

UNIVERSITY OF MINNESOTA

schoolofphysics &astronomy

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A letter from the department head



The past year was very successful from the point of view of recruiting new faculty. We hired an experimental astrophysicist, an experimental condensed matter physicist and a nuclear theorist working on astrophysical problems. The experimental astrophysicist, Dr. Vuk Mandic, formerly a Postdoctoral Fellow at Caltech, joined

the faculty in August. He will be working on the Laser Interferometer Gravitational Observatory (LIGO) and on the Cryogenic Dark Matter Search (CDMS). The experimental condensed matter physicist, Dr. Michel Kenzelmann, currently a research professor at ETHZ in Switzerland will arrive in early 2008. Kenzelmann's research is focused on neutron scattering studies of strongly correlated electron systems. Dr. Alexander Heger, the new nuclear theorist is currently a staff member at Los Alamos National Laboratory. He will join us in August 2008. During the coming academic year we will continue to search for a replacement for Anatoly Larkin, as well as an additional condensed matter experimentalist.

On November 14th we held a special colloquium to mark the retirements from teaching of two high-energy experimentalists, Earl Peterson and Keith Ruddick. Both will continue their participation in research. Earl will continue to serve as the Director of the Soudan Laboratory.

The Nova project, or off-axis neutrino detector, has now advanced beyond the proposal stage, with the formal agreement with the DOE beginning on September 1, 2008. Design and construction of this \$250 million detector is being led by Marvin Marshak of the High Energy Physics group. The detector, when completed, will look for the shift from tau to electron neutrinos.

The new Physics building project continues to advance, albeit quite slowly. Since the Science Teaching and Student Services building was not funded by the 2006 legislature, the Physics Building originally targeted for the 2008 legislative bonding session has been pushed back to 2010. Hopefully the statement of need for this project will be approved next fall.

--Allen Goldman

Bridge collapse impacts Physics Lab

The I-35W bridge that collapsed Wednesday, August 1st was very close to the School of Physics and Astronomy's Williams Laboratory, known as the "Tandem Lab." The bridge was twenty feet from the building's loading dock. There were no University staff, faculty or students in the laboratory at the time of the collapse.

The laboratory was built in 1965 as a combined project between the AEC, the NSF and the University of Minnesota to supplement and eventually replace the 68 Mev linear accelerator which had been constructed and operated by the physics department since the middle 1950's. The new machine, although of lower energy (20 Mev) provided a considerably more monochromatic particle beam better suited to the developing area of nuclear structure physics. The facility continued in this area with AEC-DOE funding until 1978. At this time proposals were made to transfer the

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Allen Brisson-Smith /The New York Times/Redux

Photo of the I-35W bridge collapse that shows the Tandem Lab on the left foreground.

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AWARDS & ANNOUNCEMENTS

Peloso



Professor Marco Peloso of the School of Physics and Astronomy has received the McKnight Presidential Fellow Award. The Fellowship is offered to the most promising faculty at critical stages in their careers. Peloso will receive a financial award for three years to help support his research and scholarship.

Jenny Allan

Cushman



Professor Prisca Cushman was recently appointed to the High Energy Physics Advisory panel. The three-year term appointment began in January 2007. The High Energy Physics Advisory Panel provides advice to both the Department of Energy and the National Science Foundation about the national high energy physics program. This encompasses theoretical and experimental efforts as well as accelerator research and development. The panel reviews current projects and provides long range planning strategies and funding recommendations. The twenty member panel is made up of high energy physicists from national and international academic and research institutions.

Pepin



Professor Robert O. Pepin was recently named a fellow of the Geochemical Society and European Association for Geochemistry. The title of "Fellow" is given to outstanding scientists who have, over the years, made a major contribution to the field of geochemistry. The number of Fellows elected each year is limited to less than 1% of the membership of the combined societies and is typically significantly fewer. Pepin was honored along with the other new Fellows at the Goldschmidt Conference in Cologne, Germany in August,

Jenny Allan

Nobel Laureate David Gross to deliver 2008 Van Vleck Lecture



Professor David Gross, Director of the Kavli Institute for Theoretical Physics at the University of California at Santa Barbara will deliver the 33rd Annual Van Vleck Lecture. The Lecture is schedule for March 5, 2008. Gross was awarded the 2004 Nobel Prize in Physics for the "for the discovery of asymptotic freedom in the theory of strong interaction." He shared the prize with H.

David Polizer and Frank Wilczek. The public portion of the Van Vleck Lecture will take place Wednesday, March 5th followed by a physics colloquium on Thursday, March 6th. You can find more information on the lecture at www.physics.umn.edu/outreach/vanvleck/

Marshak



Professor Marvin Marshak has been named faculty director of undergraduate research at the University. Marshak will lead the university's effort to expand undergraduate research opportunities and to make research a hallmark of the University of Minnesota undergraduate experience. He will work with colleges to develop new opportunities

for students to participate in research and to make current opportunities more visible and more accessible. The new Office for Undergraduate Research will include the current Undergraduate Research Opportunities Program (UROP) and will connect with undergraduate research programs housed in colleges and elsewhere in the university. "Professor Marshak is the perfect candidate to take undergraduate research at the U to new levels," Vice Provost and Dean of Undergraduate Education Craig Swan said. "He has served as head of the School of Physics and Astronomy as well as senior vice president for academic affairs at the university, and his commitment to undergraduate students is legendary on the Twin Cities campus." "Marvin is an outstanding choice to lead the expansion of undergraduate research at the university," University of Minnesota Provost Tom Sullivan said. "He conducts an active and highly regarded research program in particle physics and has involved undergraduate students extensively in his own work, as well as leading numerous other efforts to improve undergraduate education at the university."

Shifman



Professor Mikhail Shifman has been named a 2007 Blaise Pascal Chair by the Foundation of the Ecole Normale Supérieure (ENS) in Paris, France. This honor includes support for Shifman and research workers of his choosing for up to twelve months out of a two-year period at a higher learning institution in the Paris metropolitan area. The ENS search committee selects three or four candidates from among all scientific disciplines every year for this prestigious honor. Among past recipients have been several Nobel Prize winners and many well-known physicists. Shifman plans to spend his Blaise Pascal tenure at the Laboratoire de Physique Théorique, Université Paris XI at Orsay, near Paris.

