Physics at Boulder

Physics @ CU-Boulder

A Publication of the Department of Physics at the University of Colorado at Boulder • Spring 2006

Boulder Physics Faculty Win Awards

CELEBRATE! The five most recent honorees of the CU Boulder Physics faculty pose a celebration in their honor. Left to right, they are: Jun Ye, John L. Hall, Neil Ashby, William Ford, and Noel Clark. For a complete list of faculty awards since the last newsletter, see page 5.

"It's been an amazing two weeks!" said John Cumalat, chair of the CU-Boulder Physics Department. In late September and early October, five faculty members and affiliates received awards and recognition for teaching, writing, and research. These are recent additions to the long list of awards received by faculty since the last edition of *Physics@CU-Boulder* (see page 4).

John L. Hall, a fellow and senior research associate at JILA, was awarded the 2005 Nobel Prize in Physics. Hall shared the Nobel with Theodor W. Hänsch of the Max Planck Institute for Quantum Optics and a professor of physics at Ludwig Maximilians University in Munich, Germany, and Roy J. Glauber, a professor of physics at Harvard University. Hall and Hänsch were awarded half the Nobel Prize for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique. An optical frequency comb is generated by a laser specially designed to produce a series of extremely short—a few billionths of a second—equally spaced pulses of light. Hall has been affiliated with the physics department since 1966 and has been the thesis adviser of 15 physics doctoral students at CU-Boulder.

Neil Ashby, professor emeritus, received the Richtmyer Memorial Award through the American Association of Physics Teachers (AAPT). Since 1941, the recipients of this award present a major address at the AAPT Winter Meeting on a topic of current significance suitable for non-specialists.

Noel Clark, professor, won the Oliver Buckley Condensed Matter Physics Prize from the American Physical Society (APS). The Buckley Prize was endowed in 1952 by AT&T Bell Laboratories (now Lucent Technologies) to recognize outstanding scientific work. Only 70 other scientists have received the award, 13 of whom have gone on to receive the Nobel Prize.

William Ford, professor, received the W.K.H. Panofsky Prize in Experimental Particle Physics from APS with John Jaros and Nigel Lockyer. Ford and his colleagues won the prize for "leading contributions to the discovery of the long b-quark lifetime with the MAC and Mark II experiments at SLAC. The unexpectedly large value of the b-quark lifetime revealed the hierarchy of the Cabibbo-Kobayashi-Maskawa quark mixing matrix."

Jun Ye, associate professor adjoint and JILA fellow, won the first prize in the Technological Innovations category in the Young Scholars competition at the "Amazing Light" symposium in Berkeley. He won for his paper, "Optical phase control from 10-15s to 15: Precision measurement meets Ultrafast Science." He is affiliated with CU, JILA, and NIST.

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Ultrafast X-Ray Science and Technology at CU

CU physics professors Margaret Murnane and Henry Kapteyn have been working with short wavelength "laser-like" light that has many potential industrial, research, and medical uses. For example, their research team, which includes CU students from physics, engineering, and chemistry, hopes to build a compact, table-top x-ray microscope for biological imaging.

Laser-like light in the extreme ultraviolet and soft x-ray regions of the electromagnetic spectrum is generated by firing a femtosecond laser into a gas. The fast laser pulses, with durations as short as 100 trillionths of a second, rip electrons from atoms which then recombine to generate laser-like beams of x-rays. These extremely short wavelengths of light can be used to study nanometer-scale objects that are too small to be seen with visible light.

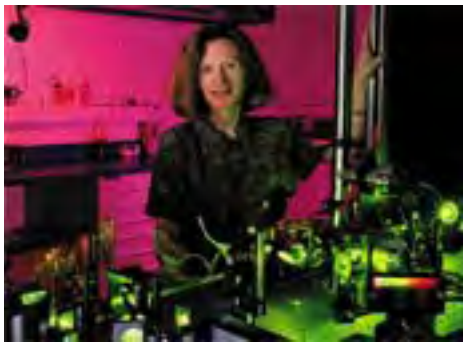
"Such microscopes could visualize processes happening within living cells, or perhaps even allow scientists to understand how pharmaceuticals function in detail," according to Murnane, who is also a fellow of JILA, a joint institute of CU-Boulder and the National Institute of Standards and Technology.

CU researchers Murnane and Kapteyn published papers in *Science* and *Nature* in 2000–2004, where they demonstrated that the x-ray's beams were coherent or laser-like. They also demonstrated how concepts from photonics were useful in making the x-ray's beams even brighter.

