University of Minnesota
school of physics & astronomy

2012 Annual Newsletter • Issue 13

A letter from the Head of the School

It's been a terrific year for the School of Physics and Astronomy. The top headline, of course, is the approval, groundbreaking and start of construction for the new Physics and Nanotechnology Building. With a budget of $83 million, this project will provide offices for more than 125 physics professors, postdocs and students, along with 40 state-of-the-art laboratories and a "high-bay" facility for assembly and testing of large experiments in astrophysics and particle physics. Alongside physics in the building will be the new 5,000-square-foot clean room of the University's Center for Nanostructure Applications (CNA), providing impetus for expansion of the School's nanoscience programs through additional faculty hires in condensed matter physics and biological physics.

As the Physics and Nanotechnology design process reaches completion and construction gathers steam, it is fitting to acknowledge those who have made this possible. Dean Steve Crouch has provided unwavering support for the project, and our Building Committee under the leadership of Paul Crowell has worked tirelessly to ensure that the new building will meet the needs of physics researchers for decades to come. The University's Office of Capital Planning and Project Management and the Project Manager Matt Stringfellow, along with design and construction teams led by Architectural Alliance and Mortenson Construction, have been outstanding partners. Work on the site, just north of the Scholars' Walk, a 90-second stroll east from Tate Lab, began on November 28, 2011, with construction projected to last two years.

Since 2009 the School's physics faculty has grown by four professors, or about 10%. Our newest arrival, particle physics experimenter Professor Greg Pawloski, is profiled on page four of this newsletter. We currently have two searches in progress, one for an assistant professor in condensed matter theory and one for a senior theoretical physicist who will join our William I. Fine Theoretical Physics Institute. As part of the overall expansion of the College of Science and Engineering, we plan to search for as many as four assistant professors in experimental condensed matter and biological physics over the next two academic years, with arrivals strategically coordinated with the new building.

A major restructuring of the School of Physics and Astronomy has recently occurred with the creation of the Minnesota Institute for Astrophysics (MIfA), highlighted in this newsletter on page two Under its first director, Professor Bob Gehrz, the MIfA unifies research in astrophysics, cosmology and space physics previously split between the School's physics program and the Department of Astronomy. With over 20 faculty members, we expect the MIfA to raise the profile of astrophysics research in Minnesota and to be a magnet for undergraduate and graduate students. We will celebrate the MIfA founding

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Cindy Cattell, Elizabeth Smith, Allen Goldman, Paul Crowell, Dean Steven Crouch, Ron Poling and Matthew Stringfellow break ground on the new Physics and Nanotechnology Building.

Inside

Awards & Announcements

Minnesota Institute for Astrophysics created

The University created the Minnesota Institute for Astrophysics (MIfA) in July, 2011. The Institute brings together 20 faculty members of the School of Physics and Astronomy conducting research in astronomy, astrophysics, cosmology, planetary science, and space science under a single banner. As an institute within the School, the MIfA will replace the Department of Astronomy in administering the University's undergraduate and graduate programs in astrophysics. It will also help coordinate astrophysics research in the former Department of Astronomy with the growing astrophysics program in the physics portion of the School. The MIfA will work actively to develop new research funding opportunities and to seek endowed support for its key functions, including the University's involvement in the Large Binocular Telescope project. Bob Gehrz has accepted appointment as the founding Director of the MIfA.

Heller and Cattell win Taylor Awards

Professor Cindy Cattell won the 2011 George W. Taylor Award for Distinguished Service for outstanding service to the University and voluntary public service to governmental or other public groups. Professor Ken Heller won the 2011 George W. Taylor/CSE Alumni Society Award for Distinguished Teaching for outstanding contributions to undergraduate and/or graduate teaching.

Lysak elected AGU Fellow

Professor Bob Lysak was selected as a 2011 Fellow of the American Geophysical Union (AGU). To be elected a Fellow of AGU is a special tribute for those who have made exceptional scientific contributions. Nominated Fellows must have attained acknowledged eminence in the Earth and space sciences. This designation is conferred upon not more than 0.1% of all AGU members in any given year.

Hanany made APS Fellow

School of Physics and Astronomy Professor Shaul Hanany was named a Fellow of the American Physical Society in 2012 "for developing novel techniques for, and making important measurements of, the anisotropy of the cosmic microwave background radiation and its polarization, particularly on balloon borne instruments."

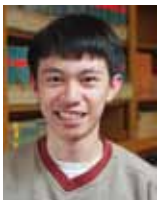
Cattell and Janssen named APS Fellows

Professors Cynthia Cattell and Michel Janssen were selected Fellows of the American Physical Society (APS). Cattell was nominated by the APS Topical Group in Plasma Astrophysics with the citation "For measurements of solitary waves and electric fields in the Earth's radiation belts and for observation and interpretation of the very large amplitude whistler mode waves that provide a new mechanism for accelerating trapped electrons to relativistic energies in a fraction of a second. Janssen's Fellowship was recommended by the APS Forum on the History of Physics, with the citation "For path-breaking contributions to the history of early twentieth-century physics, for excellent editorial work on Einstein papers, and for promoting substantive interactions between physicists and historians.

MINOS to help settle question of faster than light neutrinos

A European neutrino experiment recently made the controversial announcement that neutrinos travel faster than light. The results contradicted Einstein's theory of relativity, but were similar to a 2007 measurement of neutrino speed recorded at the MINOS far detector in the Soudan Underground Mine in Northern Minnesota. MINOS physicists assumed their faster than light result was due to the margin of error in their calculation. With the attention surrounding the OPERA result MINOS physicists are planning a more accurate experiment to settle the question once and for all. The new experiment would rely on a better GPS system and an atomic clock to detect the neutrino stream as it is fired through MINOS from the originating point, Fermilab's Main Injector, which is located 450 miles away.

Physics student wins Goldwater Scholarship



Zijun (Jimmy) Chen, a junior majoring in mathematics and physics has been named a 2011 Barry M. Goldwater Scholar. Chen plans to pursue a doctorate in condensed matter physics. Under the direction of professor E. D. Dahlberg, Chen has conducted research on a variety of projects at the Magnetic Microscopy Center, including water deformation due to diamagnetism, quantification of magnetic force microscopy and domain wall pinning in permalloy nanowires. A Presidential Scholar and a National Merit Scholar, Chen is also an avid pianist and leads the viola section of the University of Minnesota Campus Orchestra. Chen, who was born in Guangzhou, China, is from Roseville, Minn., and graduated from Roseville Area High School. The scholarships provide up to $7,500 per year for up to two years of undergraduate study.

Research project combines astrophysics and archeology to decipher ancient texts

University of Minnesota researchers are part of an international collaboration with Oxford University and the Egypt Exploration Society that applies the analysis tools of astrophysics with archeology to help decipher a collection of ancient Egyptian papyri. Lucy Fortson is leading the University team that includes faculty and staff from the Classical and Near Eastern Studies Department and the Minnesota Supercomputing Institute.
The collaborative project, called Ancient Lives, is putting hundreds of thousands of images of fragments of papyri written in Greek online. The collection, named the Oxyrhynchus Papyri, was excavated more than a hundred years ago yet archeologists and classics scholars have only managed to transcribe a small percentage of these fragments. "It's like if you have thousands of puzzles, take all the pieces and mix them together in one big box. Then you try to put the puzzles together," Fortson said. "It's an enormous task."

Because of the huge number of images involved, researchers need volunteers from the public to look through and catalog them or transcribe the text using a simple web interface, which displays both known and unknown texts. No knowledge of ancient Greek is required.

This is where Fortson's expertise and Zooniverse, a collaboration of astrophysicists and public volunteers, comes in. Members of the general public will be able to help "read" the texts by locating the placement of ancient Greek letters and matching the shapes of letters in order to help create strings of letters. This will allow the computer algorithms to learn to translate and recognize the various characters. Using a computer interface first developed for the Zooniverse collaboration to allow the general public to identify the shapes of galaxies, volunteers will be able to click on places where they think a letter might be. This data should train the algorithms to improve their ability to translate the texts.