Andersson



Brian Andersson School of Physics and Astronomy Assistant Education Specialist was recently made president of the Physics Instructional Resource Association (PIRA) at the 2007 American Association of Physics Teachers (AAPT) summer meeting. Andersson's term as president began August 1st and will run until the end of the next AAPT summer meeting (July 23rd).

School website redesign



School of Physics and Astronomy staff worked over the spring and summer redesigning the web site with a more contemporary look and greater functionality. The site was launched August 1st. The overall look of the site is in keeping with the University's templates, but the design did not employ the templates. "We wanted to add our own features and would have lost a lot of the site's current functionality had we gone to a template," said Graham Allan, IT Manager, who oversaw the project. Alex Schumann, an info tech professional, who did all the coding and much of the layout design of the pages, said that the new site employs a more recent version of html and makes extensive use of cascading style sheets. Style sheets, a standard way of defining the style of a site, allow for the best possible look across a wide variety of computer platforms. The new design includes a research spotlight feature on the home page, an intranet and an improved alumni section. Take a look at our redesigned School of Physics and Astronomy website (www.physics.umn.edu). The School welcomes feedback and comments at www.physics.umn.edu/new.

Minnesota receives grant for PhysTEC



Wendy Tschauder

The University has recently been selected to be in the Physics Teacher Education Coalition (PhysTEC). The coalition was designed to enhance recruitment of college students to become high school physics teachers and to improve their training and early

career mentoring. The UM program is a collaborative effort between faculty in the School of Physics and Astronomy, the Department of Curriculum and Instruction, and the Department of Postsecondary Teaching and Learning of the College of Education. A key component of this program is the Teacher-in-Residence (TIR). A TIR is an experienced high school physics teacher who works with the program for one to three years. Our first TIR is Nancy Bresnahan who joins us this year from the Hopkins School District. Next year our TIR will be Jon Anderson from Centennial High School in Circle Pines, MN. In addition, the program will have a Teacher Advisory Group (TAG), made up of approximately five secondary physics or physical science teachers. The PhysTEC Program is sponsored by the American Physical Society and the National Science Foundation.

Nancy Bresnahan teaches the Physics for Elementary School Teachers class.

Eich and Holets retire



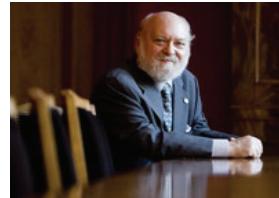
Jenny Allen

Two of our long-term staff members retired this year. Bobbi Eich and Dave Holets collectively served the department for 74 years. Eich retired from physics in July 2007 and Holets in May 2007. There was an open house retirement party for them in May 2007.

Bobbi Eich began working for the School as a secretary in the main office in 1970. Eich said that some of the highlights of the recent decade were creating the history display cabinets in the physics building, the Hoff Lu 90th Birthday Party Celebration, the "100 Years of Physics at Minnesota" celebration and "working with graduate students - especially in the fall welcoming new students from all over the world." Eich also mentioned that she enjoyed planning the Van Vleck Lectures and in particular the Stephen Hawking visit. Since retirement, Eich has enjoyed her garden and visiting relatives and friends. She and her husband are planning to move one hour north of the Cities but have just started looking for a new house. She is also exploring volunteer activities.

Dave Holets began his career at the University in 1965, at a position in the President's office. He joined physics in 1969 as administrator. Dave holds a Bachelors Degree in Business and Economics from the University of Minnesota, Duluth. Dave worked closely with six department heads. A major part of his work involved grants management and overseeing sponsored and non-sponsored financial activities. He also worked in human resources and helped determine departmental needs. Since retirement, Dave has been enjoying travel.

Kadanoff delivers 2nd Annual Misel Lecture



Courtesy Misel Lecture

The Second Annual Edyth and Irving Misel Family Lecture series took place on October 4th at Tate Lab of Physics. Leo P. Kadanoff, from the University of Chicago, spoke to a packed house on the topic of "Making a Splash; Breaking a Neck: The Development of Complexity in Physical Systems." Kadanoff is a John D. and Catherine T. MacArthur Distinguished Service Professor of Physics and Mathematics. The Misel Lecture Series is endowed by a generous gift from Irving and Edythe Misel to the William I. and Bianca M. Fine Charitable Trust. The Misel lectures are hosted by the Fine Theoretical Physics Institute.

FACULTY PROFILES



Wendy Tschauder

Vincent
Noireaux

Vincent Noireaux is a new professor in the area of experimental Biological Physics. Noireaux's research is centered around the creation of artificial "proto cells" which are able to express DNA. For many years the pharmaceutical industry has used artificial "cells" (they are not truly cells since they are not alive and can not reproduce) to study drug delivery. The difference between Noireaux's use of proto cells and those used previously, is that Noireaux's group is able to encapsulate the cell with a gene expressed within.

Noireaux's interest in these vesicles, or part of a cell, is in creating *in vitro* gene expression to better understand the physics behind cell mechanics. Noireaux's lab tries to engineer genetic networks that are quantitative so that the physical conditions can be understood. The conditions required for this type of study are homeostasis, in other words the small dynamic changes necessary for the cell to remain in a stable condition. To do this they make continuous exchange of materials through the membrane of the "proto cell."

Once the protocell is created and stable, understanding the physics is a matter of applying equations from other areas of expertise. The engineered system is governed by nonlinear mechanics that is similar to those describing oscillators. The goal is to predict behavior as you would in any other area of physics. Of course genetic expression is an incredibly complex version of this type of system. However working *in vitro* with gene expression, Noireaux and his assistants are able to control every part of the process. Currently, Noireaux is specifically studying actin which is a protein that forms the cytoskeleton of a cell and is also involved in a lot of processes related to cell mechanics. By controlling actin they can control the movement of a cell and have the key to all aspects of cell mechanics. The next step will be to insert proteins inside the membrane, which is a very complicated process using a transducer for specific genetic expressions.

Noireaux believes that a true artificial cell, one that would be capable of reproducing itself, is still a few years off. "Now, that I know the system, I have more reasonable goals for the short term, such as refining the process to better control the genetic expression." Noireaux said that some drug companies are interested in his research methods because these techniques could be used to improve drug delivery.



