Awards for Physics Educators

AAPT recognized another CU-Boulder Physics Professor and Nobel Laureate, Carl Wieman, with the Oersted Medal, which recognizes his notable contributions to the teaching of physics. The Oersted Medal was established in 1936, and Wieman is the first recipient from the University of Colorado.

In the past few years, Physics Professor Paul Beale has been recognized by both the Boulder Faculty Assembly and the President’s Faculty Award program for excellence in teaching. His teaching abilities were recognized again in 2006 when Todd Gleeson, the Dean of the College of Arts and Sciences, appointed Beale to be the Director of the Honors Program.

Explosions, flames, and glowing goo are all part of a monthly Saturday morning CU Wizards presentation for the larger Boulder community. The May 2007 show “Waves That Changed the World,” given by Dana Anderson and his wife, Zoya Popovich, was recognized by Chancellor Bud Peterson as the 30th anniversary of the first Wizards show. Begun in the Physics department by Professor Jim Scott, continued by Professor John Taylor, and now run by David Nesbitt of Chemistry, the Wizards show always includes a spectacular, seemingly magic event followed by the scientific explanation. Over three decades with 5-10 shows per year, the CU Wizards have introduced several generations of young people and their parents to the mysteries of the physical world. Today’s CU wizards come from astronomy, astrophysics, biochemistry, biology, chemistry, engineering, and physics to get kids hooked on science.

From interactive Web sites to university classrooms to Wizards presentations, CU-Boulder Physics faculty is winning awards and recognition for teaching physics to all ages.

Learning from the Web became more effective and more fun when the Physics Education Technology Project or PhET went live at http://phet.colorado.edu. The PhET team has developed and posted more than 50 research-based simulations that support introductory college curricula and advanced topics in physics and chemistry. The simulations entice students to interact by letting them adjust the variables and watch what happens. All simulations are free and can be downloaded from the Web site by educators and students worldwide. The PhET Web site won the highest honor awarded each year by the Multimedia Educational Resource for Learning and Online Teaching (MERLOT). It also won the 2006 MERLOT Classics Award in the field of physics.

Students in Mike Dubson’s classes have long benefited from his exuberant style and the effective use of “clickers” to keep everyone engaged. Dubson’s teaching excellence was recognized this year by the American Association of Physics Teachers (AAPT). AAPT is dedicated to enhancing the understanding and appreciation of physics through teaching and awarded Dubson the Excellence in Undergraduate Physics Teaching Award for 2006. Dubson is the first winner of the Undergraduate Physics Teaching Award from the University of Colorado.

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Students Contribute to New Horizons Mission

CU students have “…a unique opportunity to design, build, test, and operate a real instrument in deep space.” That is how Mihály Horányi, CU-Boulder Physics professor and Research Associate at the Laboratory for Atmospheric and Space Physics (LASP), describes the experience of the dozens of students who have contributed to the NASA New Horizons Mission to Pluto. Launched January 19, 2006, the mission carries the Venetia Burney Student Dust Counter (SDC) instrument (named for the English school girl who named Pluto in 1930) which was designed, built, and is now being operated by students and faculty advisers at LASP.

SDC began full science operations in July 2006 to count and measure dust particle impacts along the spacecraft’s trajectory as it travels to Pluto. The dust particle impacts should provide information on the population of comets and other distant colliding bodies that are too small to detect with telescopes. In February 2007, it flew through the Jupiter system on its way to Pluto, where it is scheduled to arrive in 2015.

The device includes an 18-by-12-inch (45-by-30 centimeter) detector mounted on the outside of the spacecraft and an electronics box inside the craft that determines the mass and size of the particles that hit the detector. Because no dust detector has ever flown beyond 18 astronomical units from the Sun (nearly 1.7 billion miles or 2.7 billion kilometers, about the distance from Uranus to the Sun), SDC’s dust counter data will give scientists unprecedented measurements of the size and spatial distribution of dust in the outer solar system.

With faculty support, CU-Boulder students will also distribute and archive data from the instrument throughout its life as part of the New Horizons education and public outreach project. They will lead a comprehensive effort to bring their results and experiences to classrooms of all grades over the next two decades. According to Horányi, “Generations of future students will be involved in handing over their skills to the group that follows them.”

