourth year graduate student in astronomy at UW–Madison. For her Ph.D. thesis, with Dr. Eric M. Wilcots, she is studying magnetic fields in star bursting dwarf galaxies by observing their synchrotron emission. Her research makes use of three major radio astronomy facilities: the Green Bank Telescope (GBT), the Very Large Array (VLA) and the Australia Telescope Compact Array (ATCA). She is very excited to receive an award in honor of the founder of her field, Karl Guthe Jansky, and his wife, Alice Knapp Jansky.

Kepley graduated summa cum laude in 2002 from Case Western Reserve University with a B.S. in Astronomy and received her M.S. in Astronomy in 2004 from UW–Madison. She is the recipient of an NSF Graduate Research Fellowship. She hopes to one day get a faculty position in astronomy at a research university.



Amanda Kepley

This year two women were awarded the **Hirschfelder Award** to pursue travel or to go to a conference in support of each of their areas of research. This year's winners are **Anupama Atre** and **Sucismita Chutia**.

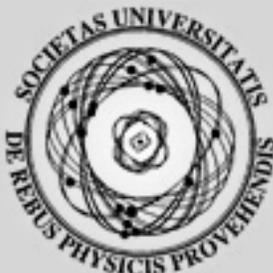
Carlos Pareda won the **Advanced Opportunity Fellowship** for 2005–06.

University Physical Society

The Physics Club of University of Wisconsin–Madison, also known as the University Physical Society can be found at <http://ups.physics.wisc.edu/>. Check it out! Also, check our new room in 2328 Chamberlin Hall, which overlooks Charter Street entrance.

They feature information on:

- Jobs: job posting in the UW Physics Department
- Events: Upcoming UPS Events
- Officers: Your UPS Officers
- Research: How to find research opportunities
- About: What is the University Physical Society?
- Tutoring: We offer volunteer tutoring
- Humor: Bad physics humor
- Photos: Physics Club memories



They also provide links to The American Physical Society and the Society of Physics Students.

Don Fahey (President) Kristen Jones (Vice President) Ben Payne (Treasurer)

Undergraduate News and Awards

We are pleased to announce that **Erin Conrad** has been awarded a prestigious Barry M. Goldwater Scholarship, which provides \$7,500/year to support undergraduate study in mathematics, engineering or the natural sciences. Erin will hold the scholarship for her junior and senior years. Applicants are nominated by their university and undergo a rigorous screening process. Out of a pool of 1081 nominees, 323 scholars were selected on the basis of academic achievement and potential for a successful research career. Erin is majoring in physics and does research in Professor Mark Eriksson's laboratory. She intends to pursue a Ph.D. in physics and a professorship at a research university.

L.R. Ingersoll Awards

L.R. Ingersoll Awards for distinguished achievement in undergraduate physics for spring and fall were awarded on May 5, 2006, at the Physics Banquet & Awards Ceremony at Lowell Hall. Awardees included:

Spring 04–05

(103) Elias Wan
(104) Sook Yui Jessica Ho
(201) Ryan Ripp
(202) Thomas Albrecht
(207) Emilie Siverling
(208) Peter Thurlow
(248) Brandon Harris

Fall 05–06

(103) Kurt Kastenholz
(104) Mark Sievert
(201) Blake Carlson
(202) Andrew Thomas
(207) Martin Fleener
(208) Agnieszka Kubica
(247) Ho Ling Li

Albert Augustus Radtke Scholarship

The 2006 Albert Augustus Radtke Scholarship for distinguished achievement in the study of undergraduate physics was awarded to several physics students, including **Young-Joon Paul Choe, Grant Teply** and **Rebecca Shapiro**.



Young-Joon Paul Choe

Young-Joon Paul Choe writes: "It was approximately six years ago that I sat down with my parents in Seoul, Korea to discuss my future. I was falling through the cracks of the Korean school system, and they were concerned. In order to stay afloat, I had to attend school eight hours a day and receive at least 2–3 hours of tutoring every evening. There was absolutely no room for creativity or individualism within this school system. My parents realized I needed to

find myself somewhere other than in Korea, and I spent my high school years in a small private prep school in the small Hoosier town of LaPorte, Indiana. I learned English, studied hard and made a life for myself. This is how I was able to finally get to Wisconsin."

"I feel as though I once again have to discuss my future prospects. I am now a man with two countries - my family in Korea and my academic career in the United States. I arrive home when I return to Korea, and I arrive home when I enter the United States. My immediate goals include finishing my triple major—AMEP, physics and mathematics—and then I hope to continue to graduate school to study plasma physics. After fulfilling my required military service in Korea to retain citizenship, I hope to find a job that would bridge American and Korean technology through physics."

Fay Ajzenberg-Selove Award

The 2006 Fay Ajzenberg-Selove Award for outstanding undergraduate women majoring in physics, astrophysics or astronomy had two winners this year: **Louise Behnke (astronomy)** and **Jessica Waters (physics)**.

Liebenberg Family Undergraduate Summer Research Fellowship

Our thanks go to the family of **Maude Liebenberg** and her son, **Don**. Because of their generosity, the Liebenberg Family Undergraduate Summer Research Fellowship is available for **Peter Kerens** at the May awards banquet. This award provides funding to encourage undergraduates to become involved in summer research programs.



