

# NERSNotes

FALL 2007

The Newsletter of  
the Department of  
Nuclear Engineering and  
Radiological Sciences

## Charging into the Future with Plasma Science

The Plasma Science and Technology Laboratory (PSTL), a new fully equipped plasma research facility, has been established in Cooley by NERS Associate Professor John Foster. The laboratory will be used to conduct low-temperature plasma science and engineering research. The PSTL will focus on three areas: space propulsion, materials/environmental plasma processing, and energy conversion. These topical areas are connected to the physics of low-temperature plasmas.



Iron thruster discharge chamber designed and built by a U-M student working in the PSTL this summer.

Broadly speaking, a plasma is a quasi-neutral soup of electrons, ions and neutrals. Plasmas are capable of collective motion due to the long-range electrostatic coupling between charged particles. To maintain this highly energetic state, the temperature of at least one of the species must be sufficiently large to prevent recombination via the mutual attraction between unlike charged electrons and ions. It has been said that 99 percent of the known universe exists in this fourth state of matter, and we happen to live in that rare place where plasmas are not a common, natural occurrence. On earth's surface we seldom see naturally created plasmas, save for lightning strikes and the Northern lights. By virtue of its very existence, a plasma state is energetic in comparison to a simple hot gas. It does not

require much of a jump in imagination to conceive of a multitude of applications for plasmas. The fact that a plasma is an ensemble of charged particles means that it can be manipulated by electric and magnetic fields. Applications of focus in the PSTL utilize plasma conditions that are far less energetic than plasma conditions that exist in the sun. The plasmas under study are characterized as nonthermal. Here the various species in the plasma (electrons, ions, and neutrals) are all at different

temperatures. In fact, in these so called low-temperature or "cold" plasmas, the electron temperature is considerably higher than the ion or neutral gas temperature, in contrast to the solar plasma where the electrons and ions are in thermal equilibrium and the gas is fully ionized. This nonthermal attribute of low-temperature plasmas make them quite useful in industrial applications. Because the thermal energy is contained in the ensemble of very lightweight electrons, the heat content of such a plasma is not sufficient to melt materials in contact with it. For example, a silicon wafer can be bathed in a low-temperature plasma without melting the wafer. Silicon wafer etching for computer chip fabrication is done with low-temperature plasmas. With a cold plasma we

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Guess who  
turns fifty  
next year!

See “Note from  
the Chair” (p. 2)

# Note from the Chair



William R. Martin

Greetings to all of you in the extended NERS community! We have had another interesting and newsworthy year, and I will share some of

the events with you in this short note. Much of what I report in this column is elaborated on within the pages of this newsletter, so your reading assignment includes the entire newsletter! We again have substantial changes to our faculty and staff rosters. Two new faculty will be joining the department this fall: Michael Hartman and Sara Pozzi. Mike joined the faculty in September as Assistant Professor and is now teaching NERS 441, Nuclear Reactor Theory I, to our seniors. He will also be taking over the Neutron Science Laboratory (NSL) in the cyclotron bay adjacent to the Naval Architecture and Marine Engineering (NAME) Building. The NSL is built around a D711 neutron generator, comprising a (D-T) head, capable of producing up to  $2 \times 10^{10}$  neutrons/s, and associated instrumentation and counting systems. Professor John Lee was instrumental in getting the NSL established through funding provided by DOE, the University of Michigan, the College of Engineering, and NERS. A future article will describe this facility in more detail.

Sara will start this December as Associate Professor. She will have a laboratory on the first floor of Cooley Building that will be focused on research in nuclear nonproliferation and homeland security applications. With the addition of Mike and Sara to our teaching faculty, we will have 18 faculty by the start of the winter term, not including emeritus or research

faculty. Since we still have one open search, our faculty headcount could reach 19 by next year.

We also have three new technical staff: James Berry has been supporting Professors Zhong He and David Wehe; Fabian Naab has been working in the Michigan Ion Beam Laboratory, directed by Professor Gary Was; and Russell Miller has been supporting the research of Professor Was in the High Temperature Corrosion Lab and the Irradiated Materials Testing Lab. More detailed descriptions for these staff will be found elsewhere in this newsletter.

It is with sadness that I report that John King, Emeritus Professor of Nuclear Engineering, passed away in late August. Please see the article on page 5 that describes Professor King's scientific accomplishments over a long and distinguished career.

