

A letter from the department head



This past academic year has been out of the ordinary. The replacements for Roberta Eich and David Holets, Julie Murphy and Virginia Olson, respectively, were instrumental in helping us survive and perhaps prosper during a very complicated year. We succeeded in promoting Paul Crowell, Shaul Hanany, Yong-Zong Qian,

and Alex Kamenev to full professor. We are awaiting the outcome of two searches, one for a Condensed Matter Experimentalist and the second for a Condensed Matter Theorist and chair holder in the William I. Fine Theoretical Physics Institute.

The major event of the year was an external review of the department. You can see the self-study report at www.physics.umn.edu/about/self-study. The review committee consisted of Daniela Bortoletto, Purdue; Wick Haxton, University of Washington; Arthur Hebard, University of Florida; Andrew Millis, (Chair) Columbia; and Mark Srednicki, University of California, Santa Barbara. We are grateful to the committee for their positive report, which articulated the significant challenges we face with small faculty size, age distribution, diversity, and the limitations of our physical plant in quality and quantity of both research and instructional space. I am personally grateful for the enthusiastic participation of the faculty, staff, graduate, undergraduate students, and alumni. It is up to the University administration to move ahead, hopefully towards a new building.

We had some changes in our faculty. Tony Gherghetta, a particle theorist, accepted a position at the University of Melbourne, Australia. Leonid Glazman, a condensed matter theorist and McKnight Presidential Chair holder, accepted a position at Yale University. Alexander Grosberg, a condensed matter theorist/biological physicist, accepted a position at New York University. Next year we will be looking for suitably distinguished replacements. We would have liked to have retained all three individuals, but being raided in this way speaks to the quality of those who have left. Happily, we look forward to Alex Heger, a nuclear theorist, joining us this summer.

On a personal note, in late April, I had the heady experience of going through the National Academy of Sciences presentation ceremony which coincided with the birth of a second grandchild and the external review.

QuarkNet at CERN

A University QuarkNet team from Centennial Senior High School from Blaine, MN travelled to CERN in Geneva, Switzerland on April 4-6, 2008. The team reported on the preparations of the Large Hadron Collider (LHC), soon to be the world's highest energy particle accelerator. The team documented the LHC activity using video, photographs, and blogs during their visit. They met with and interviewed physicists from around the world.

The LHC is a proton accelerator seven times more powerful than the Fermilab Tevatron, the current high energy champion. It is a 27 km circle of superconducting magnets 100 m underground. Threading through this circle is a beam of 7 TeV protons which collide head-on 40 million times a second at the center of two huge detectors. Physicists will use the data collected to investigate the origin of mass, explore the existence of extra dimensions of space, look for microscopic black holes, and determine the composition of dark matter.

QuarkNet is an outreach program sponsored by the National Science Foundation, which brings particle physics into high schools. The team's blog is available at www.lhscience.org/journalists.



Photo courtesy of Quarknet

Peter Solfest, Jim Peterman, and Jon Schmidt together with their physics teacher and Minnesota QuarkNet leader Jon Anderson

Inside

- 2 Awards & Announcements
- 3 History
- 4 Faculty Profiles: Mandic * Qian * Mans
- 6 Class Notes
- 10 Alumnus Profile: George Gamota
- 11 In Memoriam/ Development Update

AWARDS & ANNOUNCEMENTS

Goldman



Allen Goldman has been named a University Regents Professor. The Regents Professor position was established in 1965 by the Board of Regents to recognize the national and international prominence of faculty members.

It serves as the highest recognition for faculty who have made unique contributions to the quality of the University of Minnesota through accomplishments in teaching, research, scholarship, creative work, or community service.

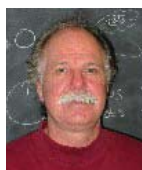
Humphreys



Professor Roberta Humphreys is the winner of the 2008 Mullen/Spector/Truax Women's Leadership Award. She was presented the award at the Office for University Women Celebrating University Women Awards

Program on April 24th. The Mullen/Spector/Truax Women's Leadership Award was established in 1997 to honor former University employees Patricia Mullen, Janet Spector, and Anne Truax who worked throughout their careers to improve the campus climate for women. The award is given annually to women faculty or staff who have made outstanding contributions to women's leadership development.

Jones



Professor Terry Jones received a Horace T. Morse Alumni Award at a ceremony on April 28th. The Horace T. Morse-University of Minnesota Alumni Undergraduate Education Award was designed to recognize outstanding contributions to teaching by members of the

faculty. Recipients become members of the Academy of Distinguished Teachers. The title "Distinguished University Teaching Professor" is conferred upon all recipients.

2008-09 student award winners

Alfred O. C. Nier Scholarship, **Nathan Mirman**
Harry and Viola St. Cyr Scholarship, **Joseph Barthel**
J. Morris Blair Scholarship, **Adam Pieterick**
Jeffrey Basford Scholarship, **Can Zhang**
Edmond G. Franklin Scholarships, **Vanessa Cheesbrough,**
Craig Muckenhirn, Nicholas Eggert, Daniel Brinkman,
David Christle and Ashley Nord
The Hagstrum Award, **David Toyli**
Aneesur Rahman Award, **Martha Boyer and Masaya Nishioka**

Outstanding TA Award, **Andrew Gustafson, Yeonbae Lee,**
Nadezda Monina, Brian Skinner, Feifei Wei, Peter Karn,
Daniel Ouellette and Matthew Weinberg
Robert O. Pepin Fellowship, **Scott Fallows**
Hoff Lu Fellowship, **Shivaraj Kandhasamy**
Anatoly Larkin Fellowship, **Brian Skinner**
You can read more about our award winners online at www.physics.umn.edu/news.

Cattell



Professor Cynthia Cattell was recently named a Fellow of the American Geophysical Union (AGU). The AGU is an international scientific society with 50,000 individuals from over 135 countries. The designation of "fellow" is conferred on not more than 0.1% of all AGU members in any given year.

Bardeen stamp issued



A stamp bearing the likeness of the late physicist John Bardeen was issued in March 2008 by the United States Postal Service. John Bardeen, the first person to win two Nobel Prizes in

the same field, was an assistant professor at the University of Minnesota from 1938-1941. He left Minnesota to act as a civilian physicist at the Naval Ordinance Laboratory in Washington, D.C during World War II. After the war, Bardeen joined Bell Labs where his research focused on electrical conduction in semiconductors and metals, surface properties of semiconductors, theory of superconductivity, and diffusion of atoms in solids.