2011 Scholarship and fellowship awards

The 2011 student awards for scholarship are: **Alex Ditter** Alfred O.C. Nier Scholarship, **Nicholas Smith** won the Harry and Viola St. Cyr Scholarship, **Matthew Epland** won the Jeffrey Basford Scholarship. **Mitchell Ambrose, Zijun Chen, Colin Clement, Andrew Emerick, Cristian Gaidau, Anthony Kremin, Jonathan Morris, Grant Remmen, Justin Willmert** and **Chengjian Wu** received Edmond G. Franklin Scholarships. **Christopher Geach, Molly Krogstad** and **Robert Peterson** received the Homer D. Hagstrum Award. The 2011 fellowship winners are: **Te Yu Chen** won the Allen M. Goldman Fellowship. **Peter Koroteev** won the Anatoly Larkin Fellowship, **Kristopher Kersten** won the Burlaga Fellowship, **Anthony Hatke** and **LiDong Pan** received Aneesur Rahman Awards. **Eric Aver, Barun Dhar, Derek Lee, Cheng-Hsien, Yao Meng** and **Pamela Sooriyan** received Physics Outstanding TA Awards. **Dmitry Spivak** received CSE Outstanding TA Award.

Alex Schumann

First row: Barun Dhar, Pamela Sooriyan, Cristian Gaidau, Anthony Hatke, Second row: LiDong Pan, Te-Yu Chen, Alex Walter, Chengjian Wu, Andrew Emerick, Third row: Yao Meng, Ryo Namba, Colin Clements, Jimmy Chen, Justin Willmert, Jonathan Morris, Kristopher Kersten, Fourth Row: Mitchell Ambrose, Derek Lee, Nicolas Smith, Robert Peterson, Grant Remmen, Matthew Eckland, Anthony Kremin, Molly Krogstad, Fifth row: Alex Ditter, Christopher Geach, Eric Aver

Profiles

Alex Schumann

Jorge Vinals

Jorge Vinals is a theoretical physicist who uses supercomputers to study, among other things, complex systems such as snowflakes. Vinals specializes in non-equilibrium phenomena and pattern formation in systems which are outside of thermodynamic equilibrium, i.e. they are exchanging energy, changing size or or shape, or varying their chemical composition. Most systems found in nature, such as snowflakes, are really examples of non-equilibrium phenomena. But why use super computers to crack the snowflake code? "I'm a contrarian," Vinals laughs, before explaining that his research has wide-ranging applications within materials science and engineering. For example, many new materials with nanoscale features have properties that are difficult to predict by traditional means, making them unsuitable from an engineering standpoint. Vinals uses another example that Minnesotans can quickly identify -- how to predict the speed at which ice crystals grow. Because ice crystals grow at the surface they refuse to remain flat, and instead create intricate patterns. What shapes will appear, and how fast they will grow is quite difficult to predict, sometimes even approximately. The non-equilibrium nature of the process makes the math very complicated and supercomputers can address only relatively simple cases.

Block co-polymers are another important area of study for Vinals. These are materials that are being extensively investigated for a wide variety of nanotechnology applications. "Right now, Minneapolis is the block co-polymer capital of the world," Vinals says. Block co-polymers form regular nanoscale structures on their own if you let them evolve to equilibrium. This makes them highly useful for applications such as nanoscale lithography, photonic crystals, templates for high density computer storage systems, and even drug delivery systems. They also happen to be a very nice playground in which to to study non-equilibrium phenomena. The math and computational tools to do that, Vinals says, turn out to be fairly similar to the math involved in modeling other non-equilibrium systems.

Vinals says the point of studying the physics of non-equilibrium systems and of understanding their complexity is to learn how to make their evolution predictable or to better control it. "Then we can intervene in a range of processes to make things faster or better." Non-equilibrium principles can also help physicists answer some larger questions ranging from the cosmological scale, through biological processes a the cell level, down to the nanoscale.

Alex Schumann

Greg Pawloski

Greg Pawloski is an expert on antimatter. As such he works on one of the great unsolved mysteries of physics: what is the cause of the great asymmetry in matter and antimatter? Physicists have long theorized that there are antiparticles for every particle in the Universe and that these annihilate one another in pairs. Yet, if there were an equal number of anti-matter particles, there would be no matter in the Universe.

Pawloski looks for muon anti-neutrinos going to electron anti-neutrinos on the MINOS neutrino experiment. Pawloski says this is a new channel for MINOS. In the past, MINOS looked at the matter neutrino transitions, but not for the appearance of anti-matter neutrinos. "The reason we are looking to see if matter and anti-matter behave differently," Pawloski says, "if they do behave differently than is predicted for this mode then that's totally unexpected and might indicate new physics." MINOS is winding down to make way for the new neutrino experiment NOvA, and will stop taking data in spring, 2012. Pawloski expects his analysis will be completed within a year.

Pawloski also works on NOvA, looking for disappearance of anti-muon neutrinos and muon neutrinos. "Again, we're looking for a difference between matter and anti-matter; a possible new interaction between neutrinos and matter. Is there something out there that we're not expecting that will lead us forward in knowledge? We live in a universe that's dominated by matter. "In our theories you always get matter and anti-matter together, but where is all the anti-matter?"
Pawloski's job might sound a little like that of Mr. Scott the Engineer on Star Trek, but as a data analyst his work consists of computer software coding. Pawloski is running simulations of data they expect to see and then will use both the simulations and future data samples to develop new techniques for when he gets the real data from the detector that is being built at Ash River, MN. Pawloski says that most of this analysis will have to take place before NOvA begins taking real data with the detector at Ash River in 2013. "There's work to be done before you actually look at the data and attach meaning to it."


Alex Schumann

Lucy Fortson

Lucy Fortson is a high energy astrophysicist with some unusual tools in her belt. Fortson uses telescopes to try to understand how the highest energy gamma rays are being produced by celestial objects. Fortson says that until ten years ago there were only a handful of known sources producing such high-energy gamma rays. With VERITAS (Very Energetic Radiation Imaging Telescope Array System), astrophysicists have identified over 40 objects emitting this type of radiation, such as supernova remnants, pulsars, starburst galaxies and active galactic nuclei. They have dubbed this last class of objects "blazars," which are defined by an active galaxy with large jets of matter beamed from the center of the galaxy towards Earth. According to Fortson, the process which creates this type of radiation is ubiquitous but not yet understood. By investigating the properties of the host galaxies of blazars along with properties of their jets, she is looking at the problem from a different angle.

Fortson and her group have compiled a collection of blazars and look for trends in the information with the aim of understanding how blazars evolved over time and which galaxies should be targeted for deeper gamma ray observations in the next generation of experiments.

One unique method that Fortson uses to obtain blazar host galaxy information is through her involvement on the Executive Team in the Zooniverse collaboration. Zooniverse projects use the wisdom of the crowds to sort astronomical data. By using the internet to tap into the brain-power of hundreds of thousands of volunteers, parameters such as galaxy shape or bulge size can be determined more readily than with computers. With digital telescopes, terabytes of data can be taken in a relatively short amount of time. Computer algorithms can sort that data but the human eye is still the best tool for sorting shapes. Astronomers have found that it is best to have lots of pairs of eyes on the case. The Zooniverse Collaboration has also become a tool for all kinds of citizen science projects, such as Ancient Lives which uses the same type of shape recognition internet interface to try to decipher a massive collection of ancient Egyptian Papyri. Zooniverse also helps scientists develop more efficient algorithms and share tools from one branch of science with another. A handwriting transcription tool used for weather data collected in World War I by the British Navy has been adapted as part of the Ancient Lives project. All these analysis tools aim to turn "clicks," data points given by the public, into scientific publications. More information can be found at zooniverse.org.


Alex Schumann

Allen Goldman

Allen Goldman is condensed matter experimentalist working on the properties of materials at low temperatures. His research involves the study of quantum phase transitions. These are transitions that are found at absolute zero with a magnetic field, disorder, chemical composition or charge density, controlling the transition. The parameter controls the quantum mechanical ground state of the system. In conventional phase transitions, such as the liquid-gas transition or the transition to ferromagnetism or superconductivity temperature is the control parameter.