NERS is continuing to do well in both undergraduate and graduate enrollments. Pam estimates we will have over 100 undergraduates in NERS this fall, which is beginning to stress some of our laboratory courses as well as lecture courses that used to fit comfortably in our first floor classroom! Compared to 26 undergraduate students in 1995-96 and 1996-97, we have essentially quadrupled our enrollment over the past decade! Our graduate enrollment continues to be strong, numbering about 85 students, with 21 new students this year. Our externally sponsored research also continues to be strong, which is good as we have a large number of graduate students to support. We have graduated 10 PhDs since September 2006, and you can find a short summary of these graduates and their degrees and current positions elsewhere in this newsletter.

As has been a trademark of NERS since the department was established in 1958 (a hint!), we not only have a

healthy graduate enrollment but we continue to attract the best students in the country, and this year is no exception. Evidence for this claim can be found in the articles about our graduate students as well as the achievements of our outstanding alumni. An example of one of our prominent alumni is Chang Kue Park, who was honored as a distinguished alumnus of the department last fall and whose achievements are summarized in a separate article in this newsletter. Also, a number of alums have taken the time to write and let us know what they are doing. I am sure you will find these notes very entertaining, so please contribute your own for our next issue so we can continue this tradition of interesting, informative, and fun-to-read reports from NERS alums.

You might ask if our outstanding students have any time for fun and relaxation outside their classes or research. Just turn to the last page and see the breakout song by our own "He-Men" to show that our students can be just as creative on the right side! And our students continue to show their commitment to their profession and the greater community through their professional and civic activities as part of the student section of the American Nuclear Society (ANS), which this year received an Honorable Mention from the ANS in the annual Glasstone competition.

On the research front, our department is continuing its world-class research activities. Our cover article on Professor John Foster's laboratory is a good example of the outstanding research that is being performed by our faculty and students. Our faculty are also leading initiatives that will promote research in critical areas of national importance, such as the appointment of Walter J. Weber, Jr. Professor of Sustainable Energy,

Environmental, and Earth Systems Engineering Gary S. Was to lead the Michigan Memorial Phoenix Energy Institute (MMPEI). I expect MMPEI to be a catalyst for a number of energy-related initiatives, including activities in NERS as well as the rest of the university.

Our faculty and staff continue to garner awards. As reported within this newsletter, Professors Rod Ewing and Karl Krushelnick have been honored by their professions, and Professor James Holloway has been honored as an Arthur F. Thurnau Professor in recognition of his exceptional contributions to undergraduate teaching. I am sure those same achievements contributed to his recent appointment as Associate Dean for Undergraduate Education in the College of Engineering. On the staff side, Peggy Gramer was presented with one of the six awards given out to CoE staff for excellence in staff service.

Well, I am out of material. It's now up to you to read the rest of the story!

Oops, I didn't tell you who is turning 50 next year. We are! The Department was established in 1958 so next year we are half a century old. That's almost as old as I am! So we will have some sort of birthday party next year, probably along the lines of our 25<sup>th</sup> anniversary, when Glenn Knoll was Chair. We had a good alumni turnout then and I expect we can do even better this coming year, since we have so many more alums since 1983. We have not started planning this event yet but will be setting up a planning committee soon and will start looking at some tentative dates for this occasion. We will soon set up a link on our website for the 50<sup>th</sup> for you to follow our planning for this celebration.

*Bill Martin, Chair  
wrm@umich.edu*



## Michigan Memorial Phoenix Energy Institute Established

### Gary S. Was Appointed its First Director

In September 2006, the Michigan Memorial Phoenix Energy Institute (MMPEI) was launched to chart the path to a secure, affordable and sustainable energy future by applying the University of Michigan's strengths in public policy, economics, business and social sciences to lay the foundation for successful implementation of our scientific and technological achievements.

In 1948, the Regents approved a resolution to "create a war memorial center to explore the ways and means by which the potentialities of atomic energy may become a beneficent influence in the life of man, to be known as the Phoenix Project of the University of Michigan." The Phoenix Memorial Laboratory and the Ford Nuclear Reactor (FNR) operated as a memorial to the 585 university alumni, students, faculty and staff members who gave their lives in World War II. It was "devoted to the peaceful, useful and beneficial applications and implications of nuclear science and technology to the welfare of the human race." In 2004, following the beginning of the decommissioning of the FNR, Regental action broadened the charter of the Phoenix Project beyond atomic energy to encompass "research on the devel-

opment of energy policies that will promote world peace, the responsible use of the environment, and economic prosperity." The new charter furthermore stresses interdisciplinary research and education that encompasses "perspectives from the natural and social sciences, engineering, medicine, and the arts and humanities."