In 2003, Murnane and Kapteyn joined with researchers at Colorado State University and the University of California at Berkeley to win a National Science Foundation (NSF) award establishing an Engineering Research Center (ERC) for Extreme Ultraviolet (EUV) Science and Technology. One of only 24 NSF Engineering Research Centers in the nation, the EUV ERC received $17 million for the first five years of a ten-year cooperative agreement.

"Most EUV science and technology development is presently being conducted at a handful of large national light source facilities, but to realize the full potential of EUV, there is an urgent need to make this technology accessible to university, national, and industrial laboratories," said Murnane who is co-principal investigator of the ERC. "Throughout the lifespan of the ERC, we expect to make compact coherent EUV sources at significantly shorter wavelengths than is now possible, and to reduce their scale to desktop, and in some cases, even laptop size."

The national push to develop nanotechnology, devices and circuits built from single atoms or molecules demands techniques such as EUV for observation and manipulation.



Margaret Murnane and a high power, ultrafast laser.

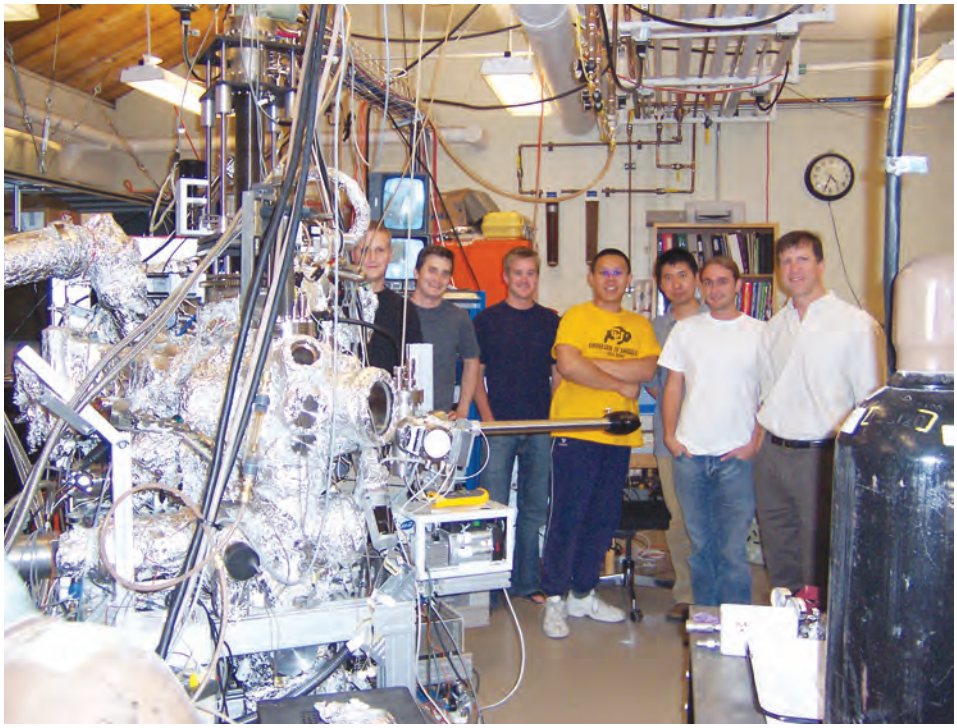
For an overview of the latest developments in EUV science, read H.C. Kapteyn, M. M. Murnane and I.P. Christov, "Extreme Nonlinear Optics: Coherent X Rays from Lasers," Physics Today, Vol 58 (3), March 2005.

Coming Events

Commencement:
Spring 2006, Friday, May 12

A New Light Source for Photoemission Spectroscopy

Dan Dessau's (right) research group uses angle resolved photoemission spectroscopy (ARPES) to explore the electronic structure and phase transitions of high temperature superconducting materials and unusual magnetic materials. Students pictured left to right: Justin Griffith, Nick Plumb, Fraser Douglas, Quinn Wang, Zhe Sun, and Jake Koralek. Visit *Physics@CU-Boulder* on the web for bonus content! physics.colorado.edu/Newsletter/Spring2006