Wendy Tschauder

John Wygant

Professor John Wygant is Principal Investigator of a large NASA investigation to measure intense electric fields in the Earth's radiation belts. This project is part of a two spacecraft mission called the Radiation Belt Storm Probes, which will study energetic charged particle acceleration in the Earth's magnetosphere during major geomagnetic storms. The inner magnetosphere is a region of charged, energetic particles or plasma that is trapped by the Earth's magnetic field. Although the radiation belts are close to home and were discovered in the late 1950s during the launch of the first American spacecraft, the mechanisms responsible for creating the belts and destroying them are not known because the radiation is so intense that it is hazardous to spacecraft. The project could have long term impact, not only for studying our own planet, but others in our solar system such as Saturn and Jupiter which also have substantial radiation belts. Wygant leads the Electric Field and Waves (EFW) team that will design and build the instrument that will measure low frequency electric field wave variations ranging from milliseconds to hours and over spatial scales of $1\text{-}10^5$ kilometers. These electric fields are measured using three pairs of sensors. Two pairs of sensors are deployed at the ends of 50 m booms, that are held in place by the tension associated with centripetal acceleration of the spinning spacecraft which rotates every 10 seconds.

Wygant's group is interested in the physics of the particle acceleration in the radiation belt, where particles may be accelerated from low energies (1 keV) to relativistic energies (15 MeV) in a short amount of time. Wygant says that it was previously believed that the acceleration took from days to months to occur, but recent data has shown that particles can be accelerated in milliseconds to hours through a variety of different mechanisms. Some of these mechanisms include large scale shock waves launched from the sun, episodes of explosive release of magnetic energy stored in the magnetosphere of the earth, electric fields associated with magnetic fields lines that can vibrate like violin strings, and a menagerie of small scale waves which propagate along magnetic field lines.

"Particles find a wave to surf on, they pick up speed, and accelerate to relativistic energies," Wygant explains. Most of these accelerations occur either during major geomagnetic storms (which also produce intense aurora) or during encounters with high speed solar wind streams emanating from the sun. In such a complex system it is important to get a number of small samples at the most intense part of a storm event, typically a four hour period. That is why the mission will be one with dual spacecraft that pass in and out of the radiation belt at four hour intervals. Wygant is confident that they will get samples of magnetosphere storms during the mission.

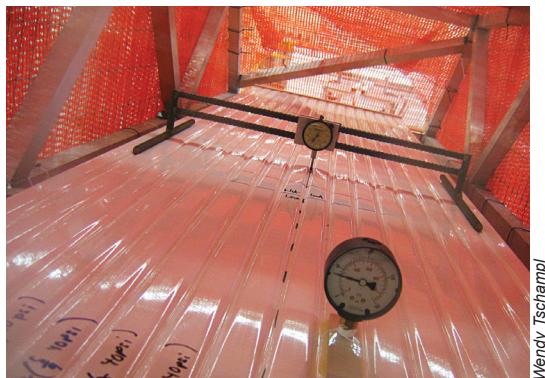


Dan Cronin-Hennessy

Professor Daniel Cronin-Hennessy is leading the development of factory machines and quality control for the proposed NOvA detector. The detector will search for electron neutrinos, and be made almost entirely of plastic. "As far as we know it will be the largest plastic structure ever built," Cronin-Hennessy said. The 15 kiloton detector will be made up of 385,000 cells of PVC. The detector is being designed to last for a ten year period. When asked why the group chose plastic and not some other material commonly used in detectors such as steel, Cronin-Hennessy said electron neutrinos have different characteristics. "We need to have as much of the detector surface 'live' (working as a detector) as possible." Therefore a thin, but strong material was needed. With the MINOS detector, which is primarily housed in steel, most of the detector mass is 'dead'. The steel-scintillator design of MINOS was optimized for observing muon neutrino interactions. NOvA which uses the same particle beam from fermilab as MINOS, will be searching for the transition from muon to electron neutrino. "Primarily we are looking for an energy reading. We need to measure light and we need to see as much of it as possible. The detectors will be filled with mineral oil doped with a scintillator material and wavelength shifting optical fiber."

According to Cronin-Hennessy, PVC was chosen because such a large amount is required. They needed a material that was relatively inexpensive with a large industrial infrastructure behind it. As oil prices rise, the price of plastic has gone up as well, and could affect the project's proposed budget. "The Department of Energy (DOE) came to us and asked for a prediction for the price of oil. We had no way to calculate that price, so we looked up which government agency could tell us that information. It turned out to be the Department of Energy."

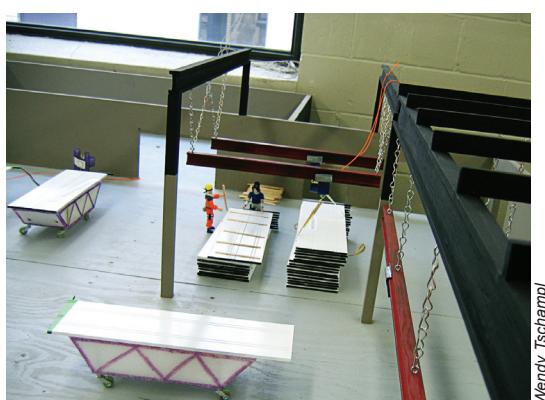
The detector will use an existing beam, the one aimed at MINOS in the Soudan Underground Laboratory. Unlike MINOS, the NOvA detector will be above ground further north. The beam enters the earth at an angle and comes out of the ground around International Falls. The massive shielding required by MINOS is unnecessary with NOvA. The fully active design provides excellent suppression of background, and the electron neutrino background is more easily suppressed. The detector is expected to begin collecting useful data in 2010.



Pressure testing the detector modules to see their failure point.



A household feather duster is attached to a pulley and used to thread optic cable into the detector module.



A model showing the NOvA factory, which will be built in an industrial building in Minneapolis.



Graduate Student Dan Ambrose works in Cronin-Hennessy's Research and Development lab.

CLASS NOTES

2006

Sean A. Bryan (B.S., Physics, 2006) I did undergraduate research in Shaul Hanany's observational cosmology group. I am currently in my first year of graduate school at Case Western Reserve University in Cleveland, OH. I plan to do my thesis research with a cosmology experiment group here.