First African-American Woman to Earn Physics PhD in Colorado

Upon her graduation this summer, Marty Baylor will join the 56 African-American women who have earned PhDs in Physics. She will also become the first African-American woman to earn such a degree in Colorado. Baylor is conducting her dissertation research under the guidance of Professor Dana Anderson. She is working with an analog optoelectronic system to solve the “cocktail party problem”: using an electronic device to mimic the human ability to pick out a single voice in a crowded room. Her research could have important implications for improved telecommunications technology.

Editors: Pat Weis-Taylor & John Cumalat
Design: Kate Kidder & Anjanette Mapp

Baylor shows off her analog optoelectric system used to distinguish a single voice in a noisy room.
Pixel Silicon Detectors from Colorado to CERN

CU-Boulder faculty in the High Energy and Nuclear Physics Groups are contributing to the design and construction of the Compact Muon Spectrometer (CMS) Experiment at the Large Hadron Collider (LHC) at CERN in Switzerland. The LHC is located outside of Geneva, at the European Organization for Nuclear Research and is designed to accelerate and collide either protons on protons or heavy ions on heavy ions. When completed in 2008, the LHC will be the highest energy accelerator in the world, capable of producing collisions of 7 TeV (trillion electron volts) protons on 7 TeV protons.

Built in a tunnel that runs in a circle almost 27 kilometers in circumference, the LHC is located from 50 to 175 m underground. This underground ring contains more than 9,000 magnets. Protons are injected into the ring in both directions at an energy of 450 GeV, and the beam is accelerated up to a peak energy of 7 TeV. At peak energy, the superconducting magnets will have a magnetic field of 8.33 Tesla.

The CMS experiment is located at one of the positions in the ring where the two proton beams collide. Operating at the energy frontier, the emphasis of the CMS experiment is on science beyond the Standard Model of particle physics. By understanding muons, the following questions could be answered. How do particles acquire mass and why do fundamental particles have different masses? What are the particles that account for the dark matter in the universe? Do supersymmetric particles exist?

Part of the Colorado group is working to construct and install Forward Pixel Detectors for the CMS experiment. The forward pixel detectors consist of two disks on each side of the interaction region. Each disk has 24 blades which are rotated 20 degrees in a turbine-like geometry. The rotation increases the charge sharing and improves the spatial resolution of the detectors. Each blade has one cooling channel on which two beryllium panels are mounted, one on each side. The detectors’ pixel sensors are 100 microns x 150 microns and are manufactured on silicon chips of 52 microns x 80 microns. The sensor chips are combined into plaquettes of various sizes and bump bonded to a read-out chip. In the baseline system, there are 4 disks each with 45 silicon chips containing 4,160 sensors for a total of 17,971, 200 channels which are used to help track charged particles in high energy collisions. CU Physics Professors John Cumalat, Bill Ford, Jamie Nagle, Uriel Nauenberg, Kevin Stenson, and Steve Wagner believe that these pixel silicon detectors will improve the sensitivity of particle tracking to help answer the science questions of the CMS experiment.

First Leon Shands Scholar Named

The Leon Shands Endowed Scholarship Fund in Physics was established by Sandra Shands Elligers and her husband, John Elligers, in memory of her father, Leon (Lee) Shands. Though Shands was an outstanding student, his journey to college was interrupted first by service in WWII and then by responsibilities to his widowed mother and younger siblings. He later resumed his education as a non-traditional student, attending night classes for six years while working full-time to support his wife and two young daughters. A lifelong New Yorker, Shands worked hard to balance his work, academic, and family obligations and eventually graduated with a BS in physics. The scholarship was established by his family upon his death in 2005 to support non-traditional undergraduate physics majors who have a GPA of 3.0 or higher and who are working full-time or supporting a family while going to school. The first Leon Shands Endowed Scholarship recipient is Darren MacNair. MacNair is married, 38 years old, and works full time driving a cab. He is a Junior at CU-Boulder with a GPA of 3.5+. 
New Faculty Corner

Meredith Betterton

I received my BA from Princeton and my PhD from Harvard. I held postdoc positions at the Curie Institute in Paris and the Courant Institute at NYU before coming to CU in 2003; originally I was a faculty member in the applied math department and joined the physics department in January 2006.

My research focus is theoretical biophysics. I am particularly interested in protein-DNA interactions and motor proteins that interact with DNA. In my work on protein-DNA interactions, I am developing an improved description of DNA elasticity suitable for relatively short molecules and using this to predict the changes to DNA behavior due to DNA deforming proteins. In my work on motor proteins, I have worked on a model of DNA unwinding by helicase proteins to quantitatively compare different helicase mechanisms. I am also interested in biochemical interaction networks, particularly simple models of cellular signaling networks.