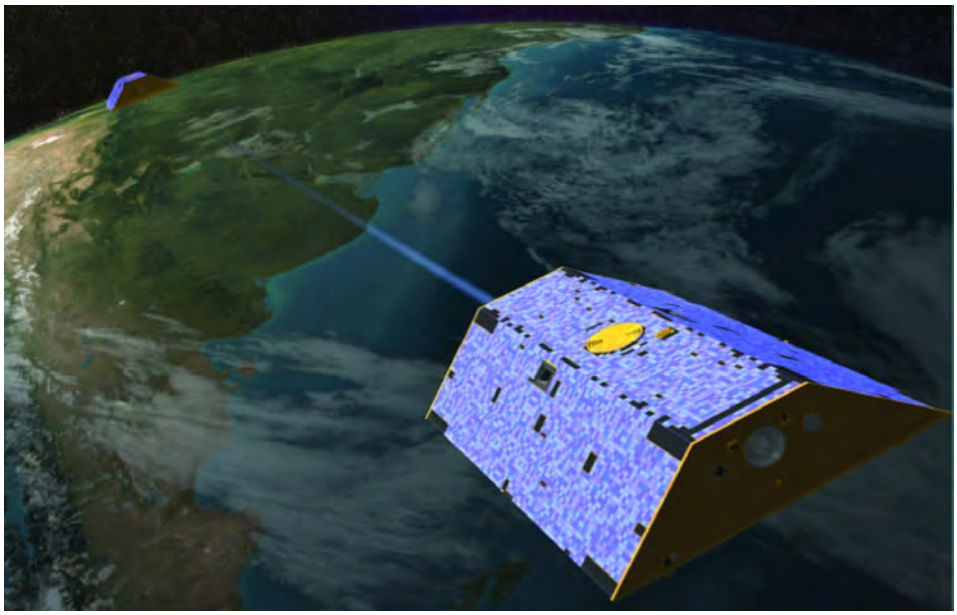
Editor: Patricia Weis-Taylor
Design: Anjanette Mapp
Circulation: Scott Noble

Applying Time Variable Gravity Measurements from Space

By Professor John Wahr, Center for Imaging the Earth's Interior

A nine-year US/German satellite mission called GRACE, launched early in 2002, is sending data on fluctuations in the earth's gravity that can be applied to geophysical problems. John Wahr and his students and colleagues in the Physics Department (Isabella Velicogna, Sean Swenson, and Mery Molenaar) have been involved with GRACE since its inception, playing a prominent role in understanding its scientific payoff and developing algorithms to process the data. Now that the mission is up and running, they are beginning the long process of applying the data to geophysical problems. So far, Wahr and his colleagues have looked at such things as documenting changes in ice and snow over Greenland and Antarctica, determining fluctuations in global sea level caused by seasonal variability of ocean mass, estimating changes in the amount of water stored in large river basins around the world, and determining seasonal changes in snow and meltwater at high northern latitudes in North America and Eurasia.

Unless you are a geophysicist you probably think of the Earth's gravity field as a rather simple and featureless quantity: a force that decreases as the square of the distance to the center, and that causes a 9.8 m/s^2 acceleration of objects at sea level. This simple description would be fine if the Earth were a round ball with a spherical density profile, and it works pretty well at explaining most everyday experiences. But the picture starts falling apart at the level of 0.3% from the effects of the Earth's rotational bulge, and then even more dramatically down at the level of 0.003% due to other non-spherical terms in the Earth's density distribution.



The GRACE satelite mission is sending data on the fluctuactions in the earth's gravity.

Geophysicists have long taken advantage of this complexity, by using surface and satellite gravity measurements to learn about lateral differences in the Earth's density. The GRACE mission consists of 2 satellites (see figure) in identical orbits, that continually monitor the fluctuating distance between one another to determine the gravity field. Accuracies are good enough to resolve gravity variations not just in space but also in time, providing global gravity field maps at scales of a few hundred km and greater every month. Monthly variability is caused mostly by processes in the earth's fluid envelope: the atmosphere, the oceans, and the water, snow, and ice stored on land.

The range of applications of GRACE is unprecedented, and much of the information it can provide is unique. Wahr and his group look forward to their continued exploration of the Earth with this brand-new data type.

CU Physics Alumna Heads Sigma Xi

Laura Nigro, MS, 1987, is Director of Membership and Chapter Programs at Sigma Xi, the Scientific Research Society—an international honor association that recognizes scientific achievement. Its mission is to enhance the health of the research enterprise, foster integrity in science and engineering, and promote the public's understanding of science for the purpose of improving the human condition. Prior to joining Sigma Xi, Laura did nonprofit management and PR in the arts, environmental, and humanitarian sectors. Shortly after graduating from CU-Boulder, she worked on geophysical process modeling at INSTAAR and CIRES (including CSES). She joined the Sigma Xi staff in November 2004 after CU's "100 Years of Excellence in Physics" event in October 2002 caused her to reconsider her career path. The trip back to campus, and especially reuniting with Nobel laureates Carl Wieman and Eric Cornell, inspired Laura to honor the legacy of her own physics training by once again serving science through her profession. Having been inducted as a member of Sigma Xi back in 1985, she saw the Society's opportunity in Membership and Chapter Programs as a meaningful way to achieve this goal. Laura warmly welcomes contact from any CU affiliates (mail to: ljnigro@sigmaxi.org).