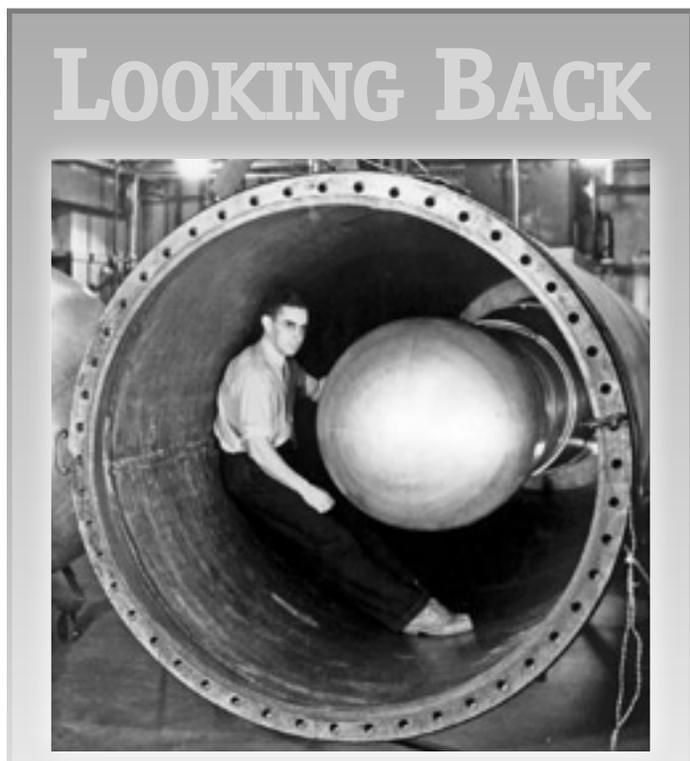
Peter Kerens

Peter writes: "I'm a third-year physics major from Neenah, Wisconsin. My parents and younger brother still live there, while my older brother is a professor of film at Southern Methodist University and my older sister is in the med school right here in Madison. Ever since I was very little I've wanted to become a scientist of one sort or another—my original career path of choice was a Ghostbuster, then for many years a paleontologist—but physicist didn't make its way to the forefront of my mind until I realized the field's scope of applicability. As an inquisitive guy, general curiosity had kept me from focusing in on any one area, but physics is, in a very real sense, the study of everything, and that suits me just great."

"I'm just as excited about physics today as when I came to school, but in a different way. My original interests coming out of high school were in cosmology and theoretical physics, but as I've taken classes at Madison, I've come to learn that there are a lot more avenues to explore than those. In particular, working



Apples from Newton's apple tree



4MV Accelerator

Ray Herb's famous 4MV accelerator, also called the "long tank," was shipped to Los Alamos during WW2, along with Professors Barschall and Richards. At the end of the war, the tank and the two professors returned to UW-Madison. Pictured is technician Cliff Vought in the open end of the pressure tank that housed the accelerator. He was the only team member short enough to fit into the tank comfortably.

as an undergraduate hourly for Professor Winokur has introduced me to condensed matter physics, as well as experimental physics as a whole."

"Even now, three quarters of the way through my time as an undergraduate, I am still learning of topics and fields of research that are completely new to me. I plan to go to graduate school, but where, and to do what? I think that this scholarship, by allowing me to get my feet wet and do some basic but genuine research, will go a long way towards helping me answer these questions, and I am sincerely grateful for the opportunity."

Dr. Maritza Irene Stapanian Crabtree Undergraduate Award

This is the third year of this award, which stems from a bequest by William Crabtree on behalf of the late Dr. Maritza Irene Stapanian Crabtree to the University of Wisconsin to support tuition and fees based equally on merit and need for undergraduate students in Physics. This year's winners are **Jon Hillesheim, Allison Noble, Michael Slutskiy** and **Jonathan Hedstrom**. Congratulations to all!



Jon Hillesheim

Jon Hillesheim writes, "I am from Alexandria, Minnesota. I am double majoring in Physics and Electrical Engineering, having just finished my third year of studies."

"My main interest lies in plasma physics and controlled fusion. This semester I took the Introduction to Plasma Physics course here at UW-Madison, which I found very interesting and confirmed for me my chosen pursuit. This summer I have an internship at the Princeton Plasma Physics Laboratory through the National Undergraduate Fellowship Program. I am looking forward to this summer and hope to make the most of my time at Princeton. This fall I will go through the process of applying to graduate schools. I hope to get accepted into a department where I can learn more about plasma physics and controlled fusion and where I can make a meaningful contribution."

Bernice Durand Undergraduate Research Scholarship

This award goes to undergraduate women or minorities majoring in or planning to major in physics or astronomy. It is made possible through the generosity of associate vice chancellor and physics professor **Bernice Durand**, who established this scholarship to encourage young women and minorities to do research and continue their career in science. This year's winner is **Erin Conrad**, who worked with Professor Teresa Montaruli doing research this summer.