Faculty named outstanding APS referees

Professors Allen Goldman, Alexander Grosberg, C. C. Huang and Mikhail Shifman were named outstanding referees by the American Physical Society. They were recognized at an award ceremony at the 2008 March meeting. The four faculty members were among 574 selected from 40,000 active referees.

Peloso



Professor Marco Peloso received the 2007-2010 Sofia Kovalevskaja Award from the Alexander Von Humboldt Foundation. The award was established to recognize the outstanding academic achievements of exceptionally promising junior researchers from abroad, and enables them to establish their own groups of junior researchers at research establishments in Germany. The award is valued at 1.65 million EUR.

Peebles to deliver 2008 Misel Lecture



The Third Annual Misel Family Lecturer will be P. James E. Peebles, Albert Einstein Professor of Science Emeritus from Princeton University. The lecture will take place Tuesday, September 23 at 7:00 p.m. in the Tate Lab of Physics. The topic of the lecture will be the study of the related issues to the cosmological tests, the nature of the dark matter, and the origin of the galaxies. Professor Peebles will also deliver the Physics and Astronomy Colloquium on Wednesday September 24, 2008 at 4:00 p.m. For more information see <http://www.ftpi.umn.edu/misel/index.html>.

The Cold War hits Minnesota

"Are you now or have you ever been a member of the Communist Party?" The question, famously asked by the House Un-American Activities Committee (HUAC), conjures up images of black lists, congressional hearings and "naming names." In the 1940s and 50s, events in Europe and espionage scandals made the fear of communism into a juggernaut that helped political careers while wrecking the lives of many innocent Americans. HUAC was born out of a war-time congressional committee established to investigate Nazi activities within the United States. In response to the Cold War, HUAC was made a permanent body focused on rooting out communists who were in positions of influence or power. HUAC targeted two faculty members in the Department of Physics. Here are the stories of two talented men whose lives were changed forever.

Joseph Weinberg



In 1948, Joseph Weinberg joined the Department of Physics as an Assistant professor after completing his Ph.D at the University of California, Berkeley. He was named in a Milwaukee Journal article as a member of a communist espionage ring. Weinberg was accused of being "Scientist X" who gave atomic secrets from the radiation laboratory project at Lawrence Berkeley National Laboratory to communist agents in 1943. During testimony before HUAC the government produced witnesses stating that Weinberg had attended 20 communist party meetings in the Berkeley area. The government could not produce any evidence that he had enrolled in the party. During his time at Berkeley, Weinberg was an instructor and not connected to the radiation laboratory project. He denied all charges claiming a "case of mistaken identity."

In 1949 University President J.L. Morrill cited Weinberg's distinguished teaching and research. He recommended the Regents take no action against Weinberg unless legal proceedings were brought against him. In 1950, a grand jury indicted Weinberg not on charges of espionage, but on three accounts of perjury based on his HUAC testimony. Weinberg testified before the grand jury hearing in August, 1950. In 1951 Weinberg was cited with contempt after he refused to testify further since he had already testified twice. Morrill suspended Weinberg from his duties despite the fact that the contempt charges were dropped. A month later Morrill recommended that the Regents dismiss Weinberg. The grand jury found Weinberg not guilty in 1953, but he was not reinstated at the University despite the verdict. Weinberg left Minnesota, after a short time working at the *Physical Review*, which was at that time being edited in the department. In an interview with the *Minnesota Daily* he expressed a wish to move to another part of the country and get himself out of financial trouble since the expense of his defense was insupportable on an Assistant Professor's salary.

Later in 1953, Weinberg found work at the House of Vision in Chicago where he developed plastic eyeglass lenses and nonfogging visors for the US Air Force fighter helmets. Weinberg's visors were used in NASA space suits. He also developed the first progressive lenses available commercially in the U.S. In 1970, Weinberg was hired by Syracuse University as a Professor. He retired from Syracuse in the 1980s after a distinguished career. He died in 2002.

Frank Oppenheimer



Frank Oppenheimer, the younger brother of J. Robert Oppenheimer, joined the University in 1947. This was his first teaching position after his work in the Second World War on the Manhattan Project. On his arrival, Morrill said Oppenheimer was destined to become one of America's outstanding nuclear physicists. Oppenheimer chose not to pursue nuclear physics research and joined Ed Ney working on Cosmic Ray balloon experiments. In 1947, he received a phone call from a reporter at 1:00 a.m. while vacationing in Nisswa, MN asking if he had been a member of the communist party while he was a graduate student at Caltech in 1937-1940. Despite his denial the article appeared in bold headlines on the front page of the *Washington Post Herald* the next day. Oppenheimer returned to the University, refuted the story and continued with his teaching and research.

Oppenheimer testified before the HUAC in 1949, and confessed that he had lied. He had been a member of the American Communist party while at Caltech. He was interested in left-wing politics while working as a physicist in Europe in the thirties after seeing the effect of fascism on Spain, Italy and Germany. He joined the Party in 1937, attended meetings discussing such topics as raising money against fascism in Spain, and desegregating the public swimming pool in Pasadena. Oppenheimer said in an interview for the Caltech archives, that he left the party in the fall of 1940 because he felt like it was too autocratic and influenced by Soviet policy. During his testimony Oppenheimer denied that he was involved in espionage or knew anyone who was involved in such activities. He refused to name names of his fellow party members.

Oppenheimer's testimony caused a media sensation because he was linked to his older brother, Robert, who would later be called up before the HUAC. Oppenheimer tendered his resignation from the University of Minnesota in June, 1949 citing his wish to not harm the standing of the University and those members of the faculty and administration who had supported him. He moved to Colorado where he taught high school. He joined the faculty at the University of Colorado in 1961. He later designed the Exploratorium in San Francisco. Oppenheimer died in 1985.