There's a new option for keeping your classmates up to date! Use the form on the insert to this newsletter or visit our new alumni update form at physics.colorado.edu/alumniportal

New Faculty Corner

Emanuel (Manny) Knill

My work consists of developing and applying mathematical and physical tools to better understand the limitations and utilize the capabilities of information processing resources. I use ideas and results from discrete mathematics, linear and multilinear algebra, information theory, the theory of computation, and theoretical physics, which I have applied to automated reasoning, learning theory, numerical methods, and the human genome project. Since 1996, my focus has been on quantum information processing, with contributions to quantum coding theory, models of computation, algorithms, and technology.

Konrad Lehnert

Konrad Lehnert came to JILA from Yale in December 2002. As an Associate Fellow, his research interests include quantum coherence in nanoscale electrical circuits (solid-state qubits), dynamics of individual electrons in one-dimensional conductors, and ultrafast quantum-limited charge measurements.

Heather Lewandowski

I received my bachelor's degree in Physics from Michigan Technological University in 1997 and came to the University of Colorado for graduate school. I worked with Eric Cornell to design and build a simpler Bose-Einstein Condensation apparatus and used it to study spinor condensates. I received my Ph.D. in 2002 and began a National Research Council postdoctoral fellowship soon after. During my time as a postdoc, I worked in the group of Jun Ye at JILA cooling and slowing OH molecules. My current research interests revolve around creating cold molecules and studying their interactions.

Tobin Munsat

I grew up in Chapel Hill, N.C. and majored in physics at the University of North Carolina. My introduction to plasma physics was a soda-can sized plasma experiment that I could see glowing from the hallway. At UNC there was one professor with one graduate student doing research on wave absorption in an RF-heated collisional plasma, and I soon started an undergraduate research project with them. I went to Princeton in 1994 and received a Ph.D. in 2001.

My dissertation work at the Princeton Plasma Physics Lab (PPPL) provided the first localized measurement of electron transport in a spherical torus (a type of apple-shaped tokamak which is capable of achieving particularly high plasma pressures).

After graduation, I received the DOE Fusion Energy Postdoctoral Research Fellowship and shifted my research to plasma turbulence measurements and the relationship between microturbulence (turbulent fluctuations with characteristic wavelength much smaller than the size of the plasma) and cross-field transport. After the DOE fellowship, I stayed on for two more years as a staff physicist at PPPL. During that time I branched out to other diagnostic and analysis techniques.

At CU, I hope to continue the diagnostic development and collaboration with the large tokamak facilities, while simultaneously developing a local experiment to study turbulent fluctuations in high-pressure plasmas.

Kevin Stenson

Growing up in St. Paul, Minnesota I was familiar with cold weather and had no problem adjusting to school in Lewiston, Maine where I received a Bachelor's degree in Physics and Mathematics in 1992. I received my Ph.D. at the University of Wisconsin in 1998 and was a post-doc at Vanderbilt in Nashville, Tennessee before moving to CU in Boulder.

I have been working on experimental high energy physics since 1995. Until recently, all of the experiments I have worked on were conducted at the Fermi National Accelerator Laboratory outside of Chicago. They involved investigating the properties of charm and beauty quarks. In the past few months, I have begun working on the CMS (Compact Muon Solenoid) experiment to be located inside the Large Hadron Collider (LHC) scheduled to turn on in 2007 at CERN in Geneva, Switzerland. With the CMS experiment, we hope to discover the Higgs particle, which is responsible for giving mass to most of the fundamental particles. We will also be searching for evidence of exciting new phenomena such as supersymmetry, such as the predicted supersymmetric partners that have never been observed.

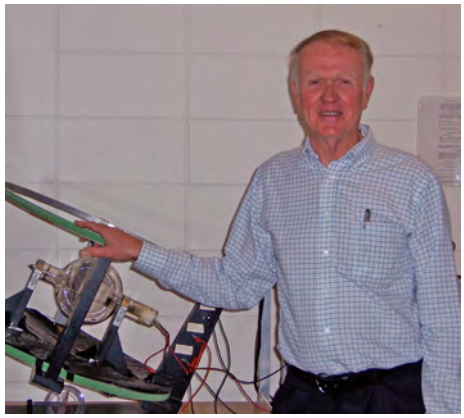
Faculty Awards and Transitions

Selected Honors and Awards to Faculty and Staff (2003–2005)