A standard way to bring about a quantum phase transition is to study a series of compounds with slightly different chemical. For example, by increasing the strontium concentration in Lanthanum Strontium Copper Oxide, samples with different Strontium concentrations evolve from insulating to metallic with high temperature superconductivity occurring in the latter. The problem with this approach is that changing the chemical composition also changes the degree of disorder. By incorporating compounds in a capacitor configuration and inducing charges electrostatically, the group have used been able to induce superconductivity in amorphous insulating films.

Goldman's group has recently been employing ionic liquids as a diaelectric. While ordinary liquids such as water are predominantly made of electrically neutral molecules, ionic liquids are largely made of ions. Goldman and his students have configured capacitor structures that use ionic liquids as the dielectric to study quantum phase transitions in high temperature superconductors, in ultrathin films of metals, and in insulators such as strontium titanate. The great advantage of using an ionic liquid as a dielectric is that charge transfers that are up to two to three orders of magnitude greater than those attainable using more conventional dielectrics. Physicists can also monitor a single variable and tune the properties of a material continuously. Ionic liquids, when applied to high temperature superconductors, also offer the promise of exploring the entire range of properties from insulator to superconductor in the same sample. Although ionic liquids have already been used in promising applications, Goldman says that fundamental physics applications of the materials are only just beginning to be exploited. "The remarkably high charge transfers allow you to study physics you wouldn't be able to study. We are interested in using it as a tool."

Class Notes

Highlighting Alumni from the 1990s

1999

Benjamin P. Speakman (Ph.D., Physics, 2007; B.S., Physics, 1999) My wife Siri and I live in Eagan with our two dogs, and delightful daughter, Helena. Siri thinks that Helena will be an astronaut, but I am certain she's a future physicist. I now work for Boston Scientific as a Systems Engineer in Cardiac Rhythm Management. My position is in research and development of implantable pacemakers and defibrillators. There were many great professors and courses while I was at the School, but I will never forget Roger Jones (freshman Physics), Earl Peterson (junior Classical Mechanics), Benjamin Bayman (graduate Classical Mechanics), and of course, Serge Rudaz (graduate Quantum Mechanics).

Jeremy L. Paschka (M.S., History of Physics, 1999) I have two daughters and a son. I coach baseball, lead boy scouts and do as much biking, softball and reading as time will allow. I teach all levels of physics at York High School in Elmhurst, IL. I am also the school's head Science Olympiad coach. For the past four summers I have also worked at Fermilab as the ACTS master teacher. My favorite course and professor from the School of Physics and Astronomy was History of Physics with Roger Steuwer. He taught me so much about writing that I use on a regular basis as I write curriculum and science grants.

Juan E. Cabanela (Ph.D., Astrophysics, 1999) After leaving the University, my wife Catherine and I decided to have a child. Little did we realize the Universe has a sense of humor and a bit over seven years ago we were blessed with a boy and girl twins. It has been a bit of a struggle as an itinerant professor. In the process we have lived in six separate dwellings in the years since leaving the UMN in 1999! Luckily, we are now happily living in our home just a few blocks from where I work. I left the University of Minnesota to start a fixed-term position at St. Cloud State after graduation. I taught there for two years before taking a two-year teaching post-doctoral position at Haverford College. I then returned for three years at St. Cloud State before landing my tenure-track position at Minnesota State University-Moorhead. The net result is that I am a tenured Associate Professor of Physics and Astronomy at Minnesota State University Moorhead. I am quite happy. During this time period I have continued doing research as time will allow, actually sharing in an NSF grant with Dr. Roberta Humphreys from the University of Minnesota.

Dr. Jeffrey Larsen (Ph.D., Astrophysics, 1996) I am now at the United States Naval Academy, studying the nature of the asymmetry in the Thick Disk of the Milky Way originally discovered by me in my Ph.D. thesis work. There were several memorable moments, including my wedding. The one moment that stands out is when I was working on my Ph.D. thesis, frazzled, and needed a break. So the lot of us went out to see "Beavis and Butthead Do America.". This led to a period of time in the APS lab where I would burst out in spontaneous Beavis and Butthead impersonations. It was a fun lab. I recall with fondness Roberta Humphreys' Galactic Astronomy class. Roberta had a way of making the material very approachable and comprehensible, while at the same time challenging us in class. I liked the material so much that even though I was doing extragalactic research for my thesis, I ended up asking Roberta to give me a chance to work with her on a Galactic Astronomy research project, which she did!

1998

Thomas Gredig (Ph.D., Physics, 2002; M.S., Physics, 1998) I am now an assistant professor at California State University, Long Beach.

1997

Douglas L. Thain (B.S., Physics, 1997) I married my wife Lisa Walczcetc in Madison, WI in 2003. We have three children-William , Zachary and Emily. I earned a Ph.D. in computer science from the University of Wisconsin in 2004. Currently, I am an Associate Professor in Computer Science at the University of Notre Dame.

Laura McCullough (M.S., Physics, 1997) I am married to science fiction author Kelly McCullough, whose fifth novel was published in May 2010. I was promoted to Professor this year. I also serve as the Department Chair of Physics at the University of Wisconsin-Stout. My favorite professor, who was also my advisor, was Dan Dahlberg. He had a great sense of humor and was very supportive, an all-around great guy.

Neil B. Covington (M.S., Space Plasma Physics, 1997) The last 13 years have been quite busy, but not in the realm of physics. I just retired from the Navy after 20 years of service as a submarine officer. I have started working as a project manager for an energy services company based out of Washington, DC. My job is to coordinate engineers and contractors working on projects to make universities, public schools, etc. more energy efficient. I am working on a multi-phase project at Virginia Tech. My wife and I have been married for just over two years. We have two kids from my previous marriage, Julian (9) and Annika (7). Since graduating in 1997 I have made a number of exciting trips including trips to Hawaii, China, the Ukraine and Russia, and traveling from one corner of the United States to the other. I flew to France and captained a 60 foot sailboat across the Atlantic back to the US. I hope to continue to have great vacations and experience success as a project manager helping businesses become greener.

1996

William "Bill" F. Ketzeback (M.S., Physics, 1996; B.S., Astrophysics, 1994)) Following my interest in observational astronomy and with valuable experience gained at both Wyoming Infrared Observatory (WIRO) and Red Buttes Observatory (RBO), I have been a key support staff member at a variety of observatories since I left Wyoming. I have worked at the Very Large Array as an Array Operator, as an Optical Technician for US Naval Observatory on the Navy Prototype Optical Interferometer, and as an R&D Laser Metrology Engineer for Zygo Corporation. I currently work as an Observing Specialist at the Apache Point Observatory on the Astrophysical Research Consortium 3.5 meter Telescope. Besides my regular duties as a night assistant, I have contributed to a number of science, instrumentation and engineering projects in the six years since I has been at the observatory. My current research interest involves improving image quality through reduction of resonant frequency sources produced in the telescope. I have been using a high speed imager for the past three years to monitor frequency sources in the zero to fifty hertz range. The engineering staff and I then work to isolate, reduce or eliminate these noise sources. I live in Carlsbad, NM with my wife, Lisa, and our three children, Ben, Keegan and Maggie.

1995

Dongxiao Yue (Ph.D., Physics, 1995) I have been developing computer software based on technologies I started working on while I was at the University of Minnesota. I moved to the San Francisco Bay area and founded a software company. In May of 2010, my company

area and founded a software company. In May of 2010, my company and I won a million dollar jury verdict in a software copyright infringement case against a publicly traded company in federal district court. I wish to come back to the school and visit my mentors and friends sometime in the future.

1994

Bjorn S. Nilsen (Ph.D., Physics, 1994) I am still working on the ALICE experiment at CERN'S LHC. We collected the first data in 2010. I will be moving to Geneva, Switzerland to emphasize data analysis, but will still be employed by Creighton University.