Kyle McElroy

After getting my BA in physics from University of California at Berkeley and a brief stint working nights at an observatory, I started grad school back in Berkeley and I turned my attention from the big (stars) to the small (atoms). Joining the scanning tunneling microscope group of Seamus Davis, we studied the atomic-scale structure of unconventional superconductors. The competition between real space correlations and momentum space kinetic energies lead to rich structure in the electrons on length-scales only accessible to the STM. During graduate school I also helped move our laboratory to Cornell University where I spent two years as a research assistant before getting my PhD in 2005. I then spent a year and a half at Lawrence Berkeley National Laboratory studying similar materials from momentum space.

At CU I plan to further develop STM technology to investigate correlated materials and to use individual atomic impurities as probes of atomic scale electronic and magnetic structure. I also plan to expand my research into atomic force microscopy to investigate materials, nano-structures, and dynamics on these short length-scales.

Oliver DeWolfe

I joined the physics faculty in January 2006. I arrived from Princeton, where I held a postdoctoral position; prior to that I was a postdoc at the Kavli Institute for Theoretical Physics at the University of California at Santa Barbara. I received my PhD from MIT and my bachelor’s degree from Wesleyan University. I am a high energy theorist, and I’m particularly interested in string theory, particle physics, and cosmology. My current work focuses on exploring and understanding the solutions of string theory, in particular the so-called flux compactifications, which appear to be the best candidates for understanding the phenomenology of elementary particles from an underlying theory of quantum gravity. I also have a growing interest in early-universe dynamics. In the past I have studied the AdS/CFT correspondence, which provides a useful alternate description of strongly-coupled forces like quantum chromodynamics. I am excited to be at CU!

James Thompson

I moved to my current position here at CU, JILA, and NIST in September 2006. I received my B.A. and M.S. in physics from Florida State University, performing accelerator-based laser spectroscopy of highly-charged ions as a leveraged test of few-body QED calculations. For my PhD, I worked with David Pritchard at the Massachusetts Institute of Technology. I was awarded the 2004 APS DAMOP Thesis Prize for my work on trapping and detecting pairs of ions and performing the most accurate mass comparisons ever made, at 1 part in 1011. Somewhat atypical for a precision measurement, a wide range of physics resulted from this work including the most precise tests of both QED and Einstein’s relationship E=mc^2 and a novel quantum non-demolition method for continuously monitoring the quantum state of a single molecule over periods as long as weeks. For my postdoctoral work, I stayed at MIT and joined the MIT-Harvard Center for Ultracold Atoms, working with Vladan Vuletic. Using laser-cooled atoms in an optical cavity, we produced the brightest photon-pair source to date. Further, and in contrast to typical parametric down-converters, this new system incorporates a quantum memory—the key ingredient necessary for realizing proposed quantum repeaters that might extend quantum communication to long distances.

Here at CU, I plan to use an optical cavity as a non-destructive probe of the collective quantum state of ensembles of laser-cooled atoms. Essentially, Heisenberg uncertainty relationships guarantee shot-to-shot noise that I hope to directly measure and subtract out in order to obtain more precise magnetometers, permanent-electric-dipole-moment searches, and clocks. My spouse Deborah Whitehead is a professor in the Department of Religious Studies here at CU, and we have two heart-stealing daughters: two-year-old Grace and one-year-old Lily.

Faculty Awards and Transitions

Selected Honors & Awards to Faculty & Staff:

Albert Bartlett M. King Hubbert Award, Association for the Study of Peak Oil (2006)

Noel Clark Oliver E. Buckley Prize (2006); National Academy of Science (2007)

Mike Dubson Outstanding Undergraduate Teacher of the Year, AAPT (2006)
Noah Finkelstein Excellence in Teaching Award, CU Boulder Faculty Assembly (2007)


Chris Greene Miller Fellowship (2007); Alexander von Humboldt Award (2007)

Mihaly Horanyi Alexander von Humboldt Award (2007); Excellence in Research Award, CU Boulder Faculty Assembly (2006)

Debbie Jin National Academy of Science (2005); Fellow, American Association for the Advancement of Science (AAAS) (2006); American Academy of Arts & Sciences (2007); Bonfils-Stanton Award for Lifetime Achievement in Science (2007)

Heather Lewandowski Alfred P. Sloan Fellowship (2007)