Neil Ashby: Richtmyer Memorial Lecture Award, American Association of Physics Teachers (2005)
Albert Bartlett: Lifetime Achievement Award, University of Colorado (CU) Environmental Center (2004)
Paul Beale: Boulder Faculty Assembly (BFA) Excellence in Teaching Award (2004-2005); the President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (2004)
John Bohn: Fellow, American Physical Society (APS) (2003)
Noel Clark: Oliver E. Buckley Prize (2005)
Eric Cornell: Nobel Prize in Physics (2001); Fellow, American Academy of Arts & Sciences (2005)
Tom DeGrand: Faculty Research Fellowship (2002-2003)
Dan Dessau: Faculty Research Fellowship (2003-2004)
Michael Dubson: The President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (2004)
Noah Finkelstein: NSF Career Award (2005); Junior Faculty Development Award (2004); Residential Campus Teaching Award (2004)
William T. Ford: W.H.K. Panofsky Award (2005)
Allan Franklin: CRCW Distinguished Research Lectureship (2002-2003)

Awards, con't

Chris Greene: Chair, APS Div. of Atomic, Molecular, and Optical Physics (2002–2003)
Victor Gurarie: NSF Career Award (2005); Junior Faculty Development Award (2004)
John L. Hall: Nobel Prize in Physics 2005; Department of Commerce Gold Medal (2004); I.I. Rabi Prize, IEEE (2004)
Murray Holland: Fellow, APS (2003)
Mihaly Horanyi: Fellow, APS (2003)
Deborah S. Jin: MacArthur Fellow (2004-2009); I.I. Rabi Prize, IEEE (2005); Scientific American's "Research Leader of the Year" (2004); Service to America Medal: Science and Environment (2004); Arthur S. Flemming Award (Scientific Category) (2003); Fellow, APS (2003)
Doug Johnson: The President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (2004)
Edward Kinney: Faculty Research Fellowship (2005-2006)
Jerry Leigh: CU Employee of the Year (2005)
Kalyana Mahanthappa: BFA Excellence in Research Award (2004-2005)
Tobin Munsat: DOE Plasma Junior Faculty Development Award (2005-2008)
Margaret Murnane: National Academy of Sciences (2004); MacArthur Fellow (2000-2004); Fellow, the American Association for the Advancement of Science (2003); Richtmyer Memorial Lecture Award, American Association of Physics Teachers (2003)
Uriel Nauenberg: Hazel Barnes Prize (2004)
Steven Pollock: The President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (2004)
John Price: Fellow, APS (2004)
Michael Ritzwoller: Faculty Research Fellowship (2005-2006); Fellow, American Geophysical Union (2005)
Scott Robertson: Fellow, APS (2005)
Mike Thomason: The President's Faculty Excellence Award for Advancing Teaching and Learning through Technology (2004)
John Wahr: Vening Meinesz Medal, European Geosciences Union (2004); Faculty Research Fellowship (2004)
Carl Wieman: Nobel Prize in Physics (2001); National Professor of the Year, Council for Advancement and Support of Education and the Carnegie Foundation (2004); Presidential Teaching Scholar (2004)
Jun Ye: Arthur S. Flemming Award (2005); Amazing Light Symposium (2005); Fellow, APS (2005); Presidential Early Career Award for Scientists and Engineers (2003)
Shijie Zhong: David and Lucile Packard Fellowship (2001-2005); NSF Early Career Award (2001-2005); Alfred P. Sloan Foundation Fellow (2001-2004).



Jerry Leigh, long-time coordinator of the undergraduate laboratories was recognized in 2005 as the Chancellor's Employee of the Year.

Recently Retired:

Neil Ashby, David Bartlett, Joe Dreitlein, Allen Hermann, Carl Iddings, William O'Sullivan, Brian Ridley, and John Taylor.

Memorials:

Anthony Barker
(March 21, 1961–February 29, 2004)

Professor Anthony (Tony) Barker, 42, died of natural causes the weekend of February 29, 2004 at his ski condominium in Steamboat Springs, Colorado. Tony grew up in Colorado and took undergraduate classes at CU-Boulder. He earned his bachelor's degree in physics from Harvard College, graduating summa cum laude in 1982. He received his master's degree in physics from Harvard University and his doctorate from the University of California at Santa Barbara in 1988. He was a postdoc at the University of Chicago.

Tony became an Assistant Professor of physics at CU-Boulder in 1992, an Associate Professor in 1999, and a full Professor in 2003. He was appointed Associate Vice Chancellor for Research in January 2003 and then was named Associate Dean for Natural Sciences in the College of Arts and Sciences in October 2003. In 2004, he was the spokesperson for experiment E799 designed to study rare kaon decays at Fermi National Accelerator Laboratory.