2005

Jacob D. Haqq-Misra (B.S., Astrophysics, 2005) I am currently working on my Ph.D. in meteorology and astrobiology at Penn State University with my advisors Jim Kasting and Sukyoung Lee. My MS paper, which I defended on August 22, is titled "A Revised, Hazy Methane Greenhouse for the Archean Earth". My Ph.D. research involves the use of 3-D general circulation climate models to estimate the outer edge of the habitable zone -- the farthest an Earth-like planet could be from its parent star and still sustain standing liquid water. I am enjoying being part of this department and community. State College is a great place to live. I am active with a band named Cootie Brown--a seven-piece funk/jazz/reggae group. I have been playing congas and percussion with Cootie Brown for a year and a half. Our debut album, titled "Meltdown" was released August 24. Details about our shows and albums can be found at our website [<http://www.cootiebrown.net>] or our myspace page [<http://myspace.com/cootiebrown>].

2003



Hassib Amin (Ph.D., Physics, 2003; B.S., Physics, 1998) I have been working at Seagate Technology for 3.5 years as a senior electrical integration engineer. I was recently promoted to the staff level engineer in a new department: the advanced recording head research and development.

As for my personal life, I am enjoying my single status, but plan to settle down soon. I do a fair amount of work-related travel. I recently traveled to Singapore, Malaysia, and Thailand. Within the states I have traveled to Boston, MA and Fremont, CA. My hobbies include plenty of reading (yes, including Harry Potter), ballroom dancing, and photography.

Luke A. Corwin (B.S., Physics, 2003) I am a graduate student in Physics at the Ohio State University. I am doing research on leptonic decays of the charged B meson for the BaBar Experiment. Earlier this year, I won second place for a presentation on my research in the Ohio State College of Mathematical and Physical Sciences category of the annual Hayes Graduate Research Forum. My first paper is scheduled to be published in Physical Review D.

2004

David W. Kleinjan (B.S., Physics, 2004) I was accepted to graduate school at UC-Riverside. I began working on my physics Ph.D. in fall 2006.

2002

John D. Hoekman (B.S., Physics, 2002) After graduation I moved into biophysics. I worked as a lab tech in the Biochemistry Department at the University of Minnesota for two years. Then I got a job as a lab tech at the Alzheimer's Research Center in Regions Hospital in St. Paul doing drug formulation and drug delivery research. Last year I started a Ph.D. program in Pharmaceutics at the University of Washington. This program is considered the top program in the country. I know that

having a Physics degree really helped me get in to this program. In my interview, the head of the program told me that a physics degree is very highly regarded in any scientific Ph.D. program. I also got married just before starting graduate school.

2001



Byron K. Freelon (Ph.D., Physics, 2001) I recently received the first Morehouse Physics Prize. I accepted the award and delivered a colloquium on high-temperature superconductors at Morehouse College on April 5th. The National Society of Black Physicists established the award "to honor graduates from Historical Black Colleges and Universities who have shown considerable promise as physics researchers and teachers." I am currently a scientist at University of California-Berkeley in the group of Chancellor Robert Birgeneau. After graduate school, I worked as a post-doctoral research associate with Dr. Zahid Hussain at the Lawrence Berkeley National Laboratory. There I developed a beamline-based molecular beam epitaxy system at the Advanced Light Source (ALS). My interests look at various synchrotron techniques to study high-temperature superconductors and soft-matter systems. In addition to synchrotron techniques I am working on inelastic neutron scattering with Professor Birgeneau. I am also leading an international collaboration to develop a pulsed-laser deposition facility at the Advanced Light Source synchrotron.

John W. Pint (B.S., Physics, 2001) I am working as an intellectual property attorney, both patent and trademark prosecution and intellectual property litigation, at Proskauer Rose LLP in Boston, MA. My current cases are in a variety of fields including autonomous automobile navigation systems, networking equipment and technology, and photolithography mask technology. I also have been working with several companies in the semiconductor fabrication and plasma arc cutting torch industries. I am still married. My wife and I celebrated our third anniversary on October 2. We do not have kids yet. I have not retired. My hobbies still include running, biking, reading, and watching the Red Sox, Twins and Patriots.

1999

Usman Suriono (Ph.D., Physics, 1999; B.S., Physics, 1993) I have been working for six years at Polar Semiconductor Inc. as principle modeling engineer in Bloomington, MN.



Heather Sykora (Banbury) (B.S. Astrophysics 1999; M.S., Aerospace Engineering 2002) After graduating, I accepted a job with Northrop Grumman Corp. in San Diego as an Aerospace Engineer (level E2). During my first three years at Northrop, I worked as an aerospace engineer on the unmanned air vehicle (UAV) called Global Hawk in the Guidance and Controls (GNC) group, while my husband finished his degree and then worked at Ernst and Young as an Auditor. In 2005, I began working on special projects (advanced development) at Northrop, still out of their San Diego office, and still working as a GNC engineer. My then fiancee, Ben, happened to switch jobs while in San Diego as well and worked in mergers and acquisitions at RSM McGladrey. In March of 2007, we moved to LA to pursue a job

opportunity for Ben in Investment Banking and I was able to transfer to Northrop's office in El Segundo and continue working on the same project from there. On July 16, 2005, we were married in Crosslake, MN. An anniversary helicopter ride, led Ben to pursue a pilot's license. We are pictured here enjoying our second anniversary flying in a Cessna 172.

1998



Mark C. Williams (Ph.D., Physics, 1998) I was recently promoted to Associate Professor with tenure at Northeastern University in Boston. After completing my Ph.D. in low temperature physics in 1998, I did a postdoc with Victor Bloomfield in the Department of Biochemistry, Molecular Biology, and Biophysics at the University of Minnesota. In 2001, I started as an Assistant Professor in the Physics Department at Northeastern. My lab focuses on the development of single molecule biophysical methods for the study of nucleic acid interactions. I have received major grants from the National Science Foundation and the National Institutes of Health to study topics ranging from the biophysics of small molecule-DNA interactions to retroviral replication proteins. More information on my research can be found at: <http://www.atsweb.neu.edu/mark/>

1997

Phil Taddei (B.S., Physics, 1997) I completed a Ph.D. in Radiological Health Sciences (Radiation Physics) in 2005 from Colorado State University. From 2005-2006, I was an Assistant Research Professor at the United States Naval Academy in Annapolis, MD. Since 2006, I have been a research scientist at the M. D. Anderson Cancer Center, Houston, TX. I was married in June 1999 to Lyla Thimsen. We have three children: two daughters Amma (7), Halima (5), and a son Abraham (2).