Dave Thomas (B.S., Astrophysics, 1994) I am married to my wife, April and we have a son, Evan, who was born in 2005. My current professional role is President of Americas for Capital Safety Group, a company which provides safety equipment for people working at height (construction, oil, etc). A few of my favorite memories from being in the School of Physics and Astronomy were teaching Astronomy labs and playing frisbee with Professor Skillman. My favorite course and professor was Extragalactic Astronomy with Professor Evan Skillman, after whom we named our son.

1993

Steve L. Cassola (B.S., Physics, 1993) I obtained my M.S. in Physics from the University of North Dakota in 1995 and then my M.S. in Medical Physics from the University of Colorado Health Sciences Center in 1997. I currently live in West Fargo, North Dakota. I am employed at MeritCare Health System, working as a Medical Physicist in the Radiation Oncology Department. One of my favorite memories from my time in the School of Physics and Astronomy was talking about physics between bites of a juicy bratwurst from the brat cart just outside the physics building. Two of my favorite professors were Dr. Ron Poling and Dr. John Dickey.

Baohua (Bob) Liu (Ph.D., Physics, 1993) I am currently living with my wife, Jinlan Yang, in Cambridge, Massachusetts. My son, Yilei Liu, graduated from UCLA with a B.S. in Aerospace Engineering and from United States Navy Postgraduate School with a M.S. in System Engineering. He is currently working in San Diego. My daughter, Lisa Liu, will attend MIT in the fall. I am the chief physicist in the Department of Radiology at Massachusetts General Hospital in Boston, MA and an Instructor of Radiology at Harvard Medical School. I teach diagnostic imaging physics to radiology residents and work on the development of new imaging modalities to detect breast cancer. The most interesting courses I attended while at the School of Physics and Astronomy were Biophysics taught by Russell Hobbie, General Relativity by Keith Olive, Quantum Field Theory by Serge Rudaz, and Gauge Field Theory by Mikhail Shifman and Mikhail Voloshin. Also, working with Larry McLerran, my Ph.D. thesis advisor, was one of the most pleasant experiences I have ever had.

James Marti (Ph.D., Physics. 1993)
I am 52, have been married for 27 years, and am the father of an 19-year old. After grad school we lived in the Washington DC area before returning to the Twin Cities in 1997. Since returning, I have rediscovered my childhood love of astronomy and am now an avid amateur astronomer. Upon completion of my degree, I did a post doc with the Particle Technology Lab at University of Minnesota, then in 1995 took a position as senior scientist at the United States Naval Research Laboratory in Washington. After two years, I received an offer to become the head of R&D of a small product development company in Woodbury (Aveka Inc, a spinoff of the 3M Company). After seven years at Aveka and positions as VP of R&D and R&D manager at two other firms, I joined the staff of the University in the fall of 2008. I am now the external relations coordinator for the Nanofabrication Center (NFC), located in Keller Hall. My role is to reach out to technology-based companies in the region and help set up research and development collaborations with the NFC. I also support NFC's involvement in a regional program of nanotechnology education at the community college level. As part of Professor Konrad Mauersberger's research group, I took part in several upper atmospheric sampling missions. These consisted of high altitude balloons that towed our instruments into the stratosphere to collect ozone samples; at the end of the mission, the balloons would be deliberately burst and the payload would parachute to Earth. The missions were run from NASA facilities in Texas and New Mexico, and were not unlike rocket launches, in that the scientific payload had to be carefully prepared and mounted on the launch vehicle, followed by days to weeks of waiting for the ideal launch conditions. Once the mission started, though, it was all excitement, both during the lift phase and during the instrument recovery. I did several high speed drives across west Texas chasing our instrument as it parachuted down from 65,000 feet, usually landing on a ranch to the slight interest of the resident cattle (and much more interest from the rancher). My favorite professors were: Konrad Mauersberger, my advisor, a fine scientist and a great gentleman from whom I learned much; and Dan Dahlberg who was director of graduate studies at the time and presented a welcome/orientation for new students during the first week. I asked him if he had any advice for married grad students about balancing grad school and family. He said, "I was married when I started grad school. I got divorced." Marvin Marshak was department chair at the time, and one of his efforts was to enlist our Congressman (Martin Sabo) to help support federal science projects, which at that time included the Superconducting Supercollider (never built). Marvin and I went to Sabo's office where Marvin made an impassioned pitch to support the collider project. I think we expected to help educate Sabo on the technical aspects of the project, but the congressman took a long puff on his cigar (yes, he had just fired up a stogie—this was 1992) and said "So, you want me to support building a multi-million dollar hole in Texas?" The meeting did not go so well after that.

Rodney J. Olson (B.S., Astrophysics and B.S., Physics, 1993)
Upon graduation, I enrolled in the post-baccalaureate program at Winona State University to earn my teaching credential. While working on my physics teaching degree, I was also an adjunct faculty member of Winona State's physics department. I taught the introductory lab course. It was at Winona State that I met my wife, Debbie. We moved to Los Angeles, California in 1996. We have two wonderful children Christopher and Marie. I have been teaching high school physics (regular and Advanced Placement) since 1995. From 1995 to 2005, I taught at St. Francis High School in La Canada, CA which is literally next door to JPL and a short distance from Caltech. We moved to Wisconsin for a year and I taught at Divine Savior Holy Angels in Milwaukee.
In 2006, we moved back to the Los Angeles area, and I have been teaching at Crespi Carmelite High School in Encino ever since. For the past four years, I have been using Professor Kakalios' book *The Physics of Superheroes* in my physics classes. It was with great joy that Crespi allowed me to start an astronomy course in 2008. We have one of the few astronomy programs in the whole Southern California area. I hold monthly observing sessions with my students so that they have an opportunity to view some of the wonders of our solar system, galaxy, and deep space. We have an 11 inch computerized telescope equipped

with an SBIG CCD camera and spectrograph. I hope to have my class collaborate with my friend and fellow astronomy department alum **Bill Ketzeback** (BS, Astrophysics, 1994) on a photometric study of the mysterious eclipsing variable star Epsilon Aurigae. Bill is on the staff of Apache Point Observatory in New Mexico. My favorite memory of my time in the School of Physics and Astronomy would have to be when I was able to observe a couple of times at the Mt. Lemmon Observatory in Tucson. Other great memories would include spending many days and nights at O'Brien Observatory at Marine on St. Croix, and working and hanging out with friends in the Infrared Lab and Astronomy Reading Room. I still keep in contact with **Brooks Rownd (B.S. Physics, Astrophysics, 1993)** and Bill Ketzeback. I honestly cannot single out one favorite professor. Every astronomy professor that I had or worked for was fantastic and helped mold me into the science educator that I am today. I would though especially like to thank Professor John Dickey for allowing me to teach the Intro to Astronomy Labs for three years. Clearly that experience made me decide to become a teacher. Lastly, Professors Bob Gehrz and Terry J. Jones deserve a hearty thank you for teaching me all about instrumentation, observation, and data analysis during the three fun years I worked for them in the Infrared Lab.

1993

Brooks Rownd (B.S., Astrophysics, 1993) After my undergrad years in the physics and astronomy departments at the University of Minnesota, I went to grad school in Astronomy at the University of Massachusetts, Amherst. In my later grad school years I mostly worked on submillimeter wavelength bolometer arrays, including SuZIE and Bolocam at the Caltech observatory on Mauna Kea. That led to a brief job at the University of Colorado testing prototype components for the SPIRE instrument of the Herschel Space Observatory. After the SPIRE prototype testing ended I moved to the Harvard-Smithsonian Submillimeter Array (SMA) on Mauna Kea. I initially ran the observatory at night, and currently maintain receiver systems at the summit during the day shift. After arriving in Hilo I became very interested Hawaii's native wilderness. I now spend all of my spare time up on the mountainsides helping with forest bird surveys, searching for rare plants, and studying the ecology of the native wilderness. The best moments are when I find endangered plants which can be fenced to protect them from the destructive feral pigs and sheep. While an undergrad at the University of Minnesota, I was mostly interested in lab classes and programming. My favorite classes and projects were the physics electronics labs, Woodward's computational methods class, and the leisurely final year when I was working on my astronomy research project with John Dickey. We also had a lot of memorable time suffering through problem sets in the astronomy reading room, and trying to tame the instrumentation at O'Brien Observatory.