Margaret Murnane Fellow, AAAS (2006)

Uriel Nauenberg Robert L. Stearns Award (2007)

Jerry Peterson State Department Jefferson Science Fellow (2007)

Steve Pollock Marines Smith Faculty Recognition Award, CU Parents Association (2006)

Patricia Rankin Elizabeth D. Gee Memorial Lectureship Award, CU Faculty Council (2006)


Carl Wieman Oersted Medal, AAPT (2007)


Shijie Zhong CRCW Faculty Fellowship (2007)

Memorial:

Wesley Emil Brittin died August 1, 2006 following a long illness. Wes was born April 27, 1917 in Philadelphia. He attended Temple University and the University of Denver before earning a B.S. in chemical engineering from the University of Colorado in 1942. He earned an M.S. in physics from the University of Colorado in 1945 and a second Master’s in mathematics and physics from Princeton in 1947. He earned his PhD in physics in 1957 from the University of Alaska where he worked with Sydney Chapman on statistical mechanics and transport phenomena in a fully ionized gas.

In August of 1943, as a student, he was appointed an Assistant in the Department of Physics at the University of Colorado and he remained associated with the Department for the rest of his life. He was elected Chair of the Department in the spring of 1958 and he served in this capacity until 1974. Working with Edward Condon, George Gamow and Albert Weaver, he led in the initiation of the Summer Theoretical Physics Institute that was held in Boulder each summer from 1958 through 1971. This Institute brought theoretical physics faculty and students to Boulder from all parts of the world for intense sessions of lectures and study. Many of the students who participated in these institutes have since achieved prominence in theoretical physics. The texts of each summer’s lectures were published in one or more volumes for a total of 26 volumes. Brittin managed the Institute, gave lectures, and participated with others in the editing of all of the volumes. [Starting in 1968, K.T. Mahanthappa shared with Brittin the responsibilities of the conduct of the Institute and the editing of the volumes.] Brittin served as Acting Dean of the Graduate School of the University throughout the calendar year 1968, after which he was a visiting professor at the Institute for Theoretical Physics in Geneva, Switzerland. Following the death of George Gamow, he led in the effort to establish the George Gamow Memorial Lectures at the University of Colorado in Boulder.

Britten led the Department in the negotiations with the National Bureau of Standards (now NIST) and the university administration that resulted in the establishment in 1962 of the Joint Institute for Laboratory Astrophysics (now JILA). He was a “Founding Fellow” of JILA. He led the way in planning a large complex of buildings that houses JILA, the Department, and the existing Laboratory for Atmospheric and Space Physics (LASP) (which had evolved from work that started in the Department in the late 1940s). Brittin was instrumental in obtaining state and federal funding for the construction of the Department’s complex of buildings, the Duane Physical Laboratories, which were completed in 1971. He played a prominent role in the University’s application to the National Science Foundation for a “Centers of Excellence” grant which was awarded in 1965. This brought with it the unusual opportunity to enlarge the Department’s faculty, a task which Wes conducted with vigor and high standards, adding new faculty and enlarging and balancing the roles of research and teaching in the Department.

Wes’ managerial style was informal, low-key, but focused. He presided over an unprecedented expansion of the faculty and of the role of the Department of Physics. In this he was aided significantly by the parallel high quality development of JILA. In addition to bringing promising young physicists, he brought senior people including Frank Oppenheimer in 1962 and Edward U. Condon in 1964. Wes never relaxed in his efforts to advance excellence in the Department. Brittin played a prominent role at the interface of science and the government of Colorado. In 1972 he organized the Governor’s Scientific Advisory Council which he chaired in the 1970s for three governors of Colorado. He was a member of the Board of Directors that undertook the establishment of the Metropolitan Science Center in Denver.

In May of 1981 he received the George Norlin Award of the Alumni Association of the University of Colorado, and in May of 1995 he was recognized by the University’s College of Engineering as an outstanding graduate of the College.

He is survived by his wife Janine and five children.

Contributions may be sent to the Wesley Brittin Scholarship for Graduate Students in Theoretical Physics, Department of Physics, Box 390, University of Colorado at Boulder, 80309-0390.

Britten memorial written by Albert A. Bartlett, Professor Emeritus of Physics.
Experiencing Physics: CU Lecture Demonstrations

The Governor of Toys and the Conductor Who Is Always on Time are two titles given to Mike Thomason by his admiring colleagues. Officially the Director of the Physics Learning Laboratories, Thomason’s given titles reflect two important elements that make the lecture demonstrations of CU-Boulder successful learning vehicles: the equipment and the timing.