FACULTY PROFILES



Jonathan Chapman

Yong-Zhong
Qian

“My laboratory is a supernova,” Yong Qian states matter of factly with a smile. Qian is a theoretical physicist studying neutrino oscillations, the change from one “flavor” to another as a neutrino moves through matter and space. This phenomenon occurs because a neutrino is created in one of three flavor states (or simply “flavors”), with three distinct mass states. Using neutrinos produced by the sun, by interaction of cosmic rays with earth’s atmosphere, and by accelerators and nuclear reactors on earth, a number of experiments have shown that neutrinos oscillate and therefore have mass. Yet, some key parameters characterizing neutrino oscillations are unknown. Qian is particularly interested in the problem of neutrino mass hierarchy, or which flavor of neutrino dominates the heaviest, the intermediate, and the lightest mass state, respectively.

Qian thinks that nature may provide the best source of neutrino data in supernovae. The problem is that due to their weak interaction, a large number of neutrinos are required to extract their properties, and nearby supernovae providing sufficient neutrinos are rare. For example, in 1987 there was a supernova in the Large Magellanic Cloud, a close neighbor to our galaxy, but only a total of 20 or so neutrinos from this supernova were observed on earth. However, Super Kamiokande, a detector in operation now, can detect thousands of neutrinos from a supernova anywhere within our galaxy. Qian wants to find out whether supernovae can provide a novel approach to study neutrino oscillations before the next supernova occurs in our galaxy. Statistically, supernovae should occur once every century in our galaxy, but the Milky Way has not seen one for several hundred years. Qian figures that we are about due for another supernova.

He and his collaborators discovered that near the core of a supernova, neutrinos are so dense that interactions amongst themselves give rise to a new behavior called collective oscillations. In this phenomenon, neutrinos at certain energies form a unified block and experience the same flavor evolution. Further, the formation of such blocks depends on the neutrino mass hierarchy but is insensitive to the other unknown oscillation parameters. These results were obtained from both complex computer modeling and simple analytical studies by Qian and his collaborators, and were later confirmed by other research groups. Qian thinks that the collective oscillations of supernova neutrinos provide “a unique tool to figure out the neutrino mass hierarchy.”



Courtesy of CERN

Jeremiah
Mans

Professor Jeremiah Mans is a member of the Compact Muon Solenoid (CMS) collaboration that will take measurements on the upcoming Large Hadron Collider (LHC). The LHC at CERN recently reached an important milestone, the insertion of “the tracker” into the collider ring. The tracker measures the positions of the particles into the collider ring. Mans described the tracker as looking like an “enormous burrito wrapped in tinfoil” as it was transported in the middle of the night by special trucks to CERN. “Everything that is going into the collider is now below ground. It’s an exciting time.”

The LHC is one of the largest physics collaborations ever, including universities and government laboratories from around the world. It will be the world’s largest and highest energy particle accelerator. Mans jokes about being part of such a large collaboration. “It never seems like there is anyone around when you need to get some work done.” Since the collaborators are spread out around the world in various locations they are rarely in the same place at the same time except during meetings. “I spend a lot of time on the phone in conference calls” and he points to a second clock on his wall which tells him the time at CERN so that he knows when to expect to be able to connect with colleagues at CERN.

Mans’s work with CMS is in the design, construction and maintenance of the firing electronics for the hadron calorimeter which will measure the energies of quark-containing particles. The calorimeter is built and has been placed in the ring, but is still subject to tweaking. Mans is working on a project running technical benchmarks on the software which will operate the calorimeter. The physicists need to first simulate what they expect to discover in order to plausibly extrapolate what would constitute ground-breaking physics. Mans predicted that the first results seen from the LHC are not going to be groundbreaking. “We are going to be re-discovering the standard model,” he says “That way we can sift out apparatus effect when the collider is up and running.” Mans stresses the need for physicists to be careful. “There are some indications from cosmic ray data that previous extrapolations for protons will not work at LHC energies. We will need to come up with new extrapolations when the collider is running.”



*Vuk
Mandic*

Professor Vuk Mandic is a new faculty member in the School of Physics and Astronomy. He is an observational cosmologist involved in the search for gravitational waves with LIGO (Laser Interferometer Gravitational-wave Observatory.) Gravitational Waves were predicted by Einstein's Theory of General Relativity, but have yet to be observed in the natural world. They are expected to be produced in some of the most violent events in the Universe, such as mergers of black holes or neutron stars. Moreover, gravitational waves are expected to be created a fraction of a second after the Big Bang, so they could provide a glimpse of a much younger Universe than what is possible with other observational approaches.

LIGO has build three laser interferometers, designed to search for gravitational waves. With suspended interferometer mirrors separated by 4 km, these interferometers are sensitive to distance fluctuations at the level of one ten-thousandth of the proton size, sufficient to detect some of the strongest sources of gravitational waves. Two such interferometers are sharing the same facility at Hanford, WA, and the third is located at Livingston Parish, LA.

Mandic, his students, and post-docs focus on the searches for the stochastic gravitational-wave background, one of four signal types being sought by LIGO (the other three being bursts, inspiraling coalescences, and periodic sources). To minimize the effect of local disturbances at the LIGO observatories such as seismic noise, wind, traffic etc, these searches are performed by cross-correlating the data streams from different interferometers.

Last January LIGO announced new upper limits on the amplitude of the stochastic gravitational-wave background. This result was based on one year of data LIGO acquired operating at its designed sensitivity and it is the most sensitive limit to date. This result is beginning to constrain some of the theoretical models, such as models of cosmic (super)strings. Future LIGO runs, with improved sensitivities, will continue to probe such models, helping theorists hone their theories to the realities of nature.

Mandic is also involved in development of the germanium detectors for the Cryogenic Dark Matter Search (CDMS) experiment, which is taking place in the Soudan Underground Laboratory. Mandic's group is focusing on increasing the size of CDMS detectors, with the goal of simplifying the design of a ton-scale germanium-based dark matter search experiment. Such an experiment is expected to probe some of the most interesting theoretical models of dark matter. Mandic's group is preparing a facility designed to test and characterize these germanium detectors.



LIGO in Washington State. The "arms" of the enormous interferometer are four kilometers long. LIGO is searching for gravitational waves.



Cryostat in the e Cryogenic Dark Matter Search facility in the Soudan Underground Laboratory. A cryostat detector is in the research and development phase.