Tony was a gifted teacher and was recognized as the department's top instructor by Sigma Pi Sigma in 1997. He will be remembered as an exacting and highly competent scientist. His counsel was well-reasoned and he was viewed as an up-and-coming leader at the University of Colorado and in science.

Chris D. Zafiratos
(November 18, 1931–August 22, 2004)

Chris Zafiratos took a more circuitous route to academia than most. The son of Greek immigrants, he was raised in Portland, Oregon. His mother was a school teacher and his father died when Chris was five. According to Chris, despite his mother's best efforts, his formal education often took a back seat to his love of adventure and his curiosity about how things worked. He frequently skipped his classes, preferring to spend time working in his stepfather's movie theaters and conducting his own scientific experiments.

Chris graduated from high school and served in the Air National Guard for two years. Then he skied and worked on Mount Hood before deciding to continue his education at Lewis and Clark College. He received his undergraduate degree in 1957, and his Ph.D. in nuclear physics at the University of Washington. He spent two years at Los Alamos and four years as an Assistant Professor at Oregon State University.

In 1968, Chris came to CU-Boulder and within four years was promoted to full Professor. He served as Chair of the Nuclear Physics Lab in 1974 and in 1985, Chair of the Physics Department from 1978 to 1982, Associate Vice Chancellor of Academic Affairs in 1986, and Vice President for Academic Affairs from 1991 to 1995.

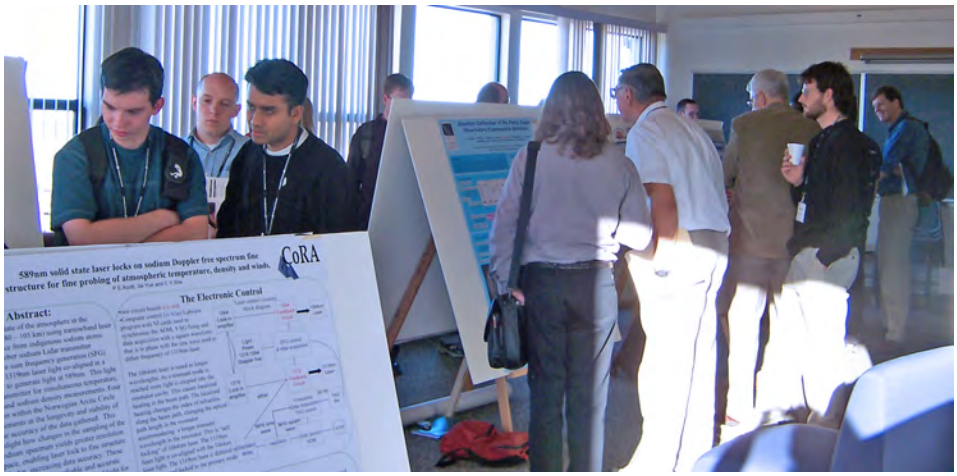
He earned national and international recognition with his research. He was a Fellow of the American Physical Society and a Fellow of the Japan Society for the Promotion of Science. He published more than 50 journal articles and authored two textbooks. He also loved teaching and he gave his best for the students of the University of Colorado.

Academic Program News

In 2005, Physics welcomed the highest undergraduate enrollment of majors: 338, including Physics, Astrophysics, and Engineering Physics. The department has been working hard to provide an atmosphere of quality education along with research opportunities for students. Recruiting efforts for the last five years include joining with the College of Engineering and Applied Science in the High School Honors Institute. In the summer, up to 300 high school students spend three days learning about CU. They choose two departments to spend a day with, and on day three they hear presentations about all departments. They also see Mike Dubson's famous "Wizards" show demonstrating the drama of physics. In 2005, more than 70 students from the Honors Institute chose to spend their day in Physics.