MMPEI serves as an enabling organization that develops, coordinates and promotes multidisciplinary energy research and education across the University, supports areas of intellectual activity that constitute our existing strengths and infrastructure, establishes new faculty and research appointments in growth areas and builds bridges between science/technology and public policy, and serves as a unified voice on energy research and education for the University. Research thrusts of MMPEI include: carbon-neutral electricity generation; energy storage and utilization; transportation systems and fuels; and policy, economics and societal impact of the energy challenge.

MMPEI hosted a workshop on energy last January at which 77 different faculty members presented 88 talks on a wide range of research topics.

This was followed in February by the Symposium in Energy Science, Technology and Public Policy, which



**CONTINUED ON PAGE 4**

featured Secretary of Energy Bodman's keynote address and talks by leaders from industry, government and academia. The institute has also provided funding for cross-disciplinary energy research, and awarded six, two-year graduate fellowships in energy research to students across the university. MMPEI will host a student "energy day" on September 19 with talks, energy company appearances and a poster competition.

It was announced recently that MMPEI will lead a \$2M, two-year program on technical challenges and societal acceptance of plug-in hybrid electric vehicles, in cooperation with Pacific Northwest National Laboratory, General Motors Corp., Ford Motor Co., and DTE Energy. DTE Energy also recently announced that it will endow a professorship closely tied to MMPEI—the DTE Professor of Energy in the College of Engineering. Renovation of the Phoenix Memorial Laboratory is expected to be completed in the Fall of 2008, after which the building will house the Hydrogen Energy Technology Laboratory (HETL), nuclear energy research and other critical areas of research in the energy initiative.

You can learn more about MMPEI, view energy research and faculty at the university and talks at the Energy symposium by visiting the MMPEI website at [www.mmpei.umich.edu](http://www.mmpei.umich.edu). The website also contains position papers and podcasts by Professors Duderstadt, Martin, and Was.

## Faculty Additions



**Michael R. Hartman** joined the NERS department in September 2007 as Assistant Professor. Dr. Hartman earned

his Ph.D. in Nuclear Engineering and Radiological Sciences from the University of Michigan in 2005. Since this time, he has held appointments at the National Institute of Standards and Technology as a National Research Council Postdoctoral Fellow and at Oregon State University as Assistant Professor of Nuclear Engineering and Radiation Health Physics.

His interests include the application

of neutron scattering techniques to investigate the properties of materials and the development of advanced nuclear reactor designs. His recent work has focused on gaining an improved understanding of the structure and dynamics of novel hydrogen storage materials, with an emphasis on engineering these materials to have better storage characteristics. "Development of a high-capacity hydrogen storage material which can reversibly store hydrogen at or near room temperature is an enabling technology for the hydrogen economy," he says.

Mike joins his wife Laurie and their two children Jeff and Alec, who currently reside in the Ann Arbor area.

**Sara Pozzi** will join the NERS department in December 2007 as Associate Professor. She earned her M.S. and Ph.D. in nuclear engineering at the Polytechnic of Milan, Italy, in 1997 and 2001, respectively. Her research interests include the development of new methods for nuclear materials identification with applications to nuclear nonproliferation, nuclear material control and accountability, and national security programs. Dr. Pozzi is a co-author of the Monte Carlo code MCNP-PoliMi, which is being used at over 50 institutions world-wide to simulate correlation measurements and detector response. Her experience includes experimental work on fissile material performed in the United States and in Europe.

For the past 7 years, Dr. Pozzi per-



formed research at the Oak Ridge National Laboratory (ORNL), where she held the position of Senior Staff scientist and led various research projects funded by the U.S. Department of Energy and other agencies.

In 2006, she was the recipient of the ORNL Early Career Award and the Department of Energy, Office of Science, Outstanding Mentor Award. At the University of Michigan, she will establish a research group to address the urgent needs in homeland security and nuclear nonproliferation. She also plans to expand her team's research into new directions, such as the development of proliferation-resistant technologies associated with the nuclear fuel reprocessing cycle and imaging and neutron capture techniques for medical applications.