First, the demonstrations follow the centuries-old tradition of using children’s toys (as well as an array of sophisticated equipment) to demonstrate the principles of physics. Education research has verified that students learn better from demonstrations and simulations than from lectures alone. In the demonstrations, students learn by employing all of their senses. They are challenged in class to predict what will happen, discuss their predictions, and reach a consensus. The “non-intuitive” results of the carefully chosen demonstrations allow students to replace misconceptions with more physically-based intuitions.

Second, the lecture demonstrations rely on exquisite timing. Thomason and his assistants support demonstrations for about 60 university instructors in six departments per semester. Some of this work involves preparing “carts” of equipment for timely delivery to classrooms or loaning equipment from the Learning Lab’s extensive inventory. But the crown jewels of the program are the two lecture demonstration classrooms with stadium seating and revolving stages. While one classroom demonstration is going on, the set up for the next class is being prepared behind the wall. When one class ends, the stage revolves, and a new demonstration is ready for the next class.

Of course, preceding equipment selection and timely delivery is the conscious design of the demonstrations that draws from resources across the United States. With a team of physics resource professionals, Thomason has created a digital classification scheme for physics lecture demonstrations and a comprehensive bibliography of all published literature of lecture demonstrations. His physics learning website (http://physicslearning.colorado.edu) includes a database of lecture demonstrations and an online ordering system, which is used by CU instructors to reserve demonstrations and audio-video items for their classes. For Wikipedia fans, the physics learning site includes the world’s first physics demo Wiki. It also now hosts the international Physics Instruction Resource Association website. The worldwide influence of the physics learning website is illustrated by its #1 Google rankings for “physics learning” and “lecture demonstration laboratory.”

Thomason has been maintaining the toys and conducting behind the scenes to support lecture demonstrations and the Saturday CU Wizards events for the community (page 1) since 1980. He hopes to convey “the pleasure of interacting with nature and being surprised by the results” to each generation of students.

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<th>Honors Graduates 2006 &amp; 2007</th>
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News from Lester Library of Mathematics and Physics

The new role of a university library is to provide journal content online to the desktop of faculty and students. While the University of Colorado Libraries have made the commitment to provide online access to scientific journal literature, the reality is that the funding will only go so far. Over the last two years we have been able to provide access to major online resources in science, specifically physics, through the extraordinary generosity of a donor within the physics community. We have purchased access to major back files of journals. We also gained access to retrospective files for major databases like Inspect, a major database in physics, and, most recently, Web of Science. Some of you might remember the latter as the old Science Citation Index. All of these journal resources represent a major commitment to the mission of research both at the undergraduate level and at the cutting-edge research level represented by our faculty and graduate students.

Not everything is in cyberspace, however. Libraries are also a “destination.” Lester Library serves as a base of operations for a large number of physics undergraduate students. The physical collection or online resources are not as important as the “place” to these students. It is important that the Library play both roles for the foreseeable future.

Should you have any questions please contact me: Suzanne.larsen@colorado.edu.

Academic Program News

CU Physics Awarded Three Hertz Fellowships

The Fannie and John Hertz Foundation provides unique financial and fellowship support to the nation’s most remarkable PhD students in the physical, biological, and engineering sciences. Only 45 leading schools are eligible to accept Hertz Fellows and CU-Boulder is one of those schools. About ten students are selected each year. Over the past three years, we have had the remarkable achievement of three of our physics majors receiving the award. Jeremiah Zartman was awarded a fellowship in 2004-2005 and is now pursuing a PhD at Princeton, Nicholas Cizek received an award in 2005-2006 and is studying at Stanford, and Brian Camley was awarded a fellowship in 2006-2007 and is attending UCSB.

Astronaut Scholar

William Lee Willcockson won the 2006-2007 Astronaut Scholarship established by the Mercury Seven Foundation. The scholarships are given to students who exhibit motivation, imagination, and exceptional performance in science.

Goldwater Scholar

The Barry M. Goldwater Scholarship program was authorized by the US Congress to foster and encourage excellence in science and mathematics. This year, two CU-Boulder students were awarded the scholarship: Physics major Maxwell C. Moe and Engineering Physics major Benjamin R. Safdi.