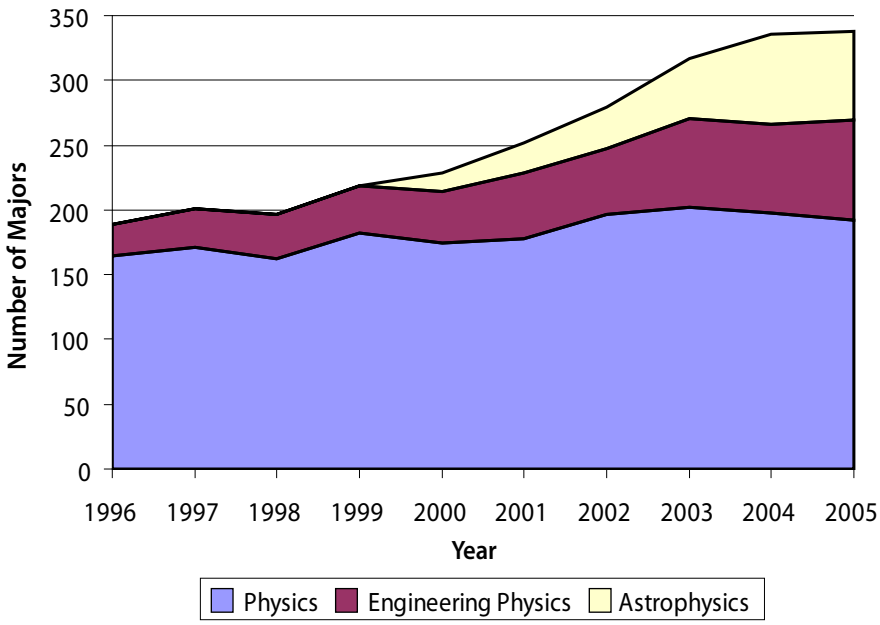
Demonstrating the kind of preparation they receive at CU-Boulder, two math modeling teams were judged among the seven outstanding teams at the 20th annual Mathematical Contest in Modeling sponsored by the National Science Foundation. A total of 599 teams from 11 countries competed. Congratulations to Cory Lee, Brian Conley, and Ian Derrington of Physics and their coach Professor Michael Ritzwoller.

Aiming to serve students and employers, Physics instituted a concurrent BA/MS degree program for Physics and Engineering Physics majors in 2005. The program gives students interested in graduate study an early start on graduate coursework and research. The concurrent BA/MS program is also a good option for students interested in immediate professional employment because it gives them research experience and provides advanced coursework. Many opportunities for research activities are available at CU-Boulder for graduate and undergraduate students to apply what they learn in the classroom. For example, student assistants are crucial to the functioning of the four research centers affiliated with the department: The Center for Integrated Plasma Studies, the Center for Imaging the Earth's Interior, The Ferroelectric Liquid Crystals Materials Research Center and the Engineering Research Center for Extreme Ultraviolet Science and Technology.



Attendees review poster presentations at the American Physical Society's Four Corners section meeting October 14-15, 2005, hosted by the Physics Department at CU-Boulder. The meeting gives undergraduate and graduate physics students from the Four Corners region an opportunity to present their work. Topics included astrophysics, atmospheric physics, condensed matter physics, and particle physics.

Undergraduate Enrollment Trends



Honors Graduates: 2004–2005

2005		2004	
Burkholder, Matt Charles	Cum Laude	Bunch, Nicholas Larkin	Magna Cum Laude
Carpenter, Colin Morehouse	Cum Laude	Chojnacki, Matthew	Magna Cum Laude
Fawcett, Stephanie Mae	Magna Cum Laude	Demarest, Heather Alison	Summa Cum Laude
Route, Matthew Philip	Cum Laude	Goodson, Jeremiah Jet	Magna Cum Laude
Shainline, Jeffrey Michael	Magna Cum Laude, Engineering Physics	Koepke, Hoyt Adam	Summa Cum Laude
		Smith, Daniel B.	Summa Cum Laude
Derrington, Ian Michael	Summa Cum Laude in Physics (minor)	Spannuth, Melissa Jeanne	Summa Cum Laude
		Stempel, Michelle Marie	Magna Cum Laude
		Thurmer, Dominic Jan	Cum Laude

Physics graduates the highest number of honors students in the College of Arts and Sciences. To graduate with honors in Physics students must write and defend an honors thesis based on original research.

Lester Math/Physics Library Adds Resources for Students and Faculty

By Suzanne T. Larsen, Faculty Director, Lester Library for Mathematics and Jerry Crail, Johnson Earth Sciences and Map Library

There are now laptops in Lester Library, among other new things. Lester Library is one of only two locations on campus where students can check out laptops. We have 10 MAC G4s that check out for 4 hours, much like a reserve book. They reside in a cart that recharges them after each use. The laptops are owned and maintained by ITS, the computing folks on campus. The computers have wireless internet access, wireless printing, and MS Office software as well as Mathematica. The Physics Department was key in helping to lobby ITS for the computers as well as providing upgraded wiring in the Library to accommodate the cart. We also have a new group study room with a large blackboard and wireless access.

In 2004, Lester Library received a gift of over $100,000 from an anonymous donor. The gift will be used to purchase scholarly material that will enhance teaching and research in physics and allied disciplines. The first purchase was for archival files for INSPEC, the primary bibliographic database in physics. Our original subscription was retrospective to 1969. With this purchase, we are able to search for citations to material as far back as 1898. This will complement our extensive journal collection in physics, both in print and online, which is one of the best in the western U.S.

Jonathan Croskell, a physics undergraduate student checks out a laptop from Suzanne Larsen in the Lester Math/Physics Library. He can use the laptop anywhere in the building for up to four hours.