CLASS NOTES

2006

Arun S. Madhavan (B.S., Physics/Math, 2006) I am a graduate student at Iowa State University in Ames, IA in high energy astrophysics. I will be doing my Ph.D. with VERITAS, a gamma ray astronomy experiment located in Arizona. Grad school is tough with the 12 hour work days, endless grading, and homework problems that do not make any sense unless you were born in Hilbert space. My old professors at the University of Minnesota did a great job of preparing me. I am hoping to pursue a research career after grad school. Given that the average Ph.D. student here takes five years to graduate, maybe I will decide to do something else!

2005

Kyungmo Koo (B.S., Astrophysics, 2005) I am a graduate student at the Astronautics and Space Technology Division of the University of Southern California (USC). I am also a current member of the American Institute of Aeronautics and Astronautics. Our program is one of few pure-space-focused engineering programs in the U.S., which offer M.S. and Ph.D. degrees in astronautical engineering. My major at the University of Minnesota has significantly contributed to my career in that I gained experience and techniques from my undergraduate study to deal with scientific problems with limited resources. At USC, I am enjoying courses such as spacecraft system design, space environment and spacecraft Interactions, and spacecraft propulsion. I am interested in doing innovative research in astronautics and space technology. I miss my undergraduate life at the University of Minnesota.

2003

Luke A. Corwin (B.S., Physics, 2003) In April, 2007, I won Second Place in the annual Ohio State Hayes Graduate Research forum for College of Mathematical and Physical Sciences category. I plan to graduate with my Ph.D. by the end of 2008.

2002

James P. Crumley (Ph.D., Physics, 2002) I am getting tenure at the College of St. Benedict / St. John's University. I will be promoted to Associate Professor next year. In December, my wife Dana gave birth to our third child (and first daughter), Teagan. We have two boys, Declan (4) and Gavin (2).

1998



Brian P. Borovsky (Ph.D., Physics, 1998) I am a faculty member in the Physics Department at St. Olaf College. I teach a wide variety of classes for both physics majors and non-majors. Some recent highlights include quantum mechanics, electronics with computer interfacing, and advanced laboratories. In the fall of 2008, I will teach a new course that takes a look at the development of modern science since the sixteenth century, combining lab work with historical readings and philosophical inquiry. This course will be team-taught with a member of the philosophy department. We hope that this course, to be called the *Science Conversation*, will expand into a year-long general education program for sophomores. My research program is based on campus and investigates the fundamental origins of friction. My research students and I use proximal probes and quartz crystal microbalances to study the frictional properties of organic monolayer films applied to high-speed microscopic contacts. The primary application of this research is to improve the performance and

reliability of micro-machined devices, especially those with moving and rubbing contacts. Such devices have shown great promise in the areas of communication and medicine, but have yet to overcome significant technical challenges related to surface forces. My wife, Tory, and I live in Northfield, Minnesota. We are now expecting our first child. We really enjoy living in Minnesota. Tory is originally from Chapel Hill, North Carolina, so the winters are a real challenge for her!

R. David Dikeman (Ph.D., Physics, 1998) I was recently named Chief Scientist of Lockheed Martin, Hawaii. I work on real-time signal processing application for the Department of Defense including applications for Space Based Radar, Undersea Warfare and Missile Defense. I am married with two boys, David (3) and Hayden (1).

Henley S. Quadling (Ph.D., Physics, 1998) I joined the physics graduate program in 1991. I had left South Africa as a draft dodger (and proud of it), and was officially AWOL until the apartheid regime ended. In my first year of grad school, the Twins won the World Series and Minneapolis hosted the Superbowl! My years in physics at the University of Minnesota were wonderful. I worked with Tom Walsh, who is the most laid back advisor in the observable universe. In the '90s, massively parallel supercomputers were all the rage, and solving difficult computational problems was my main interest. Lattice QCD provided a suitable challenge, but after graduating I decided to apply my skills in other fields. After four years of consulting/contracting, I co-founded D4D Technologies (www.d4dtech.com) in Dallas, Texas, along with my twin brother. We are introducing our first product to the marketplace. It has taken us four years from concept to final product. Our first goal was to enable to create a dental crown (or inlay, veneer, etc..) in a single visit, using a StarTrek-like intra-oral laser 3D scanner, sophisticated design software and precision ceramic machining. Lasers, MEMS devices, optics, custom video cameras, sophisticated algorithms, 3D visualization/animation, automation, motion control and advanced ceramic machining, are examples of entire fields we had to master so that the final restoration fits within a 50 micron tolerance. We are always on the lookout for more physicists who would like to defect from the Ivory Tower, especially as we become much more ambitious in our technology and look to branch out into other medical applications. This a shameless plug and invitation to email me at hquadling@d4dtech.com. The education and problem solving experience I gained in the University of Minnesota physics graduate program is the best!

1994

Scott A. Anderson (B.S., Physics, 1994) The second location of my Alignment Yoga in Madison, WI opened in May. This location will better serve the campus community of Madison, and provide certified alignment yoga teachers an inviting space to teach. See more information at alignmentyoga.com

1976

Robert D. Furber (Ph.D., Physics, 1976) I left the campus in the 1970's and was last there for a brief visit almost eleven years ago. Most of the people I knew may have retired by now. I remember Earl Peterson very well. I noted that he just retired, but will continue to direct the Soudan Laboratory. Earl has a great sense of humor. Sandy Smith, the former secretary for the department, and I have remained good friends. We exchange messages regularly. **Wes Peterson** (Ph.D., Physics, 1973) is one of my "classmates". We keep the

telephone and internet links busy, and get together whenever possible. In case this is not well known there at the department, I want to be sure to tell you all that Wes is now a full professor at ETH in Zurich. I had the pleasure of visiting him last August. I found his work in general relativity (among other subjects) most fascinating. I have been retired since 2000. I would like to spend more time on physics. I am a member of the Southern California Federation of Scientists group in this area. We offer occasional lectures on scientific and technological subjects of interest to the public. We get together on a regular basis to exchange ideas. We are politically left-leaning. Three of us expect to publish an article on the future of nuclear power in a forthcoming issue of the "Monthly Review". The University of Minnesota's School of Physics and Astronomy enjoys a very well deserved reputation. I never fail to brag about my learning experience there. Please extend my best regards to all.