# Staff Additions



**James Berry** joined the NERS staff in November 2006 as an Electronic Design Engineer. He will be working for Prof. Zhong He in the Radiation Measurements Lab and Prof. David Wehe in the Detection Methods research group. His role is to support the electronic and mechanical design activity in these two areas. He works with graduate students and post-doctoral research staff to solve design problems and otherwise facilitate research activity. Prior to joining NERS he worked in Mechanical Engineering as the Staff Engineer in the Mobile Robotics Lab. He has been employed as an Engineer by the University since 1990. Jim is married and has a four-year-old daughter. He likes to spend time with his family and play with his daughter at some of Ann Arbor's many parks. In addition to this he likes to spend time at the family cottage in Northern Michigan and play Ultimate Frisbee in a local league.



**Fabian Naab** is an Accelerator Physicist/Engineer in the Michigan Ion Beam Lab. He joined our department on September 1, 2006. His scientific background is in application of heavy-ion accelerators in research and industry. Fabian obtained his Ph.D. at the National Commission of Atomic Energy in Buenos Aires, Argentina. His research was focused on optimizing the PIXE technique to analyze biological samples using the heavy-ion

20 MV TANDAR Accelerator.

His first post-doc position was at the University of Notre Dame, where he worked in beta-decay and weak interactions. He then worked at the University of North Texas at the Ion Beam Modification and Analysis Laboratory. His current position in MIBL involves the use of ion beam techniques to analyze samples, ion beam irradiation of materials to study radiation damage, and ion beam implantation of materials to change their properties.

**Russell Miller** joined the NERS staff as an Engineering Technician on September 1, 2006 and supports the research of Prof. Was' labs (HTCL



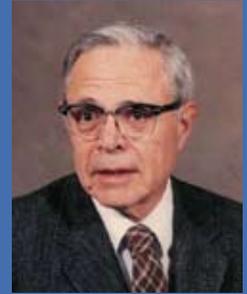
Russ with kids in Yellowstone Park

and IMTL) with instrumentation, system maintenance and new system design and fabrication. He was previously a Research Engineer in Mechanical Engineering developing hardware and embedded software for serpentine robots and navigation systems. Before leaving his native California for Ann Arbor in 2000, Russ designed and tested solid and liquid rocket engines for Aerojet and developed educational robots for Parallax.

He has coached elementary Science Olympiad for several years and always enjoys seeing kids getting excited about exploring a new topic and making their own discoveries. Russ' two children are active in music and sports, and between events he likes to go down to Argo Pond to row with the AARC.

## IN MEMORIAM

We are sad to report the passing of one of our most respected and beloved faculty, Professor John King, on August 30, 2007. Many alumni



will remember him as their instructor for the reactor laboratory or radiation measurements course. His expertise in experimental methods was legendary. Prof. King was the Manager of Reactor Physics at KAPL during the exciting years of the first nuclear submarines, and recalled lively stories of working with Admiral Rickover (the father of the Nuclear Navy) and Henry Hurwitz (GE's genius reactor physics theoretician). When his wife grew ill, he moved his family to Ann Arbor to take advantage of the superior health facilities, and joined the new Department of Nuclear Engineering in 1959. With his background in experimental reactor physics, he gravitated to the new Ford Nuclear Reactor and began a glorious career utilizing the neutrons for materials science studies. He mentored many doctoral students through their research while developing a global reputation for innovative experimental methods and facilities in neutron scattering. A Fellow of the American Physical Society and the American Nuclear Society, a former chairman of our department, and the winner of the College's excellence in research award, his contributions to the department and our students have been nothing less than spectacular. After retiring in 1986, he continued his research with his close colleagues up until his recent illness limited his activity. He was an elegant gentleman scientist, and we will all miss him dearly.

The family of John King has established the John S. King Memorial Fund at the U-M, dedicated to the support of research and instruction in NERS. Contributions (checks payable to "University of Michigan John S. King Memorial Fund") may be sent to the College of Engineering, Robert H. Lurie Engineering Center, 1221 Beal Avenue, Ann Arbor, MI 48109-2102 (phone 734-647-7040).