Class instruction in research strategies and use of library databases have increased this year. New graduate students are given an introduction during fall orientation and several classes have had in-class instruction. The University Libraries provides many resources through Chinook, the online catalog. Teaching the identification and use of these resources is an important role for the Libraries.

Alumni in the Spotlight

Rather than see his collection of vintage calculators and slide rules end up on eBay, **Charlie Case** donated many instruments to CU, and Physics made a home for the collection (pictured here). Case attended the University of Colorado at CU-Boulder from 1956 to 1962 and later received a Ph.D. in Engineering Science from the University of California at Berkeley. A collector of vintage scientific instruments, he owns the Classic Instruments Gallery in Carefree, Arizona.

University of Colorado at Boulder

Department of Physics
390 UCB
Boulder, Colorado 80309-0390

Alumni News and Notes

Peter Henning (PhD, 1964) (center) visited CU-Boulder and the Physics Department last summer and was joined by (left to right) his PhD thesis advisor David Lind and Professors Emeriti Bob Ristinen, Rod Smythe, and chair John Cumalat. Peter made a $100,000 gift to the Department of

Peter Henning (PhD, 1964)

In 1939, at age 17, Peter Henning graduated from high school in Stanwood, Washington, 50 miles north of Seattle. He started dairy farming in Arlington, 10 miles from Stanwood and in the next 20 years increased the herd size from 40 animals to 500 registered Jerseys. Along the way, he set many production records, presented show herds, and improved breeding and nutrition techniques. In 1948, he got involved in dairy marketing in Seattle as president of the largest dairy cooperative in the area, and he contributed to other marketing organizations as well.

In late summer of 1956, a chance remark led him to take an advanced algebra course by correspondence at the University of Washington and then to enroll for classes. By taking a heavy load, he finished his course work in physics by December, 1958. Then, on January 2, 1959, with a manager running the dairy farm, Peter, his wife Helen, their four children aged 7 to 15, and a big red cocker spaniel headed to Boulder, Colorado. Thus, began a new life of graduate work in the CU-Boulder Physics Department. After a time, Peter worked on the CU Cyclotron Project. His specialty was High Resolution Gamma Ray Spectroscopy using a curved crystal spectrometer under the tutelage of Professor David Lind.

By fall of 1964, Peter had finished his course work and PhD thesis. He and his family headed west to Danville, California and a position with Aerojet General in San Ramon. He worked on a Controlled Thermonuclear Fusion Project funded by the Air Force. Peter's specialty was developing a high energy hydrogen ion beam as the source to a 600-KeV accelerator. After two years, the project funding was in doubt so he moved to Palo Alto, California to a position with Varian Associates. During his 11 years with the company, he worked as Eastern Regional Manager and Research Manager for the Radiation Division, among other tasks.

In 1977, the farm manager back in Washington was ready to retire. The dairy farm was sold, and Peter left Varian to spend the next year getting the property settled. By the end of the year, he had become involved in real estate development; his oldest son returned from the east coast to join the activity as controller. Over the next 20 years, operating as WestAmerica Associates, Peter developed and managed nearly 800,000 square feet of office, high-tech, and warehouse space. In 1998 and 1999, he sold the properties and retired with Helen to Bellevue, Washington near Seattle where he lives today. In 2001, Helen, his wife of 60 years, passed away. Now, Peter spends the winter months in Palm Desert, California.

James F. Baur (PhD, 1975)

James F. Baur was elected president of Sigma Xi and will take office in July 2006. Baur worked with John Cooper at CU–Boulder and has taught physics at the U.S. Military Academy at West Point, worked at General Atomics Company in the Fusion Division, and, since 1990, has been president of Science Solutions Inc., pursuing joint research and development projects with the former Soviet Academy of Sciences.

Heather Demarest (BS, 2004)

"I would like to extend a special thank you to CU's exceptional physics department. I will be studying the philosophy of physics for the next two years at Oxford University with a full scholarship, and I have the wonderful teachers at CU to thank for preparing me for graduate studies. The opportunities at CU, through courses, office hours and research, gave me the knowledge, confidence and support that are necessary to be competitive at a top university such as Oxford. Additionally, many members of CU's physics faculty wrote letters to Oxford on my behalf. Those letters were crucial to my applications for admission and funding since I needed to demonstrate physics proficiency in order to enter as a student of the philosophy of physics. The following scholarships will cover my tuition, university fees and living expenses: the Overseas Research Students Awards Scheme, the Clarendon Bursary, the Fawkes Memorial Scholarship, and the Crisp Fellowship. So, thank you CU!"