Douglas L. Thain (B.S., Physics, 1997) I completed a Ph.D. in computer science at the University of Wisconsin in 2004. I am now an assistant professor at the University of Notre Dame. My wife, Lisa, and I celebrated the arrival of a baby boy, William, in March 2007.

1994



Scott A. Anderson (B.S., Physics, 1994) I have been teaching yoga since 1989. I opened the St. Paul Yoga Center in 1994, and the Blue Mounds Dharma Center in 2005. My training in the physics department has definitely helped me find success in my field. While I have not worked in a lab, or traditional sort of physics venue, I have found my education from the University of Minnesota Department of Physics invaluable. There is more information on my website, www.alignmentyoga.com

1989

David R. Hanson (Ph.D., Physics, 1989; B.S. Physics, 1983) I am now teaching at Augsburg College in the Chemistry Department. I am doing research on atmospheric chemistry and physics. My main research focus is developing and testing a mass spectrometer for measuring trace gases which will be deployed on a high altitude research aircraft. I also maintain an interest in atmospheric particle formation as a visiting scientist in the University of Minnesota's Department of Mechanical Engineering with Peter McMurry's group. I live in St. Paul with my wife Leslie and two children, Emilie (4) and Oliver (2).

1985



Gregory R. Roelofs (B.S., Physics, 1985)

I have worked at Yahoo for the last three years as part of the core (runtime) search-engine team. Search is an absolutely fascinating field, covering the spectrum from highly threaded, high-performance computing (and every thing that entails, including kernel bugs, library bugs, compiler bugs, CPU bugs, and plain old application bugs) to large-scale clustering (many thousands of machines, tens of billions of documents, petabytes of data, robust failover and redundancy) to all the fuzziness associated with computational linguistics: dozens of languages, multiple character-encodings, misspelled queries, underspecified user intent, over-constrained fitting problems, and on and on. My work does not involve much physics, but it does encompass a huge variety of interesting problems. The problem solving skills one uses are fundamentally similar. It is immense fun, in case that wasn't obvious. Did I mention that we are hiring? Folks can poke around <http://careers.yahoo.com/>, upload their resume, and then additionally send me an e-mail with the resume and potential job-req numbers so I can alert our hiring managers. Note that if the position is outside of web-search, I will not be able to help much, if at all. The search group has quite a variety of openings. newt@pobox.com Prior to Yahoo, I spent nine years at Philips Electronics, six in the corporate research division (Internet TV, graphics and audio compression, virtual worlds, etc.) followed by three in the semiconductors division (embedded Linux on a triple-core processor); every now and then one of the patents I filed there is approved. At around the same time, I helped design the PNG image format and wrote a book about it. I still maintain the official web site and occasionally contribute to libpng and related free/libre and open source software. Before Philips I spent a number of years working on my dissertation at the University of Chicago ("Radial Motions in Spiral Galaxies"), though I actually ended up spending more time at NASA Ames in the San Jose area than I did in Chicago. I met my wife, Veronica, there. We recently celebrated our 14th anniversary. We have two daughters, Lyra (11) and Delenn (8). We still live in San Jose. Our most recent mini-trip was to the Monterey Bay Aquarium, where both kids participated in the "Underwater Explorers" scuba program.

1983

Thomas J. Greenwald (B.S., Physics, 1983) Professionally, I have done research in the atmospheric sciences for the past 22 years. Sixteen of those years were spent at Colorado State University in Fort Collins where I earned a Ph.D. In the 90's I was involved in global climate change research for NASA. For the past five years I have worked at the University of Wisconsin-Madison. I am doing research related to the next generation of NOAA geosynchronous satellites, due for launch in 2012. I am still single, but I have four nephews who, along with the rest of my family, live in various parts of the Twin Cities. I like to read, write and play guitar. I have two cats.

1979



Thomas M. Christensen (B.S., Physics; B.S.,

Astrophysics, 1979) I was just promoted to Professor of physics at the University of Colorado at Colorado Springs. I currently serve as the Dean of the College of Letters, Arts and Sciences.

CLASS NOTES

Gina (Fayling) Odean (M.S., Physics, 1979) In 1979, I used my physics degree to get a job in PBX Engineering at (then) Northwestern Bell. That launched a 22 year career in telecommunications that led me from engineering to marketing in a multitude of technical, sales engineering, sales and management positions as the company split and spun into American Bell, AT&T, Lucent Technologies and Avaya. I accepted an early retirement package from Avaya in 2001. I then went to work at North American Communication Resource (an Avaya dealer). I joined NACR as the Convergence Director, just as IP Telephony was launched as the architectural foundation of telecommunications. I now lead a team of 22 engineers who specialize in pre-sales and consulting support for VoIP and data networking. On a personal note, my husband, Bill, and I have been married for 32 years and have three children. My oldest son, Tyler, is a graduate of Carleton College with a degree in Computer Science. He is working on his Master's Degree at Brown University. My daughter, Shayla, is attending Minnesota State University in Moorhead, studying education. My youngest son, Graham, graduated from Mounds View High School in June, and is heading to Century Community College in the fall.

Bradley M. Peterson (B.S., Physics, 1974) I am currently Professor and Chair of the Department of Astronomy of the Ohio State University. I also serve as chair of the Space Telescope Institute Council. The Space Telescope Institute Council is the management council for Space Telescope Science Institute, which operates the Hubble Space Telescope and will operate its successor, the James Webb Space Telescope, scheduled for launch in 2013. I carry out research on active galactic nuclei using Hubble Space Telescope and other telescopes.

1972

Paul E. Madsen (M.S., Physics, 1972) This past summer was my 24th summer at Fermilab. I have spent the last twenty plus years in DOE sponsored programs that allowed high school physics teachers to join experimental groups in lab efforts to build detectors or take part in updates to improve existing detectors to make the taking of data more efficient and productive. In the 1980's I joined a great group of young and experienced physicists building detectors to be placed in the meson beamline that was to become E706, a fixed target experiment looking for transverse photons among other exotic particles. That was followed by a move to one of the two big collider experiments, CDF, having been invited by a very talented young physicist, Rob Roser, and working on updating the numerous phototube detectors that form a part of the large two-story central detector. For the past four summers I have been teaching summer workshops in various physics topics, courses developed by my colleagues and me aimed at attracting young high school physics teachers. I taught courses in mechanics and the history of physics at Fermilab. High school teachers, can take these for credit and add to their professional experience. I give credit to a great teacher at the University of Minnesota, Roger Stuewer, who provided wonderful inspiration for my already existing interest in the history of physics. That inspiration came from a course back in 1972 and I have not forgotten the experience. This fall I will begin my 39th year of teaching physics full time in a private girl's school. I am still fascinated by the subject and the chance to help young minds appreciate the many challenges physics offers.