CU Physics Moves up in the Rankings

In a little more than 10 years, the CU-Boulder Physics Department has moved from an overall ranking of 33rd to 16th and among public institutions from a ranking of 20th to 7th. Assessing the national ranking of an academic department is difficult and the placement can significantly change with different criteria. Nevertheless, in the 1995 Gourman report the CU-Boulder Physics Department was ranked 33rd overall and 20th among public AAU institutions. In the 1999 US News and World Report, the department was ranked 25th among all institutions (public and private) and 15th among public. Then in the 2002 US News and World Report, the department moved up to 20th among all institutions and 11th among public AAU institutions. In the most recent 2006 US News and World Report ranking, the CU-Boulder Physics Department was ranked 16th overall and 7th among public institutions. In some sub-discipline areas the department ranked even higher. For example, in atomic physics CU was ranked as #1, in quantum physics #10, and in plasma physics #10 overall. This trend is very gratifying to all who have worked so hard to deliver the best education and perform pioneering research!

Outstanding Service in the Physics Helproom

Mike Dubson presents Gary Benson with the Outstanding Volunteer to the department award for the past year. Benson is a retired engineer who is a regular volunteer in our Physics Homework Helproom. He has been recognized as the outstanding volunteer to the department for the past two years.
Alumni News and Notes

Peter Henning Jr. (PhD Physics, 1964)

Peter Henning, Jr. was presented with the 2007 George Norlin Award for distinguished lifetime achievement as a dairy farmer, nuclear physicist, and businessman. He was recognized for his devotion to the betterment of society and his community. Peter earned his doctorate in nuclear physics in 1964. After graduation he spent several years working with Varian Medical Systems pioneering the use of electron linear accelerators in hospitals for radiation treatment of cancer. The award was presented on May 9, 2007 at the Annual Awards Ceremony at CU-Boulder. The award was received on his behalf by his son as Peter was recovering from surgery.

Steve Swanson (BS Engineering Physics, 1983)

Steve Swanson has recently become the 17th CU-Boulder alum to fly in space. He joined NASA as a systems engineer in 1987 and was selected as an Astronaut Candidate 1998. As a mission specialist for STS-117, NASA’s most recent space shuttle mission, Swanson and the five other members of his crew launched aboard space shuttle Atlantis on June 8, 2007. Among the personal items that Swanson packed was a black and gold CU flag, which will be given to the CU Heritage Center.

Jim Holtsnider (BA Physics, 1996)

Jim Holtsnider recently paid a visit to the Kapteyn-Murnane Lab, where he worked as an undergraduate lab assistant during the 2005-2006 academic year. Henry Kapteyn reports that, “After finishing his degree… Jim joined the US State Department Foreign Service and is now stationed in Mosul, Iraq. He is the principal US government liaison to the Ninawa province, a job that he describes as, ‘about four levels above’ his pay grade. In his job, he meets with political, cultural, and religious leaders… to facilitate cooperation with the US presence there and to aid in development efforts. He is also the host to media from the US, the Arab world, and elsewhere, who visit US forces in Ninawa. When he travels on the ground, he is accompanied by a security detail of 15 troops. He also travels quite a bit by helicopter, which apparently is quite exciting since they hug the ground at rooftop level, popping up for power lines. Fortunately, Ninawa province is one of the quieter regions at present, with a functioning government.”

Reunion in Santa Fe

On October 5, 2006, the CU-Boulder Physics Department held a reunion of CU alumni in Santa Fe, New Mexico. Three CU faculty members attended: John Cumalat, Dave Lind, and Jerry Peterson. Most of the alums at the reunion had come from the department’s graduate program and most received their degrees from work at the CU Cyclotron and the CU Nuclear Physics Lab (NPL). A brief history of the NPL was presented by Professor emeritus, David Lind. Among those who attended were Darrell Armstrong, Paul Biagi, Gary Gardner, Steve Greene, Matthew Hecht, Alan Hurd, Jim Jett, Tom King, Nick King, Dave Mercer, Linda Smith, Paul Smith, William Somers, and Dave Stupin. Everyone agreed to repeat this reunion next year.

David and Mary Lind (left) share stories with Darrel Armstrong and Paul Smith at the CU-Boulder Physics Department reunion in Santa Fe.

Jim Holtsnider (center) visits with the Kapteyn-Murnane Laboratory group. Left to right: Brandon Smith, Ariel Paul, Juan Pinot, Richard Sandberg, Daisy Raymondson, and Henry Kapteyn.