Erin Conrad

I N M E M O R I A M

Ulrich Wolfgang Arndt, 1924–2006

U.W. Arndt played an important part in the development of a broad range of instrumentation for X-ray diffraction from protein crystals. Over the last 50 years, information about protein structure has been one of the cornerstones underpinning the progress of molecular biology. Arndt was a member of the staff of the physics department for the University of Wisconsin in 1956, assisting Professors Beeman and Anderegg.

John Roderick Cameron, 1923–2005

John Cameron was born on a farm in northern Wisconsin, the fourth of seven children. He went on to take a B.A. in mathematics at the University of Chicago and then a Ph.D. in physics at the University of Wisconsin in 1952, working with Ray Herb. John always put having fun at the top of his priorities. He had a zest for physics, medicine, life and just about everything else that he did, making him the envy of everyone who knew him. He was an internationally known and respected medical physicist. He retired from the UW in 1985.

When he saw the opportunity to make a significant impact on the transfer of knowledge in the physical sciences to the life sciences, he founded a new department, medical physics, at the UW. He made several significant discoveries in his field and founded Radiation Measurements, Inc., a business whose sale was used to create the Medical Physics Foundation. This foundation continues to support research and education in medical physics. He also founded the Medical Physics Publishing Company, a non-profit publishing society dedicated to education.

Alfred Olaf Hanson, 1914–2005

Born on his father's homestead farm in North Dakota, Hanson received his elementary education in a one-room country school. He continued his education in Grand Forks, North Dakota, earning a B.S. in education at the University of North Dakota in 1936. After a stint as a high school science teacher, he returned to the University of North Dakota as a teaching assistant in mathematics, obtaining an M.A. in 1938. He then enrolled at the University of Wisconsin as a graduate student in physics. In 1942 he received his Ph.D. in physics under the direction of

Professor Ray Herb and remained at the UW as an employee of the Manhattan Project until April 1943, when the two Wisconsin accelerators and most of the staff working with them were moved to Los Alamos.

In January 1946 he moved to the University of Illinois as an assistant professor of physics to begin his long and distinguished career in academic experimental nuclear physics. At that time, Donald Kerst's 20-MeV betatron at the University of Illinois produced the highest energy X-rays in the world, and Professor Hanson, with colleagues, used them to investigate the structure of, and especially the size of, atomic nuclei.

Professor Hanson was a Fulbright Scholar in Turin, Italy and Sao Paulo, Brazil, contributing to the international community of nuclear researchers. He organized several conferences and served the national community on many advisory committees.

Wendell Gene Holladay, 1925–2004

Wendell served in the Navy (1943–50) and enrolled at Vanderbilt University, where he received his B.A. in physics (*magna cum laude*) in 1949, followed by an M.A. in 1950. In 1950 he was appointed Alumni Research Fellow at the University of Wisconsin and a National Science Foundation Fellow from 1952–54. He was awarded the Ph.D. in particle physics from the UW in 1954. He returned to Vanderbilt as assistant professor of physics and quickly progressed, becoming full professor in 1962. He continued his interest and work after his retirement in 1993.

He served his university as chairman of the Department of Physics and Astronomy, as Dean of the College of Arts and Science and as Provost. Wendell was a dedicated and accomplished teacher. He taught much of the physics catalogue and co-authored a very well-received undergraduate textbook on modern physics. He exemplified a passion for physics and a dedication to his university.

Robert R. Ledin, 1920–2005

Robert served in the Wisconsin National Guard after high school and then joined the U.S. Army from 1939 until 1946, serving in the Pacific Theater during World War II.

Robert worked for the University of Wisconsin physics department as an instrument maker, retiring in 1982.

Thomas William (Tom) Lovell, 1946–2005

Thomas attended the University of Wisconsin and worked in plasma physics since 1967. He started as a part-time student employee and, by virtue of hard work and innovative accomplishment, became an engineering project manager/researcher, until he became incapacitated.

Appropriately, a memorial ceremony was held on May 13, 2005, in 1300 Sterling Hall, where he coordinated and participated in 170 presentations of The Wonders of Physics over the past 22 years.

Harold Frank Scott, 1914–2006

Harold graduated from Janesville High School and attended Beloit College. After farming for 25 years in LaPrairie Township, Harold moved his family to Madison where he took a position with the University of Wisconsin physics department, as an electronic technician (1964). Harold thoroughly enjoyed working at the university, eventually retiring in 1976.

Emeritus Professor **Hugh Richards** passed away on September 29, 2006 at the Dunn County Health Care Center in Menomonie, Wisconsin. Hugh was born November 7, 1918, on a homestead in Baca County, Colorado. He served as department chairman for three terms and also as associate dean of L&S.

We also wish to note with sadness the passing of two faculty wives: **Beatrix "Trixie" Roesler**, wife of Professor Fred Roesler, passed away on Aug. 23, 2006, at the Don and Marilyn Anderson HospiceCare Center in Fitchburg, Wisconsin.

Cheryl Green Friedman, wife of Emeritus Professor William Friedman, passed away Friday, September 1, 2006, at home in Mill Creek, WA.

More information will be forthcoming in our next edition.

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