1992

Zachrey J. Helmberger (B.S., Physics, 1992) Through a long winding series of events I transformed from an almost militant rationalist who said, "If I can't sense it or measure it, I don't want to talk about it. Go away"!, to a blubbering born again Christian who has chosen Jesus as his Lord and Savior. How could this happen to a physics graduate?! I think it really started when my wife and I took the Landmark Forum by Landmark Education, then I came across Eckhart Tolle's "The Power of Now" which mentions spiritual things like God and Presence and Being. Since Landmark also talks a lot about Being, I did not immediately throw the book out the window. Then I started studying Buddhism and Zen and practiced meditating and seeking enlightenment. I started really getting into "Near Death Experience" testimonies on YouTube. By this point I had been softened up enough to tolerate the concept of God and other spiritual things. But what really blew me away was that during the "out of body" phase of a typical Near Death Experience (NDE), people were able to observe the doctors working on their body during the resuscitation attempts (usually "floating" near the ceiling above their body). Many of them gave vivid, accurate and detailed accounts of what happened while their body was physically dead (no pulse, no respiration and no brain activity). In many cases, these details were independently verified by a third party. Now this was really starting to screw with my "physical" mind. Maybe there really is life or consciousness outside of the physical body! Then, some of these Near Death Experiencers actually saw God and were overwhelmed by God's infinite, unconditional love and forgiveness. Then I saw a video of an atheist turned born again Christian after his NDE and that did it for me. I became a Christian on the spot. While studying physics, Phil Johnson hired me to work with him in the lecture demo hall. What a wonderful job and what a wonderful man to work with! Just before and after graduation, I briefly worked with GE Government Services, a contractor to Goddard Spaceflight Center in Maryland, and learned a great deal about electronics and computers. I came up with a clever way to troubleshoot long ISA cards, fully populated with ICs on the front and a rats' nest of white "wire wrap" wire on the back that were mis-wired! I also participated in a feasibility study for X-Ray interferometry for astronomical imaging and taught the meaning of "coherence length" to Ph.D. physicists. Then I worked at National Semiconductor's Amplifier Design Group. I was not very good at designing ICs but I was really good in the lab troubleshooting ICs under the microscope. In that lab, I did a couple of "saves" that enabled an innovative precision amplifier to go to production. It and subsequent designs went on to make millions of dollars for the company. I realized my real passion was to live harmoniously with nature and learn how to grow a complete diet for me and my wife. This marked a turning point in my professional life. I am now a subsistence farmer in training. My favorite courses were Intro Physics with John Broadhurst. I loved the fun lecture demos and how he explained things so clearly. I really enjoyed Kris Davidson's lectures on eta Carina. Most of all, I loved Methods of Experimental Physics with Keith Ruddick, Earl Peterson and Kurt Wick. My project for Methods had me up at all hours of the night happily soldering, calibrating and coding away on the computer while taking barometric pressure readings with a micromachined silicon pressure transducer. Those were the days! I also wanted to thank Ed Ney for his friendship and kind words of encouragement while I worked in the lecture demo lab. I helped him solve a couple of problems with lecture demos that he appreciated.

Howard L. Hecht (B.S., Physics, 1992) I am currently a Technology Program Manager for West Managed Technology Services, a Thomson Reuters business, managing law firm customer Cloud Computing IT environments within our Eagan, MN data centers. My wife Laura (U of M '92, Economics) and I have three active children between the ages of 5 and 11. We most recently did a 2.5 week minivan trip to the Northeast U.S. and southern Canada. In my spare time, I work with the University of Minnesota Marching Band as the pregame and halftime P.A. announcer at Golden Gopher football games in TCF Bank Stadium. with the University of Minnesota Marching Band as the pregame and halftime P.A. announcer at Golden Gopher football games in TCF Bank Stadium.

1991

Michael P. McDonald (B.S., Physics, 1990) I am married with three children. I have completed 26 marathons. I work as a global sales manager for GE Water. My job is designing and selling industrial water treatment systems for food and beverage clients. There is no way my favorite memory will show up on print! My favorite professors are Professors Serge Rudaz and Keith Olive.

Mark J. Lowe (Ph.D., Physics, 1991) After graduating, I took a postdoc position at Rice University working at CERN on a fixed target experiment. My personal experience there was great, but my scientific experience was somewhat disappointing. My HEP experience with the faculty and crew on the Soudan experiment during my thesis work had been immensely stimulating and even exciting. At CERN, I learned that participating in the large scale collaborative experiments that were becoming common in HEP was not for me. My experience at CERN, combined with the fact that my return to the US coincided with the collapse of the SSC, convinced me to change fields. In 1994, I accepted a postdoctoral position in magnetic resonance imaging in the MRI physics lab at the University of Wisconsin. There I began a 15+ year career in functional magnetic resonance imaging. In 1997, I accepted a faculty position at the Indiana University School of Medicine in Indianapolis. I setup and ran an MRI research laboratory with a dedicated 1.5 tesla research MRI scanner. In 2002 we added a three tesla head-only MRI scanner to the facility. In 2003, I becameas Director of High Field MRI in the Imaging Institute of the Cleveland Clinic. I currently direct a laboratory here in Cleveland that consists of 1.5 tesla and three tesla whole-body MRI scanners engaged in numerous medical research endeavours, mostly focused on the development of methods to study brain function and white matter health in the brain. We recently received funding to purchase a seven tesla whole body MRI scanner--one of a handful of in northeast Ohio. I married my wife, Julia, in Jackson Square in New Orleans in 2000. She has two sons Morgan and Brendon, from a previous marriage. In 2006, we had our own son, Donovan. We have done a lot of traveling over the years, including Australia and several trips to Europe. One of my hobbies is flying and I will soon test for my license. I have many fond memories of my days in the physics department at the University: competing to see who could get the most parking tickets for parking in the loading dock after hours, playing Saturday morning baseball, all the years of playing intramural softball and nearly winning it all once (curse you, Dave Maxam (B.A., Physics 1989). My favorite memory will always be the time Allen Goldman walked in on me and Jeff Duryea (Ph.D, Physics, 1991) playing lacrosse in the old physics lab room across from the second floor men's room. The office had just had the lab desks removed in preparation for turning it into additional HEP grad student office space. The room was completely free of furniture and had cinderblock walls. The ball would hit the wall so hard that paint dust would jump in a layer off the entire wall. I am sure Goldman could not imagine what was making all that noise. We should have locked the door. My favorite professors were Bob Lysak and Marvin Marshak. Bob was the best physics teacher I ever had and Marvin was the best mentor. My favorite course was quantum mechanics with Professor Suura. It was immensely enjoyable.

1990

Brian Connelly (B.S., Physics, 1990) My wife and I, along with our three children, make our home in Minneapolis. I am currently working as the Senior Hydrologic Forecaster with the National Weather Service. A few of my favorite professors from my time at the School of Physics and Astronomy were Walter Johnson and Dan Dahlberg.

Christopher White (Ph.D., Physics, 1990) I am married with three children. I like to garden, cook, and play trumpet. I am a full Professor of Physics at the Illinois Institute of Technology. I am also an active neutrino physicist. My favorite memory from my time in the School of Physics and Astronomy was when the Supernova 1987a exploded while I was taking an astronomy grad class and the day before the supernova was observed, we were told in class that such an explosion was overdue. I most enjoyed Professor Lysak and his Classical Mechanics course.

Additional Class Notes

2009

Charlie P. Blackwell (Ph.D., Physics, 2009) I was hired by 3M to work in the Aerospace and Aircraft Maintenance Department located in Maplewood. I will also continue to teach a physics course at Augsburg College in the spring semester.

2008

Marie Lopez del Puerto (Ph.D., Physics, 2008; M.S., Physics, 2004) I am now an Assistant Professor in the Physics Department at the University of St. Thomas in St. Paul, MN. My research is on the study of optical and electronic properties of nanoscale systems using density functional theory, time-dependent density functional theory, and many-body methods. I am also interested in Physics Education Research; in particular, I am interested in conceptual difficulties students have in modern physics and how to best address them. I have two daughters: Valeria, and Adriana.