1975



Joan Marie Verba (B. Physics, 1975) I am currently a professional novelist and publisher with a new novel coming out in June 2008, *A Countdown to Action!* that is an officially licensed Thunderbirds novel. I am the author of the books *Voyager: Exploring the Outer Planets* and *Boldly Writing*, as well as numerous short stories and articles. I have

run FTL Publications, in Minnetonka, MN, which publishes science fiction, fantasy and mystery genre titles, for over 10 years. More information can be found at <http://www.sff.net/people/Joan.Marie.Verba/>



1971

Robert D. Gehrz (Ph.D., Physics, 1971; B.A., Physics, 1967) I am currently a Professor of Physics and Astronomy and Chairman of the Department of Astronomy at the University of Minnesota. My wife, Sue, and I live in Falcon Heights, MN. Sue retired after 12 years as Mayor. Our first grandchild, Angeline, was born on December 10, 2007 in Portland, OR. Read about our children and other hobbies at: <http://webusers.astro.umn.edu/~gehrz/bio.html>

Stephen Lindfors (B., Physics, 1971; M.S. Comp. & Info. Sci, 1976) My APL interpreter, a four-year project, was written in Visual Basic .Net and processes all the standard APL operators. Unlike most APLs, it doesn't use the non-ASCII characters. It uses only the printable ASCII characters for the operators. It consists of 24,000 lines of Visual Basic source code. Features include complex arithmetic, user-defined functions, trig and hyperbolic functions (real and complex), and matrix operations, including matrix inversion. The latter can be used to solve simultaneous equations. Data types accepted include integer, real (double precision accuracy), character and complex. The product is easy to install and works on most Windows systems. A few free copies of the install disk and printed user guide are available to physics faculty, on request. Contact me at stevl563@netscape.net

1968

Horst L. Truestedt (B., Physics, 1968) I did research in Physics while working at 3M (while still attending IT). I decided to go into computers. I joined IBM in 1968 and worked there for 30 years. At the end of my time at IBM I was a computer architect and specialist in computer storage. Since leaving IBM, I have my own consulting company called TrueFocus, Inc (www.truestedt.org). TrueFocus

specializes in consulting in storage and training in Fibre Channel, SAS, and SATA. I have provided Fibre Channel training around the world. I also help my daughter with an art promotion business (www.printsandperspectives.com). On the personal front, my wife and I have been married for 41 years this year. We have two lovely daughters (both attended the University of Minnesota), four grandsons and one princess.

1964

James F. Walker, Jr. (Ph.D., Physics, 1964; M.S., Physics, 1961; B.S., Physics, 1959) I married my wife Elaine in 1959. We have three children and six grandchildren including 12-year old triplets. I am active in two musical organizations, the Valley Light Opera and the Heritage Pops Orchestra. I had a postdoc at New York University 1964-1966 and another postdoctoral position at MIT from 1966-1968. I joined the Department of Physics and Astronomy at the University of Massachusetts/Amherst as a faculty member from 1968-2003. I was appointed Dean of the Graduate school at University of Massachusetts from 2001-2003. I have been retired since 2003. I am currently a part-time post-retirement associate dean. My favorite memories from my undergrad years were associated with the marching band. I had to make many arrangements with the various university offices because I was band manager. I even had to chalk the field house we used for practices. While in grad school, I was married and raising children. I have a number of favorite memories of my professors. Mark Bolsterli taught quantum mechanics. He always lectured with a cigarette in one hand and chalk in the other, and he never got them mixed up! Ed Hill, who taught math physics, was very organized but a little above most of us. Steve Gasiorowitz took field theory while he was writing his book.

1963

Charles D. Kavalovski (Ph.D., Physics, 1963; M.S., Physics, 1959; B.S., Physics/Math, 1957) I am married with four children. I am semi-retired. My activities include gardening, fishing and birding, trying to understand string theory, following the development of the latest (and proposed) accelerators and what they will tell us about super symmetry and cosmology. After working as a post-doc at several different institutions and somehow managing a full professorship by age 35, I took a 90-degree turn (on a sabbatical, of course) to pursue my interest in music. To make a long story short, I spent the next 30 years as principal horn, French horn, with the Boston Symphony Orchestra. Now in my "retirement," I have been attempting to catch up, for my own amazement and amusement, on the phenomenal growth in particle physics, and the marvelous convergence between cosmology and particle physics that has ensued. It looks like it is back to the books for me! My favorite memory was watching, like the proverbial "mouse in the corner" in Norton Hintz's office, Norton and Ben Motieson working feverishly at the black board, culminating with Norton biting completely through the stem of his ever-present pipe! My favorite professors were Norton Hintz who taught "modern physics", Dr. Tennie who taught "quantum physics" and Al Nier with his marvelous irreligious attitude about the niceties of mathematical detail.

1961

Earle Kyle (B. Physics, 1961) I am going into my seventh year as a NASA/JPL Solar System Ambassador (SSA) working with school systems, scout troops and civic organizations in Minnesota and upstate New York to increase the number of students pursuing careers in science and technology with the mission to inspire the next generation



Charlie Warner

of space explorers. My primary focus is on robotic and manned missions to Mars. As one of the aerospace engineers who helped design the space ships that took men to the moon on the Apollo program, I like to tell the kids what great challenges lie ahead for them as we embark on an even greater adventure to send men and women to the planet Mars. I am also the president

of TCC Systems, LLC providing consulting services to high technology start-up companies looking to expand their global marketing activities. I have been working with the Infotonics and Rochester Institute of Technology's Lennox Center high technology incubators in New York and operations in Pennsylvania, Minnesota and New Mexico in the areas of microelectronics, biomedical systems, energy, and software development. Email: SolarAmbassador@yahoo.com or EFKyle@aol.com; www2.jpl.nasa.gov/ambassador/profiles/Earle_Kyle.htm.