1971

Rod A. Britten (Ph.D., Physics, 1971) I am retired. I spent most of my professional life working for aerospace companies in southern

California including 14 years at Jet Propulsion Laboratory (JPL) in Pasadena. I now live in Montrose, CO, a small town in the west-central part of the state. I am active in community affairs. I also like to travel.

1969



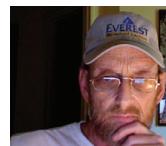
Charles P. Reinert (Ph.D., Physics, 1969; MS, Physics, 1963; B.S., Physics, 1961) I am married to Lois. We have four children and five grandchildren. I taught physics and did research (honeybee diseases, solar energy, general intelligence development) for 30 years at Southwest Minnesota State University in Marshall, MN. I took early retirement to train in alternative medicine. I am now in a 10 member group practice in a clinic in Tracy, MN. Our patients present with a wide variety of conditions, such as cancer, MS, diabetes, spinal cord damage, etc. We work with a view toward using the methods of subtle energy to do what modern medicine seems unable to do. helpingtohealclinic@iw.net

1968



Alan W. Kiecker (B.S., Physics, 1968) I have worked as a Software Engineer at Unisys Corporation for 33 years. I have four children, and one grandchild. Our grandchild has certainly added a new phase to our lives. I am keeping busy outside of work doing photography and sailing.

1967



Carlos P. Avery (Ph.D., Physics, 1967; M.S., Physics, 1965; B.S., Physics, 1960) After spending an enjoyable decade plus of my life at the University of Minnesota, I began my 40+-year career with "The Company" in 1967 as an intelligence analyst, working on Soviet science, technology, and strategic defense weapons (and the counterpart to our SDI) for about 25 years. With the collapse of the USSR, I moved on to work on WMD proliferation and information technologies, with a stint on the infamous "Y2K" problem. I was drafted to help out with coverage on Iraq in 2003, doing night shift work for the first time, and that led to working on Iraq permanently. No more S&T for me! The good old days are over! I came to recognize the power of Web 2.0 and now work in a 'wiki' called Intellipedia. Starting to think about retiring, but I will not *really* do that. I would miss the action. As for my personal life, I have four great kids. I had a book published after some 25 years of research on the life and work of a Victorian-era Baltimore architect: "E Francis Baldwin, Architect--the B&O, Baltimore and Beyond," Baltimore Architecture Foundation (2003).

1964

Stanley J. Brodsky (Ph.D., Physics, 1964; B.S., Physics, 1961) I am a Professor at SLAC, Stanford University. I greatly benefited from two outstanding University of Minnesota physics teachers, Professors Donald Yennie and Steve Gasiorowicz. I started at the IT as a freshman in 1957. That was almost 50 years ago! I was very honored this year to have received the 2007 J. J. Sakurai Award for Theoretical Physics from the American Physical Society: www.aps.org/programs/honors/prizes/sakurai.cfm. See my website: www.slac.stanford.edu/grp/th/Brodsky/BrodskyHome.html.

1961

Earle F. Kyle, Jr. (B.S., Physics, 1961) Last October my oldest son (Earle Kyle IV) and his youngest son (Nick) died in a canoe accident in

Big Sandy Lake in northern Minnesota. I would like to warn your readers of the danger of cold water boating. Although we will never know how their canoe capsized, experts tell me the 55 degree F water was deadly within minutes even though they both had life jackets on. They were found floating near shore the next morning, October 9, 2006. My son was a very intelligent University of Minnesota Law School graduate and a vice president at Medtronic, Inc. I am sure if he had known of the danger of cold water boating he would not have gone out on that lake that day. I am in my fifth year as a NASA/JPL Solar System Ambassador working with school systems to inspire the next generation of space explorers and helping to develop the local economy using space program spin-off technologies.

Richard O. Rue (B.S., Physics, 1961) After graduation, I moved on to the College of Education for a B.S. in 1962. After I completed my degree, I moved to China Lake, CA as a physics teacher in the local high school and junior college. The next year I took a position with the Naval Weapons Center as a physicist and continued there until 1968. After teaching and studying for three years with Pacific University College of Optometry in Forest Grove, OR, I graduated with a degree in Optometry in 1971.

1959

George Champine (M.S., Physics, 1959; B.S., Physics, 1956) I am involved in an exciting project with the Harvard Astronomy Department to build the world's fastest digitizer for astronomy negatives. Harvard has the world's largest collection of glass plate astrophotographs. The collection covers the entire sky from 1880 to 1980, when the image science changed from glass plate negatives to electronic imaging. Every point in the sky is captured 300 to 1000 times over the 100 year time frame. In order to make the collection more accessible to the astrophysics community, the decision was made to digitize the collection. Because the collection consists of 500,000 plates, commercial digitizers at 30 minutes per 14 inch by 17 inch plate were too slow. To complete the digitization in a reasonable time (five years), the decision was made to develop a digitizer that was 50 times faster than the best of the commercial digitizers. The development of the digitizer is now complete and it has met its design goals. Calibration is nearing completion and limited production digitization is now underway. Fund raising is in process to obtain the approximately \$5M required to carry out the digitization of the 500,000 plates.

1940s HIGHLIGHTS

1949

Kawora Carl Nomura (M.S., Physics 1949; B.S., Physics 1948; Ph.D., Electrical Engineering 1953) I have four children and eight grandchildren. I am retired from Honeywell, as officer and corporate Sr. V.P. I received Honeywell's outstanding Achievement Award in 1988. I remember fondly the friendliness of the staff at the School of Physics and Astronomy. My favorite professor was Edward Hill because he made difficult subjects appear simple. I took every course he taught. If Hill had taught Sanskrit, I'd have taken that too.