Bob Wellington (M.S., Physics, 2008) I took a part-time faculty position teaching physics and mathematics at Normandale Community College for 2010.

2007

Zengqiang "John" Liu (Ph.D., Physics, 2007) I have been a professor at St. Cloud State University for four years. The state financial situation has forced the university to lay off tenure-track faculty members. Fortunately our department was not affected during this round. With increased course load and student enrollment, I spend most of my time teaching and could only spare little time on research during semesters. I look forward to the summer to get more research done. I have spent a part of my past summer working at Brookhaven National Lab (University of Minnesota) with my research student in collaboration with Brookhaven National Laboratory and University of Minnesota. We have good results for possible publications and future investigations. I still have contact with a few University of Minnesota Ph.D. grads in Minnesota and out of state.

2004

Scott A. Anderson (B.S., Physics, 2004) I have been teaching yoga since 1989 I have seen a steady growth in this endeavor, particularly the past few years. I have a rural facility (The Blue Mounds Dharma Center) that's 25 miles west of Madison, WI, and a facility very near the University of Wisconsin campus (Mound Street Yoga Center). In addition to operating these studios and teaching a full complement of yoga classes, I offer teacher training certification. Our Yoga Alliance approved programs has filled every year since its inception in 2003. I have been married to a beautiful pilates teacher and dancer, Collette Stewart. I have two children from another relationship. I have recently added a research component to my yoga schools. The Alignment Yoga Research Initiative was created to document the results from our innovative autism

Class Notes

program (Spectrum Yoga Therapy). We are currently studying the plasticity of Vagal Tone, and hope to begin publishing within the next 12 months. We will be the first yoga school in the country to have its own in-house research program, complete with on-staff scientists. There is a lot of "research" being done on yoga, though very little of it can hold up to the scrutiny/standards of the scientific community. I am grateful to my physics education for giving me the tools to bridge the two worlds of yoga and science. More information is available on my website, AlignmentYoga.com

2003

Benjamin D. Bousquet (Ph.D., Physics, 2003) I am currently in my seventh year at Wartburg College in Waverly, Iowa. This past spring I was granted tenure and promoted to Associate Professor of Physics.

1987

Jeffrey K. Nelson (B.S., Physics, 1987) (Ph.D., Physics, 1994) I am married to the former Wendy Baird (BA Math '88). We have two children: one is in middle school and one is in high school. Since 2004 I have been faculty at William & Mary (W&M). I am the founding member of the experimental neutrino physics group at W&M. We now have four faculty members in the W&M neutrino group. My current research program is focused on the MINERvA and MINOS experiments at Fermilab and on selected electron-scattering experiments with data relevant for understanding neutrino interactions (CLAS-12GeV and Jupiter) at the Jefferson Laboratory, which is 17 miles from campus. Our physics building is being renovated and expanded to double our research space. The space includes a new three floor wing of research space with a floor dedicated to the neutrino group, support labs, and a computer room for our high performance computing cluster. The other new wing is a high-bay lab for assembly of large experiments. I was appointed the Cornelia B. Talbot Term Distinguished Associate Professor of Physics and a William & Mary Plumeri Award for Faculty Excellence last spring. I am also the Director of Graduate Studies for the department's Ph.D. program. Picture above (left to right) of Joseph Plumeri, myself, and Provost Halleran. Prior to moving to W&M, I was also a Research Associate, Senior Research Associate, and Adjunct Assistant Professor at Minnesota. I spent from '82 to '04 (22 years) at SPA in various capacities including Co-PI for the operations of the Soudan Underground Laboratory from 2001 to 2004 and Manger for Installation and operations for the MINOS Far Detector. My favorite classes were graduate E&M with Professor Lysak. I enjoyed his little inside stories having actually being a TA for Jackson. I had him for undergraduate classical mechanics too. I also enjoyed having Earl Peterson for Modern Physics. It was one of the hardest classes I ever had. His second midterm had an average of 25 out of 200. This was compounded by the fact that I had mono and had to miss six weeks of classes over the course of my sophomore year.

1986

John Norlien (M.S., Physics, 1986) I am a Principal Engineer at Goodrich Sensors and Integrated Systems and my responsibility includes design of MEMs pressure sensors, data analysis, failure analysis. I previously worked as a senior Engineer at Medical Graphics Corp. and Manufacture Engineer at Data Sciences. I have been married to Kathy Giesen since 1987 (MS Public Health 90). I have three children: Matthew, James and Stephen. I coach robotics for Trinity School at River Ridge in Eagan. I am also a troop committee member for Boy Scouts

1976

Akihiko Muramatsu (Ph.D., Physics, 1976) I worked as a chief engineer and manager in process and product engineering at Texas Instruments until 2004 In 2006 I became a senior manager in product engineering and system application at OKI Electric. I am also the secretary and public relation represnetative for the Japan Minnesota Organization and the NPO Kosugi area management public relations representative. My physics education was very helpful during my whole helped especially when I was in process and product engineering.

1975

Joan Marie Verba (B.S., Physics, 1975) I work as a social media manager. I help individuals and businesses set up and customize blogs, Facebook pages, Twitter accounts, LinkedIn Profiles, and You Tube Channels.

1970

Michael T. Kauper (B.S., Physics, 1970) I have been teaching astronomy to children for many years, as part of my child day care business, and also while doing outreach for the Minnesota Astronomical Society and the Chippewa Valley Astronomical Society. Recently, I was invited to co-author a book on teaching astronomy to kids, and I am really excited about this opportunity. I have a longer term goal of teaching elementary and high school teaching students How to Teach Astronomy to Kids. This is NOT the same as teaching astronomy to these future teachers. I want to teach-the-teachers several new, unique projects and activities that I have developed over the years which have been effective with many children (and adults, too). I am feeling especially qualified to teach this class as I may have racked up more time teaching astronomy to young children than anyone else in Minnesota!

In Memorium

James Elliott Farrell (Ph.D., Physics, 1993; MS, Physics, 1987, BS, Physics, 1985) Age 49, born on December 22th, 1960, died August 19th, 2010 in a car accident near Menahga, MN. Jim was born and raised in Minneapolis, near Lake of the Isles, attending West High School and the University where he earned his BS, Masters and PhD in Condensed Matter Physics. Jim recently moved to Morris, MN, near the U of M campus, where he was soon to begin teaching physics and math. Jim's keen mind, athletic abilities, courage and humor will be missed. A bench in his honor has been placed near the bridge on Lake of the Isles.

Clayton F. Giese (Ph.D., Physics, 1957; BS, Physics, 1953) July 19, 1931-March 24, 2011. Clayton was Professor Emeritus in the Department of Physics and Astronomy at the University of Minnesota, specializing in chemical physics. He was a world-renowned expert on chemical physics, particularly of atomic and molecular collisions.

Several of the technical innovations which he and coworkers devised and produced for beam studies of such collisions are used throughout the world. Among their most notable of the scientific achievements he and coworkers found the helium dimer (1993) and new and much more precise information on the hydrogen exchange reaction (1990) using their innovative methods. Since the 1950's Clayton Giese was a pioneer in the development, improvement and scientific utilization of the mass spectrographic techniques which he began using under Professor Al Nier's direction as a graduate student at the University of Minnesota. He obtained a B.S. degree with High Distinction in Physics from the University of Minnesota in 1953 and a Ph.D. in 1957. From 1957 through 1965, Professor Giese worked at the University of Chicago. During this period, he began his career long interest in the application of mass spectrographic techniques to chemical physics. About this time he began studying ion-neutral reactions, carrying out pioneering studies of single collisions by tandem mass spectrometry. In 1965, Giese returned to Minnesota as an associate professor and, in 1970, began a long and extremely fruitful collaboration with Professor Ronald Gentry of the Minnesota Chemistry Department. The Giese-Gentry group made a series of technical innovations in molecular beam chemical physics and used them in finding the helium dimer as well as in many studies of chemical reactions and quantum state-resolved molecular energy transfer. The team also started a small company that has marketed several devices to the research community throughout the world. Around 1993, Professor Giese began collaborating with J.W. Halley in low temperature physics to study Bose Einstein condensation in superfluid He^4 using He beams. He served as Director of Graduate Studies in Physics from 1989-1995. Giese was a race car driver for many years. In the 60's and 70's, with his activist wife Paula (deceased), his house (the Mary Tyler Moore house in Minneapolis) was a center of social activity associated with many of the social causes and movements of the times. He is survived by sister, Betty Hansen; wife, Sandra Sandell; and step-children.