1959

George A. Champine (M.S., Physics, 1959; B.S., Physics, 1956; Ph.D., Business Administration, 1975) I have been married for 52 years. We have three children and seven grandchildren. I volunteer at the Harvard Astronomy Department scanning 500 astronomy plates from 30 telescopes to put on the internet. I also teach computers to senior citizens. I was in the computing industry for 46 years in engineering and advanced development with Univac, Digital Equipment, Compaq and HP. I have published four books. At Univac, I worked on software development for world's first airborne computer and software development for world's first digital missile guidance system. At Digital Equipment, I contributed to the first workstation system with a mouse, with a high resolution graphics system, and with a fiber optics communication channel. While at Digital Equipment, I helped develop the first large scale distributed workstation system at MIT. I remember using the machine shop to build low temperature apparatus for liquid helium and superconductivity. I was an adjunct professor at MIT, University of Minnesota, University of Texas-Austin, and the University of Massachusetts. My favorite professor was Ed Nye. My favorite courses were physics from A.O.C. Nier, and electronics from M. Blair.

Raymond J. Kirk (B.S., Physics, 1959; M.S., Electrical Engineering, 1961) I have been married for 51 years to my wife Lois. We have two children. I spent 28 years with Honeywell Systems and Research Center in Minneapolis working on design and development of avionic systems, space systems, and weapon systems. I had fun classes and tough tests at the University of Minnesota. I worked with Dr. Winckler and Dr. Kellogg in building experiments for space launches. My favorite professors were John Winckler, Ed Ney, Al Nier, Paul Kellogg, Morris Blair and J. Valasek.

William D. Miller (B.S., Physics, 1959) He worked for thirty years for Unisys. He spoke a lot about E-days. William passed away on September 4, 2006. (This Class Note submitted by his wife Helen.)

Gerald A. Pattison (B.S., Physics, 1959; M.S., E.E., 1967) I have been married twice resulting in five children and four grandchildren to date. I have retired from corporate life. I spend my time traveling, remodeling our home, skiing, fishing, swimming, golfing and handling our investments. I spent eight years in R&D at Univac on memory devices and radiation monitoring devices. I designed memory for the first Mars Lander at Honeywell. I designed computer hardware and memories at

EMR and Fabritek. I spent 26 years at Physical Electronics managing engineering groups for surface analysis instrumentation. During an atomic physics class, a graduate student was setting up an array of set mousetraps inside a 4'x4' chicken wire cage, and placing ping-pong balls on each trap. Before he finished and closed the door, he bumped one of the mousetraps too hard, and ping-pong balls bounced off each other and flew all over the classroom- demonstrating the "atomic reaction." I had a number of favorite professors. Dr. Frye taught freshman physics. He loved teaching and it showed! Dr. T. Blair was always working on the Van de Graff or linear acceleration. His skin tone and hair looked like he had his finger in a socket too often. He was a great guy though.



Donald E. Young (Ph.D., Physics, 1959; M.S., Physics/Math, 1951) I have been married for 60 years to my wife Billie. We have three children and seven grandchildren. I was a Communication Officer in the infantry during WWII. After the war I did my graduate studies while working at the research

laboratory of General Mills. After earning my doctorate degree in 1959, I joined Midwestern Universities Research Association (MURA) with the mission of developing high-energy proton linear accelerators (linacs), extending the experience I had acquired at the University. I then joined the National Accelerator Laboratory (now Fermilab). As one of the first employees at Fermilab, I was put in charge of building the 200-million electron-volt linac injector for the synchrotron accelerators to follow. I retired in 1990 as a Scientist Emeritus. I am currently a consultant in medical accelerator design, and in defense-related accelerator design; president of the Particle Accelerator Corporation and a Fellow of the American Physical Society. My favorite memories included the physics picnic, the linear accelerator group, the poker club, fishing and swimming outing with **John Williams**, trout fishing in Wisconsin with **Ed Tucker** (Research Associate '50-'55), luncheons and late night accel operation with **Lawrence Johnston** (Faculty '49-'61) and **Donald Swenson** (Ph.D. '58, M.A. '56), and auto repair with **Eugene Lampi** (Ph.D. '50, M.S. '41). My favorite courses included quantum mechanics, geometrical optics, mathematical physics, atomistics. My favorite professor was E.L. Hill

1958



Diane (Young) McAllister (B.S., Physics, 1958) I have been married to Jerry R. McAllister (B.A., 1957) for 50 years. We have three sons and seven grandchildren. Oldest granddaughter is a member of the U.S. Army's 82nd Airborne Division currently serving in Iraq (see photo).

After graduation, I worked for 18 months at General Mills Research and Development working on the APSAC (Automatic Positioning Something or other), which was a forerunner of the GPS. This computer camera would take star sightings and then calculate to where on earth it was. It only worked on clear nights. I quit work to have babies. I met my husband in Physics 50. For the first time ever, I cut class to have coffee with him. My favorite course was... what else? Physics 50!

1957

Morton K. Brussel (Ph.D., Physics, 1957) I retired from the University of Illinois in 1995 as a professor of physics. I have since concerned myself mostly with civic affairs, against U.S. wars in Yugoslavia, Afghanistan, Iraq, and attacks of human rights in the United States and elsewhere (Guantanamo). I belong to local activist group

called AWARE (anti-war-anti-racism-effort) in Urbana. My wife Phyllis and I have two sons and two grandchildren. I have travelled and worked a lot in France (Saclay and Orsay laboratories). One of my avocations is to promote Le Monde Diplomatique, a serious independent monthly of the left, and whose General Assembly of "Amis" meets each year. My health has been pretty good so far, allowing long day hikes into mountains every year. Backpacking however, which requires a good back, has been abandoned. Music, reading, writing, emails, and the day-to-day affairs of life take up most of my time. Perhaps this note can act as an incentive for others of my vintage to send in their notes as well. My only contacts with old classmates recently have been with **Louis Nidus** (M.S., Physics, 1952), who dropped into Urbana last year, and **Tom Scolman** (Ph.D., Physics, 1956), with whom we have exchanged holiday greetings for years. The UIUC physics department continues to be a welcoming and stimulating part of my life here.