George C. Francis (M.S., Physics, 1949) I lived in Maryland most of my years after college. I met my wife Mary Alice there either at work (Aberdeen Proving Ground) or at church in the early 1950s. I served as elder, deacon, trustee, church treasurer,

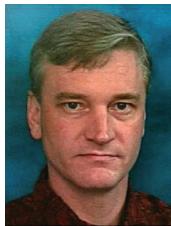
committeeman, and choir member of the Presbyterian Church. We both sang in church choirs and community choruses and enjoyed concerts, musicals, plays, etc. After 12 years in Chapel Hill, NC, we are now retired in suburban Baltimore, MD. I have enjoyed golf, ten pin bowling, bridge and other games, travel, computing, Kiwanis, and the clarinet. I taught college math full time at Carleton College, Northfield, MN (1949-52) and part time at the University of Minnesota IT (one year) and Columbia University, NYC (one year). I developed software for military applications, Ballistics Research Laboratories, Aberdeen Proving Ground, MD for about 30 years, using historic computers EDVAC, ORDVAC, BRLESC 1 & 2, and Control Data Cyber Series, DEC, PDP, and others creating guided missile simulations, battle tank duels, trade off studies on armor vs. agility; helicopter evasiveness studies; simulation of a fire control communications device; developing of algebraic symbol manipulation programs; advanced information storage, retrieval, and selective dissemination procedures. I am listed in Who's Who in the East for 1968-69. I am a member of the American Mathematical Association, Association for Computing Machinery, and special interest groups (SIGs). Even now I teach use of personal computers, email and the internet to some of our fellow retirees. While I was there, the Physics Department was part of the SLA College (now CLA) for undergrad study and the Graduate School for more advanced work in the 1940s. The Van de Graf machine stood out back and was a mystery to most passers by. The University was one of the largest in the country just after World War II (about 27,000 students). Physics was relatively small but had its share of students, especially for freshman lecture classes of several hundred. Hi to our classmates! My favorite Professors were J.W. Buchta, Alfred Nier, Frank Oppenheimer, E.L. Hill, and the Optics group, plus several in the Institute of Technology (before Physics joined IT). I remember Dr. Nier always liked to do his teaching at 8:00 a.m. (not my favorite hour), so he could get back to his lab research as early as possible. Dr. Oppenheimer always paced back and forth in front of the class, with chalk in one hand, and an eraser in the other. Sometimes he used the eraser before the class saw what the chalk had written. Dr. Hill was developing the course text as he went, and we usually got the printed lesson the next day. It could not be much "hotter off the press" than that! Optics and Spectroscopy class and lab led to one of my three long papers in lieu of a master's thesis (Plan B in those days). Those were interesting times!

1948

Kay Winger Blair (M.S., Physics, 1948; Ph.D., Math, 1959) I was married to J. Morris Blair, a long time member of the Physics faculty, until his death in 1996. We have two sons, John a physical chemist and Carl, an archaeologist. I am devoted to my three grandchildren aged 12, 9, and 7. I spent most of my career teaching at Hamline University. I currently volunteer in the fossil preparation lab at the Science Museum of Minnesota. I fondly remember the 1945-46 years as the department expanded rapidly when faculty and students returned from their war positions. At the first colloquium tea of 1946, Phyllis Freier introduced me to Morris Blair who had just arrived from Los Alamos. Within two years, we were. My favorite professor was Ed Hill, whom I remember as an excellent teacher who introduced me to theoretical physics in three quarter courses. The following year I was pleasantly surprised to find that he greeted me as a friend rather than a student.

Robert Wariakois (B.S., Physics, 1948) I am retired. I remember the Physics building fondly. My favorite professor was Dr. C.N. Wall.

ALUMNUS PROFILE



A commitment to success

Dr. Garrick Villaume (Ph.D., Physics, 1998; B.S. Physics, 1989)

You obtained your Bachelor of Physics at the University of Minnesota in 1998. You received your Ph.D. in 1998 (Thesis: "Contained Event Classification in Soudan 2 With a Neural Network") advised by Professor Earl Peterson. What was the best part of working on your research? What was the most difficult part of your working on your research?

The best part of my research was working with terrific people on a great project, on campus as well as in the Soudan mine, where I spent a lot of time as a research assistant. The most difficult part was going to grad school as a father of four small children, and trying to finish my thesis while working full-time at Seagate. It was an extremely trying time for me, my wife, and our children. I will take a moment to thank Earl Peterson and Marvin Marshak for their great support during that difficult time.

Who were your favorite professors at the University of Minnesota?

Four stand out in particular: Serge Rudaz, Ben Bayman, Earl Peterson, and Clayton Giese. These people taught me how to think and helped make me who I am.

What are your favorite memories of your time at the University of Minnesota?

Being in the department as a student, instructor, and researcher is my fondest memory.

You are an Executive Director, RHO Product Integration, at Seagate Technology LLC. What brought you to Seagate Technology?

The money! I was trying to support a family while working on my doctorate. At the time I accepted the job offer at Seagate (Feb 1994) I had started working directly on my thesis and was thinking about permanent employment. Funding for HEP was dwindling, and the SSC project was cancelled. The outlook for post-doc positions and tenure-track professorships was grim. My family commitments presented demands that potential academic positions could not satisfy. A friend of mine - also a two-time UM Physics grad (BS, MS) - had just advanced to a manager position at Seagate. We crafted a plan to bring me in. I started as an engineer in one of the wafer fabrication process groups, rather quickly moved to test and device characterization. I started managing shortly after completing my dissertation.

Tell us about your job.

I manage the overall performance, reliability and cost of Seagate's recording heads from the product integration

phase through volume manufacturing to end of life. I have a program management unit that coordinates the broad and complex operations used to produce recording heads for the various products in our portfolio, an electrical integration group that defines appropriate tests and specifications to measure and predict head performance in development and manufacturing, and a performance engineering group that applies process and design knowledge and relationships to maximize product design entitlement in manufacturing, and meet requirements with ever increasing efficiency.

How do you use your physics degree in your work?

What has been of great, persistent value is my knowledge of fundamental physical laws; bedrock mathematical training that was essential to my physics degree; and fundamental computational knowledge and programming experience. While my specific training in elementary particle physics does not directly apply to these works, the insight I acquired while studying it - how science works, how mathematics and computation augment physical reasoning and experimentation, and so on - is invaluable.

Tell us about your family.