Jones, Roger S. Age 76, Minneapolis, died peacefully on April 2, 2011 after a brief illness. Roger graduated from City College of New York and earned a Ph.D. in Physics from the University of Illinois. In 1967, he began a 32-year career as a physics professor at the University of Minnesota. Widely known within the University community as a superb teacher, Roger won the University of Minnesota Institute of Technology Best Instructor Award in 1993, 1994, 1995, 1996 and 1999; the George Taylor-University of Minnesota Institute of Technology Alumni Society Distinguished Teacher Award in 1993; the Horace T. Morse-Minnesota Alumni Association Award for Outstanding Contributions to Undergraduate Education, 1994-1995; and the Award for Innovation in Technology Enhanced Learning in 1998. He was elected to the University of Minnesota Academy of Distinguished Teachers in 1999. In his early years at the U, Roger was co-director of Minnemast, a K-12 science and math curriculum project, and co-founder of the Experimental College. He later developed many innovative programs, including an independent study course for television, *The Changing Physical World*. He published two books with a philosophical and humanistic approach to physics; *Physics As Metaphor* (1982) and *Physics for the Rest of Us* (1992). He is survived by his wife of 55 years, Louise; and daughters.

Paul M. Kintner, Jr., (Ph.D., Physics, 1974) died on November 16, 2010 from pancreatic cancer. He was a Professor of electrical and computer engineering and head of the Global Positioning Systems Laboratory at Cornell University. He was an internationally recognized authority on the interaction of radio signals, both natural and man-made, with space environments, particularly the ionsophere and magnetosphere. His studies included the effect of the space environment on GPS signals. During the 2009-10 academic year, he served as a Jefferson Science Fellow at the U.S. Department of State, advising the government on GPS, navigational satellite systems, space weather and other scientific topics with implications for defense and national security. Kintner earned his undergraduate degree from the University of Rochester in 1968 and a Ph.D. in plasma physics from the University of Minnesota in 1974, for work on the space environment of the northern lights. He continued this work with the Space Physics Group at the University of Iowa until 1976, when he moved to Cornell as a research associate. He was appointed to the Cornell faculty in 1981. He was a Fellow of the American Physical Society and a senior member of the Institute of Electrical and Electronics Engineers. He served on National Research Council committees on Solar and Space Physics and the Economic and Societal Impacts of Severe Solar Storms. He is survived by his wife, Constance Bart Kintner and four children.

Berthus B. McInteer, (Ph.D., Physics, 1950) age 90, a resident of Los Alamos. NM died Saturday, Nov. 27, 2010 following a sudden illness. He was born on February 14, 1920. Dr. McInteer was a physicist for Los Alamos National Laboratory for 32 years. He received his doctorate from the University of Minnesota from the late Al Nier. He designed and built columns to separate stable isotopes. He and other people designed a Hot Dry Rock Program and designed a nuclear sub terrine. He enjoyed mass spectrometry. He started a company Isotope Services Inc., which analyzed stable Istopes with clients from throughout the world. He closed the business in 2005. He is survived by his wife, Carlotta McInteer and seven children.

Letter Cont.

on April 11-12, 2012 with a special Kaufmanis Lecture by Professor Mike Brown of Caltech and other ceremonies.

The School's seminars, colloquia and public lectures are a great way to keep in touch with physics, and this is a banner year for big events. In addition to the Kaufmanis, we have two major lectures coming during this academic year. On Feb. 8-9, 2012, Professor David Weitz of Harvard University will give a colloquium and public lecture (on the physics of cooking!), and on April 25-26, 2012, Professor Mildred Dresselhaus will be the 36th Van Vleck lecturer. More information on these and all of our talks can be found on the School's events calendar [www.physics.umn.edu/calendar.]

Let me conclude by thanking all of our alumni and many other friends for your interest, enthusiasm and contributions, which benefit all of our programs and activities. This was especially visible and effective during the successful drive for our new building. The College of Science and Engineering in general and the School of Physics and Astronomy in particular are seeing terrific support, growing research funding, and much stronger student demand. All of these are helping us to thrive and grow during challenging economic times. Your continuing interest and support are sincerely appreciated.

Above: architects rendering of the Physics and Nanotechnology building, approaching from the South . Left: rendering of the atrium looking east.

Construction is well under way on the corner of Beacon Street and Union. You can monitor progress on the building on our web cam [cse.umn.edu/research/physicsnano/webcam/index.php]

Stuart D. Bale

B. A. Physics and Mathematics, 1989; Ph. D. Physics, 1994.

Tell us about your personal life.
I am married, and we have a son. We live in San Francisco. I am very oversubscribed and my days are messy, but it's mostly a fulfilling life. My wife Isabelle works in the wine business in the Napa valley. Our boy Hugo attends a preschool at the university. The Bay Area is a charming place to live, however, I do miss the sunshine and the winters in Minnesota.

Tell us about your professional life.
I am a Professor of Physics and Director of the Space Sciences Laboratory (SSL) at the University of California, Berkeley. My research interests are experimental space physics and plasma astrophysics. I am making measurements of the fundamental plasma physics processes that are important to astrophysics, i.e. collisionless shocks, plasma turbulence, magnetic reconnection, plasma radio emission, etc. We make measurements *in situ* with satellite-borne instruments.

After my Ph.D., I went to Queen Mary and Westfield College (QMW) in London for a postdoctoral appointment. My intention was to work on data from ESA's 'Cluster' four spacecraft mission with the QMW guys; however, the Cluster launch failed and the satellites went into the ocean. So I continued my collaboration with my Minnesota colleagues (Paul Kellogg and Keith Goetz) working on measurements from the NASA Wind satellite. In 1997, I moved to Berkeley, first as an Assistant Research Physicist and then joining the physics faculty in 2004. In 2008, I took over as Director of SSL. Berkeley is a great place to work. It is an exhilarating intellectual environment and my interactions with colleagues are enjoyable.

I have continued my collaborations with my Minnesota colleagues. We built an instrument for the NASA STEREO mission and were recently selected by NASA to build an experiment together for the Solar Probe Plus mission.

Tell us your favorite memory from your time in the School of Physics and Astronomy.
I have two memories that stand out: As an undergraduate in the Methods of Experimental Physics course (taught by Mike Shupe and Bill Zimmerman), my lab partner **Jason Hinze** (B.S., Physics, 1992) and I built a little one-shot nitrogen laser and we actually made it function. The laser was hand built from a piece of PC board, a little plastic box with a half-silvered mirror, and an enormous rack-mounted high voltage power supply. We set up a (~10 kV) discharge across some copper strips in the box of nitrogen and it lased! It had a time constant of about one second which caused computer monitors to flicker across the lab. I think we made a measurement of the beam width too.

The second memory is of our scientific expedition to South Africa in 1994 to view the Shoemaker-Levy 9 comet impact with Jupiter. Paul Kellogg thought the comet fragments might generate decametric/decimetric (~10-100 MHz) radio emission as they plowed through the Jovian magnetosphere. Paul, Keith Goetz, Steve Monson and I set up shop for about six weeks at the Hartebeesthoek Radio Astronomy Observatory. We built up a set of huge, steerable log periodic antennas and moved them by hand each night, tracking Jupiter as it passed over. We have lots of funny stories to tell about this trip: walking on hot coals during a 'braai' on the 4th of July; monkeys throwing rocks at our car as we drove into the valley; and shopping at the local 'muti' shops. Our equipment worked fine, we could see the Io-modulated emission and solar radio bursts, but no primary signatures of Shoemaker-Levy 9. A negative result is still a result.