1956

Walter H. Johnson (Ph.D., Physics, 1956; M.S., Physics, 1952; B.A., Physics, 1950) My wife and I will be celebrating our 50th wedding anniversary in June. We have two sons and two grandchildren. Since I retired in 1993 we have done a lot of pleasure travel. I was a member of the University of Minnesota Physics faculty for 34 years. Together with research on atomic mass measurements using a mass spectrometer, I enjoyed teaching introductory courses especially the demonstrations. I did about 10 years of administrative work in the Institute of Technology. Team teaching the first two offerings of the introductory physics course for the IT Honor program with Dan Dahlberg is my favorite memory. Four professors were my favorites. Al Nier, with his 8:00 a.m., five days a week Theoretical Physics. Nier also served as my grad advisor. John Williams taught the first physics course I took, which convinced me that I really did not want to major in chemistry. Cliff Wall and Ed Hill were also outstanding instructors. Learning electronics from Otto Schmitt of the Schmitt circuit was an experience. It was a wonderful education.

Richard E. Malenfant (B.S., Physics, 1956) My wife Darlene and I have four children and eight grandchildren. I am an instrument rated single and multi-engine commercial pilot and flight instructor. I did nuclear critical experiments at Oak Ridge National Laboratory and the Air Force Office in Nuclear Research. I was at Los Alamos National Laboratory from 1961-1996. I had assignments from Los Alamos to the Department of Energy, (DOE) Office of Military Application and to the Office of Non-Proliferation and National Security. I also served as a consultant to Los Alamos, the DOE, and Sandia National Laboratories. My favorite course (but far from the easiest) was Nuclear Reactor Engineering out of the school of Chemical Engineering taught by Herb Isbin. My favorite courses in physics were the Modern Physics taught by Blair and Quantum Mechanics taught by John Williams. A.O. Nier was the Chairman of the Department. I also enjoyed a course in the use of the slide rule-- a capability now forgotten by the present generation!

Theodore T. Scolman (Ph.D., Physics, 1956) I married my wife Edith in 1955. We have two children. I retired in 1989. We moved from New Mexico to Arizona in 1992. I went to Los Alamos National Laboratory, right out of school. I spent my whole career there mostly in underground nuclear weapons testing at the Nevada test site. I did a lot of domestic and foreign travel. The department was a tight knit community of graduate students and faculty. My favorite memories are of the department picnics and the journal club. My favorite

professors were Al Nier who taught theoretical physics, Ed Hill who taught mathematical physics, and John Williams who gave the course in modern physics.

1955

Nahmin Horwitz (Ph.D., Physics, 1955; M.S., Physics, 1951) I entered the department in fall 1950 after getting B.S. degree at Western Reserve. John Buchta was the department chair. I had a high regard for Dr. Buchta, but the department at that time had little to be proud of. It had recently fired Frank Oppenheimer because of a "communist connection", and was soon to fire Joe Weinberg. Weinberg was being harassed by the House UnAmerican Activities Committee. He was cited for contempt, but never convicted. The lack of conviction did not seem to concern the Physics Department. I enjoyed my five years as a graduate student. I enjoyed classes with Nier, Hill, Williams, Teng, Valasek and others. Critchfield was there. My advisor, Ed Ney, was pioneering the use of helium filled balloons to send emulsions to top of atmosphere. He played prominent role discovery of the heavy component of primary cosmic radiation. Ney knew Ed Lofgren who was a former University of Minnesota Physics faculty member. Lofgren was in charge of building the Bevetron at the Lawrence Laboratory at U of California, Berkley. My first job was there. Berkley and the Bevetron was the center of the universe in high energy physics at that time. It was a wonderful and exciting place to be. After five years, I accepted a faculty position at Syracuse University where I remained until retirement in 2004. During part of that time I worked as a member of the CLEO collaboration centered at Cornell. That involved collaborating with a very productive group from University of Minnesota who are still part of the collaboration. I have a wife and four children, none of whom I could convince to become physicists, however, one daughter has gone into computer science. I have fond memories of a pleasant experience at Minnesota.

1950

Clark E. Johnson, Jr. (B.S., Physics, 1950; M.S., E.E., 1961) My undergraduate advisor was Al Nier. Physics at the University of Minnesota at that time was focused on nuclear physics, but my interest was in solid-state phenomena. In 1950, I became one of seven physicists in a sea of chemists at 3M's Central research Laboratory. 3M was just entering the magnetic tape business. I spent nine years working on a system for recording television. RCA was working on the hardware-side, and we were doing the recording tape component. Central Research moved out to what is now the campus on I-94. For the building dedication, a direct color television transmission from RCA/NBC in New York was planned. The program, recorded on 3M "Scotch tape" lasted five minutes and consumed 5000' of 1/2" tape. Enormous reels of tape running at 200 inches/second were not a practical product. In 1954 William Fuller Brown, Jr. arrived in 3M's physics department. He shortly left 3M to teach at the University of Minnesota in the Electrical Engineering Department. I entered graduate school in 1957 with my former boss, Bill Brown as my advisor. I left 3M in 1959 to start a high-tech company--the first of several. All of my high-tech companies have relied on some aspect of science and technology that I learned at the University of Minnesota.



George Gamota: A biographical sketch

(Ph.D., Physics, '63; B.S. Physics, '61)

I went to the University of Minnesota and studied solid state physics, in part because I found a professor whom I liked, Michael Sanders, who offered me a part-time job in his laboratory. I also was inspired by Ed Nye. He was a bit crazy but his teaching was excellent. I received my Bachelor's degree in 1961. I also married my wife Christina, that year.

My M.S. thesis was to design and build a He³ cryostat to be able to study the behavior of materials at very low temperatures. The cryostat was built to potentially use it to study nuclear materials that might become useful for targets. I did the work with Chester Hwang who was a post doc in the nuclear group. The other students at Mike's lab were **Arnie Dahm** (Ph.D. '65), **Jim Levine** (Ph.D. '62, and M.S. '60) and **Jan Northby** (Ph.D. '65). I met **Marty Fricke** (Ph.D. '67 and M.S. '64) and **Carlos Avery** (Ph.D. '67, M.S. '65; B.S. '60) while a graduate student.

My wife and I moved to the University of Michigan at Ann Arbor in 1963 and I finished my Ph.D. there. My thesis studied the movement of newly discovered microscopic charged vortices (analogous to smoke rings in the air) in superfluid helium. I continued another year at the University of Michigan as a post doc, teaching and working with new graduate students, getting ready for the arrival of our third son, and looking for a job. I was offered a position at Bell Laboratories at Murray Hill, NJ.