My wife, Nicola, and I have been together since 1987. She had two children from a prior relationship, and we had two together fairly early in our relationship. I went from single with no kids to married with four in about four years while I finished my bachelor's degree and started graduate school. We are very proud of all of our children.

What are some of your beliefs on how to be successful personally and professionally?

I believe very strongly in commitment: If you say you are going to do something, then do it. My current situation is a testimony to commitment. One of the great joys I get from my kids, or sometimes through my employees, is seeing them strive for something very difficult, being challenged to the point of concession, and finding ways to achieve the desired outcome. Conversely, be measured and thoughtful in the commitments you make, while recognizing you must ultimately commit to something at some point. Be true to yourself, and be prepared to go as far as that can take you.

Contact Information:

Garrick.M.Villaume@seagate.com

Read the complete interview at:
www.physics.edu/alumni/newsletter.html

IN MEMORIUM



Ballman, Herbert F.

Herb Ballman died at the age of 80, in Minneapolis, MN, on June 21st, 2007. He is survived by loving wife of 59 years, Gloria; two sons, Michael and Paul and six grandchildren. Herb worked in the Physics shop for many years before retiring.

Hajicek, James Donald (B.S., Physics, 1961)

James Hajicek, 67, died on March 1, 2007 in Burlington, WI. He was born July 13, 1939 in Fergus Falls, MN. He was a Graduate Fellow and doctoral candidate in Theoretical Physics at the University of Minnesota. He earned his Bachelor's degree in Physics with high distinction. He had a successful career as a software engineer with various companies, including Univac, 3M, GE and Eaton Corp. He held shared patents in advanced mainframe computers and design of MRI equipment. James had also been a stockholder in his father's company, Metro Rubber Parts in Minneapolis. As an entrepreneur, James started two

companies, including Grove Games in Minneapolis and Voree Software in Burlington. He loved meeting new people through his work as a computer consultant and he enjoyed close friendships with many of his clients. James was a deeply religious man and an active pacifist. He was a competitive chess player, political activist, avid reader in seven languages, skilled in two dozen computer languages, affiliated with several high IQ societies and was an expert in religion, philosophy and scientific and natural phenomena. Survivors include his wife, Diane; children Michelle, Allen, John, Sharon; and six grandchildren.

Wallen, Richard A. (Ph.D., Physics, 1972; M.S., Physics, 1968; M.B.A. 1974) Richard Wallen died at age 65 on August 8, 2007. He was formerly from Blaine. He was born May 8, 1942. He is survived by brother, Alan and nieces and nephews. His Masters thesis was titled, "Pair spectrometer detection system" and his Ph.D. Thesis was titled was "A study of the (deuteron, Alpha) reactions on the even titanium isotopes."



Development Update

Kim Dockter

Senior Development Officer for School of Physics and Astronomy

The School of Physics and Astronomy is making exciting new discoveries in biophysics, nanotechnology, condensed matter, NOVA and more! We are proud of the quality of research being done in the School. These discoveries are based on the hard work of our faculty and graduate researchers. However, funding graduate research and education is expensive. Fellowships are a great way for you to support the graduate program in the School of Physics. There are a number of ways for you to set up a fellowship. You can establish a fellowship in your own name, the name of a loved one, or in honor of a former professor or special mentor. Fellowships are important also because they can be used as a recruiting tool helping us obtain the highest quality students.

Our current fellowships are the Anatoly Larkin Fellowship (established in memory of Professor Anatoly Larkin and endowed by a group of his former students and colleagues); the Robert O. Pepin Fellowship, and the Hoff Lu Fellowship. These fellowships helped support four graduate students this year: Tao Hu, Roman M. Lutchyn, Jolene L. Johnson and Shun Wang. You can read more about these fellowship recipients at www.physics.umn.edu/alumni/makeagift/grad.html

These fellowships are a great start, but we still need your help.

There is another motivating factor for setting up a fellowship. Gifts of \$25,000 or more that are designated to endow graduate fellowships may be eligible for matching through the 21st Century Graduate Fellowship Endowment, which matches dollar for dollar the award amount of the fellowship you endow. Additionally, you may pay your pledge over five years and use your company's matching gift program and appreciated securities to fund your endowment. Gifts of appreciated securities are a tax-wise way to give in that you receive a charitable deduction for the fair market value of your stock gift and by-pass the capital gain. Endowing a fellowship fund is a great opportunity to help a fantastic research program. Give me a call at or send me an email. Let's talk about establishing a fellowship in your name!

Take a look at the research highlights on the front page of the new website to find out about our cutting edge research (www.physics.umn.edu).

You can contact Kim Dockter by phone 612-626-9385 or email dockter@umn.edu

Tandem Lab continued from page 1



Bruce Hammer

The view from the lab's parking lot on the evening of the collapse.

complete facility to the Argonne National Laboratory, the Lawrence Livermore National Laboratory and to Shanghai, China. As these proposals, each of which involved considerable logistics, were unsuccessful, the university, at the suggestion of the then Dean R. Staehle, then requested that the facility be operated for applied science.

Professor John Broadhurst of the School of Physics and Astronomy was director of the Laboratory from 1972-1978 when it was operating as a particle accelerator. Since the lab pre-dates the bridge, he recollects that the bridge and the lab always had an uneasy coexistence. "We were having trouble with the building sinking because they were building the bridge and excavating the footings." Broadhurst also said that the wall built by the army corp of engineers to contain sand from the annual dredging of the Mississippi river protected the building from the majority of the debris from the bridge collapse.

Although the accelerator was decommissioned in 1978, the laboratory has been re-purposed and retrofitted in recent years. Roger Rusack's Compact Muon Solenoid APD Long Term Gamma Study was in the building until the accident. Bill Gilbert, electromechanical Systems Specialist, said that the experiment was undamaged, but was moved out in late August. Professor Bruce Hammer of the Department of Radiology, who shares the Tandem Facility with Physics, said that his experiment survived the accident. He has removed his equipment from the lab.

The building still houses accelerator equipment. Plans for Williams Laboratory are under discussion.



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Next Issue: Focus on 1950s alumni

It's back to the fifties for our class notes. 1950s alumni look for a class note mailing in mid-January. Send your Class Notes responses by March 15, 2008 for inclusion in the next newsletter. We can not wait to hear from you!

Send Class Notes, comments and mailing list changes to:

School of Physics & Astronomy
University of Minnesota
116 Church Street S.E.
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