Tell us about your favorite professor(s) and favorite courses:
My favorite professors were Serge Rudaz, Bob Lysak, Ben Bayman, and Bill Zimmerman. These guys were models of clarity and insight and the best teachers that I have had. Bob Lysak's graduate plasma physics course still forms the backbone of my knowledge of plasma physics. Serge's course on relativistic quantum mechanics was elegant and inspiring. I left the third quarter of the quantum field theory sequence with an incomplete – a big scattering matrix calculation that was too forbidding to finish at the time. When it was time to graduate, I tapped on Serge's door, showed him my stack of calculations, and asked him for leniency. He asked me about my post-Ph.D. plans, I told him (a postdoc position working on space data), and he said "You're not going to do quantum field theory professionally." I said "No". He asked "You're not ever going to tell anyone that *I* taught you how to do quantum field theory?" "No", I said. So he gave me a passing grade. Thanks Serge.

What advice do you have for current students and recent alumni.
A career in science and teaching is richly rewarding and worth every second that you spend pursuing it. It is important to make a rapid transition from solving 'known' problems to developing your own taste. My advice to a young scientist would be to find a topic that was formerly 'hot', but has gone cool for lack of new measurements or techniques, then really scratch your head and figure out how to take the next step. Avoid the bandwagon.

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Alumnus Profile

Donovan M. Bakalyar

B.S. Year: 1970 (Bachelor of Physics), Ph.D. Year:

You received your Bachelor and Ph.D. degrees from the University of Minnesota. What helped you decide to come to the University of Minnesota for your education?
I intended to become a high school math teacher. At one point, for economic reasons, my parents had considered sending me to junior college. When I expressed this to my high school counselor, he said, "You are not going to a junior college. You are going to the Institute of Technology at the University of Minnesota."

Who was your advisor?
Walter Weyhmann was my advisor. One time, I met a friend, a budding theorist, who had also been an undergraduate at the U. He asked me who my advisor was. When I told him he replied with, "Isn't he the guy who walks into the room with a problematic experiment, and the bad part jumps out?" That pretty accurately sums it up. Walter was a master experimentalist. He also was a terrific mentor.

What was your thesis topic and why did you choose it?
My thesis topic was Nuclear Orientation Studies of the Manganese in Copper Kondo System at Ultralow Temperatures and High Applied Fields. I did not wake up in the middle of the night with a brilliant idea. The topic was suggested by my advisor and was dictated, to some extent, by the equipment and the funding.

What did you do prior to your current job at Henry Ford Hospital?
I took a postdoctoral position in Low Temperature Physics, with Dwight Adams at the University of Florida working in some fundamental physics research in solid and liquid 3He. I became an Assistant Professor at Wayne State University while doing research in atmospheric laser spectroscopy at the Ford Motor Company Scientific Research Labs.

A joint position with Oakland University and the Cardiology Department at William Beaumont Hospital near Detroit gave me the opportunity to turn to medicine. I read hundreds of medical journal articles and discussed the science and mathematics with Gerald C. Timmis, M.D. I continued in Cardiology with William W. O'Neill, M.D. who gave me the opportunity to use my background in a wide variety of interesting projects. I became a board certified medical physicist working in the Cardiology and Diagnostic Radiology departments.

Tell us about your career at Henry Ford Hospital.
I primarily work with CT throughout the Henry Ford system and act in more of a supporting role with the other modalities. I teach some classes, and along with my colleagues, am very active in our medical physics residency program.

What are some of your beliefs on how to be successful?
Learn as much and acquire as many skills as you can. Honestly critique the work of others as well as your own. Listen respectfully to others so that you can learn from them and so that they can trust you enough to learn from you. Know that great ideas and insights can come from anyone. (Bad ideas can come from anyone, too. This is where the critical part comes in.) Physics skills in the right hands have great general applicability.

Be aware that if you stray outside your field you must be prepared to learn a lot of new things quickly. A physics education can provide you with a good framework for accomplishing this.

I spent much of my career avoiding politics. I am not so sure that this was wise.

Luck is good, too.

What advice do you have for current students and recent alumni?
See above (and learn a lot of math). Medical Physics is an interesting and rewarding career. Coming into medical physics through the back door as I did is getting to be more difficult because the field is becoming more structured. If considering Medical Physics as a career, plan carefully because in general, medical professions are much more structured in their educational requirements.

Tell us about your family.
My wife, Anne, and I were married in 1976 during my last year of graduate school. We both work at Henry Ford Hospital. We have two grown children, both married.

You can contact Donovan at:
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Development Update

Kim Dockter
Director of External Relations

Consider the Physics General Fund

As you know, the challenging economic climate is affecting us all. The state's allocation to the university continues to decrease and now covers less than 20% of the University of Minnesota's budget. In these times of fundamental change in the funding of higher education, your gifts to the School of Physics and Astronomy are deeply appreciated.

Many of you support the department through annual gifts to the Physics General Fund which enhances the School's education, research, and outreach programs. Gifts to this fund provide essential support that allows the department to address urgent needs and take advantage of unique opportunities as they arise. I hope that you will continue to invest in the department and make a 2011 gift when the student callers contact you.

The return on your investment is the success and potential fostered in the talented students in our classrooms today. On behalf of the entire the School of Physics and Astronomy faculty, we deeply appreciate your support of the department and our mission. Private support like yours means the difference between an excellent program and an outstanding one.

The Physics General Fund supports community building, honoring our graduating seniors, Ph.D. students and M.S. students, faculty recruiting, weekly research seminars, the opening of the new graduate student lounge, and orientation week.

Many Physics alumni have made gifts to the Physics General Fund every year and express various reasons for doing so.

Dr Melissa A Eblen-Zayas received her PhD in Physics in 2005. She is currently an assistant professor of Physics at Carleton College in Northfield, MN. Dr. Eblen-Zayas is an experimental condensed matter physicist whose interests lie in studying the electronic and magnetic properties of materials. Regarding her support of the Physics General Fund, she says: "In today's economic environment, funding for science education from the state legislature and from federal agencies like NSF and DOE is uncertain, at best. Although I don't give a lot individually, small amounts add up; as a group, annual donors can help provide a reliable source of funds that don't depend on the ups or downs of the current economic or political climate. Giving to the Physics General Fund ensures that the School of Physics and Astronomy continues to be able to provide outstanding educational and research opportunities to students. It's a way of saying thanks for the opportunities I was given and making sure those opportunities (and more) are available for future students."

Mr. Akihiko Muramatsu received his Bachelor of Science in Electrical Engineering in 1974 and his Master of Science in Physics in 1977. Mr. Muramatsu worked at Texas Instruments until 2004, and later Oki Electric Co as a product engineering and system application senior manager till 2006. Currently he works as a public relations manager for a nonprofit organization called NPO Kosugi Area Management, which is a local organization dedicated to improving relations between residents, business, and government in Kawasaki City Japan. Mr. Muramatsu has been an annual donor to the Physics General Fund for many years and states: "I studied at the University about 40 years ago. The University provided me a good opportunity to study high level science and technology and also have a very nice life outside of school. I donated for many years a little money to Electrical Engineering and the School of Physics and Astronomy as a debt of gratitude. I hesitated to donate small amounts, but hoped to encourage the U of M students and myself by doing so. Anyway, thank you for providing me a higher education and fruitful life during my school time."

Every gift, no matter the size, is important and makes a difference. Thank you for supporting current and future generations of scientists.

You may make a gift to the Physics General fund by visiting the University of Minnesota's on-line giving site at https://www.foundation.umn.edu/pls/dmsn/online_giving.frames_broker?owner=PHYS and click on the box that says "I would like to give detailed instructions about my gift" and then enter Fund 3768 Physics General Fund in the box that drops down.

Please mail check (please enter "Fund 3768 Physics General Fund " in the memo section) to:

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Contact Kim Dockter at (612)626-9385 or dockter@umn.edu.

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Next Issue: Focus on the 2000's Alumni

We will highlight our alum from the 2000's in the next edition of the newsletter. 2000's alumni will receive a class notes mailing. Send your Class Notes responses by September 15, 2012 for inclusion in the next newsletter. We can not wait to hear from you!

Send Class Notes, comments and mailing list changes to:
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