Working at Bell Labs during the late 60's and early 70's was very exciting to me as a young scientist. Not only was I mingling with the pioneers in solid state physics but also Nobel laureates from all over the world. My research at Bell Labs eventually expanded to include superconductivity. About that time, I also became interested in science policy and science in politics. After a short term assignment at the state level in New Jersey, I took a two year sabbatical from Bell Labs to take a job at the Pentagon. After two years, I was ready to go back to Bell Labs. I had a political job which changed when President Ford lost the election.

In 1980, I decided to go back to Ann Arbor. I accepted the positions of Director of an interdisciplinary institute



The Gamota family in 2007.

and full professor of physics. Fortunately, I ran into many old buddies from graduate school, both from Minnesota and Michigan. The most important connection was with Marty Fricke, who was a VP at Science Applications. He hired me as a consultant, as we both won a contract to start what eventually became a U.S. government program in benchmarking foreign science and technology.

In 1986, I became president of Thermo Electron Technologies Corporation in Waltham, Massachusetts. I left my industrial post in 1996, and started full time consulting, using my firm, Science & Technology Management Associates, as a base. When the Ukraine became independent, I began helping them start up small hi-tech companies. In 1998, my work with the scientists from Chernobyl was cited as one of the benefits of American help. Many Ukrainian scientists and engineers lost their jobs due to the closing of the nuclear plant, and my small business incubator helped them start new lives. For my work in Ukraine, I was honored by the Ukrainian National Academy of Sciences and was made a foreign member.

In parallel to my work in the Ukraine, I continued my benchmarking of foreign science and technology for the U.S. government. One of the reports in 1996 was on nanotechnology and was later used by President Clinton to start the National Nanotechnology Initiative.

In October 2007, I had the privilege of being invited to a Mike Sanders' 80th Birthday celebration. Many of his Minnesota, Twin Cities (UMTC) and Michigan (UM) students came. A photo of the students/postdocs who came is shown below.

I still go to Washington and do my foreign technology benchmarks, but I do not travel as often. I concentrate more on family and playing with my grandkids. My wife and I have three kids and four grandchildren.



Top left: Steve Whitmore (UMTC), John Magerlein (UM), Jim Levine (UMTC), Stu Ryan (UM), Jan Northby (UMTC), Gary Ihas (UM), and Steve Forrest (UM). Bottom left: Arnie Dahm (UMTC), George Gamota (UMTC), Mike Sanders (UM & UMTC), Gabby Weinrich (UM), and Christie Zipfel (UM). (See full article at www.physics.umn.edu/alumni/)

**Keith, Ronald Loren**

Ronald Keith died on August 24, 2008 at age 55. Ron was an Associate Professor of Physics at Emporia State University in Emporia, KS. Ron was in charge of ESU's Peterson Planetarium. He was also a gourmet cook. You can read more about Ron in these links.

www.emporia.edu/news/ron_keith.htm

www.emporia.edu/saf/news/fdnews.html

**Mergen, John Curtis**

John Mergen died at the age of 52 in Richfield, MN on March 27, 2008. He is survived by mother, Bonnie; and sister, Cheryl. John earned a Bachelor of Physics,

B. of S. in Astrophysics and Master of Science degrees from the University of Minnesota. He loved the stars and was selected out of over 3,000 applicants for a three year NASA research grant to study comets in National Observatories across the U.S.

Ward, Shirley Ann

Shirley Ann Ward died at the age of 72 in Blaine, MN on April 22, 2008. She is survived by her daughter, Jacki and two grandchildren. Shirley worked in the Theoretical Physics Institute as an administrator from the time of the Institute's creation in 1987 until her retirement from the University.



Development Update

Kim Dockter***Senior Development Officer for School of Physics and Astronomy***

As director of external relations for the Institute of Technology and the School of Physics and Astronomy, I have had the pleasure of meeting many alumni and friends and have been impressed by your commitment and support. Your support comes in a variety of forms, including mentoring our students, attending lectures and events, speaking to classes, providing financial donations, and more. Your contributions to, and involvement with the department and our students, is essential to our ability to provide a world-class physics education and conduct cutting edge research. We are most appreciative.

I would like to highlight a generous and rather unique contribution recently given to the Physics department. Dr. Leonard Burlaga, a 1965 Ph.D. Physics graduate, recently received the Arctowski Medal. The medal was presented to Dr. Burlaga by the National Academy of Sciences Council to honor his outstanding contributions to the study of solar physics and solar-terrestrial relationships. The medal, established through the Henryk Arctowski Fund by a bequest of Jane Arctowski in honor of her husband, Henryk, has been presented since 1969 and is given to one person every three years.

In addition to the medal, an award of \$60,000 is provided to an institution of the recipient's choice.

In 2008, the award was presented to Dr. Burlaga "for pioneering studies of the magnetized solar wind plasma from 0.3 to 102 AU, including the recent crossings of the Voyagers of the heliospheric termination shock and their entry in the heliosheath." Dr. Burlaga has generously directed his prize of \$60,000 to endow a fellowship that will support a full-time graduate student enrolled in the School of Physics and Astronomy working toward a graduate degree and associated with the space physics group. The fellowship award will be matched dollar for dollar by the University of Minnesota's Presidents Scholarship Matching program, thereby doubling the impact of Dr. Burlaga's gift and support for the student recipient.

The generosity of Dr. Burlaga and so many alumni and friends of the School of Physics and Astronomy have helped us to provide a great education to many young people and to advance our mission of research. On behalf of the students, faculty, and the state of Minnesota, we thank you.

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



Nonprofit Org.
U.S. Postage
PAID
Minneapolis, MN
Permit No. 155

Next issue: Focus on 1960s alumni

We will highlight our alum from the 1960s in the fall edition of the newsletter. 1960s alumni can expect a class notes mailing in July. Send your Class Notes responses by September 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:
Jenny Allan or Julie Murphy
School of Physics & Astronomy
University of Minnesota
116 Church Street S.E.
Minneapolis, MN 55455**

Allen M. Goldman, Head, School of Physics & Astronomy
Julie Murphy, Managing Editor
Jenny Allan, Editor

The School of Physics & Astronomy is a department of the Institute of Technology. The opinions expressed in this newsletter do not necessarily reflect the official policies of the Board of Regents or the University administration.

The University of Minnesota is an equal opportunity employer.

Change Service Requested