## Plasma Science

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can control the etching bombardment energy of the room temperature ions by simply varying the applied voltage on the work piece. Again, the beauty of the low-temperature plasma is that the energetic electrons maintain constant ion production but do not heat the heavy particles. These ions can be manipulated by external fields to process a piece of material, whether that process is implantation, deposition, or plasma-assisted etching. The electrons can also produce reactive radicals or excited neutrals that in turn can react with a surface, altering its properties in known ways. For example, an oxygen plasma can be used to lightly etch a slippery polymer surface such as a potato chip bag or a car bumper so that a dye label or paint can be deposited. This simply cannot be done with a thermal plasma where all species are at temperatures greater than about 5000 degrees C! The heat content of such a thermal plasma is enormous at this temperature and is capable of melting most materials. Indeed such thermal plasmas are used for melting/spray coating of ceramics, cutting/welding of various metals, and vitrification of solid waste.

Graduate students working in the PSTL learn about vacuum technology,



**Microwave plasma cathode experiment vacuum chamber and apparatus.**

plasma sources, and plasma diagnostic techniques. They use this knowledge to carry out research projects in the three thrust areas. The projects will typically involve building novel plasma sources to address a specific application or to simply expand our understanding of basic physical processes such as electron transport, erosion, and plasma acceleration, for example. It's a "hands on" approach to research tempered with predictive modeling tools for electric and magnetic field calculations as well as basic plasma interactions. Additionally, the projects will require first order modeling using analytical expressions to determine plasma behavior and scaling. Such models are predictive in nature and have the potential to grow in complexity and in general represent our understanding of a given system under study. The goal behind this approach is to produce plasma experimentalists that are also analytically savvy. These skill sets not only make for an exciting and well-developed project/thesis but also greatly enhance the student's employment options upon graduation!

In the area of space propulsion, Professor Foster's research focuses on electric propulsion, a facet of rocket science that deals with those engine systems that generate thrust by electrical means. In such engines, gas is converted to a low-temperature plasma and then accelerated electrothermally, electrostatically, or electromagnetically. These systems are desirable in that they are very fuel efficient, producing exhaust velocities greater than 10 times that of traditional chemical rockets. They are capable of providing steady thrust over periods of thousands of hours rather than the seconds or minutes typical of chemical rockets. Dr. Foster's research involves addressing two key issues related to propulsion: engine lifetime and thrust density. Progress in these areas can enable very long duration missions



**A magnetically enhanced inductive discharge operating in argon gas.**



**A mysterious plasmoid-mode of operation in the Gaseous Electronics Test Cell.**

such as those to the outer planets and beyond. Presently, electric propulsion systems utilize hot cathodes, which provide electrons to bombard the gas and produce the plasma. Because the cathode is a negative body immersed in a plasma, it is subject to erosion driven by positively charged ions impinging upon its surface. This erosion limits its lifetime. Dr. Foster's group is investigating the use of microwave and radio frequency produced plasmas for propulsion in an attempt to improve engine lifetime. These techniques utilize oscillating electric fields or electromagnetic waves to convert a gas into a plasma. Ions produced are then electrostatically accelerated. Because internal electrodes are not involved, radio-frequency (RF) and microwave plasma production techniques essentially eliminate the electrode erosion issue. The figures above illustrate an inductive plasma and a microwave source currently being studied by graduate students at the PSTL for thruster applications.

In contrast to the lifetime extension provided to electric propulsion by RF and microwave plasma production, improved thrust density reduces overall trip time. Engine thrust density typically scales with plasma density. It follows that producing very high-

density plasmas is a potential avenue toward higher thrust. Plasma density optimization is therefore another focus of the laboratory. A student is presently studying electron collection in a DC ion thruster discharge chamber. The end goal of this project is to improve ionization efficiency. The PSTL is continuing prior research that Professor Foster initiated at NASA and looks toward the future needs in advanced space propulsion. The laboratory will also be investigating the use of plasmas, both thermal and non-thermal, to support human operations on the Moon and Mars. These include using plasmas for lunar and Martian dust mitigation as well as *in situ* extraterrestrial resource utilization. For example, the lab recently acquired lunar dust simulant. Students will be involved in developing plasma-based methods to remove adherent simulant on test sample surfaces.

The PSTL will also engage in more earthly pursuits. This summer experiments aimed at producing plasma in water were initiated. Beyond understanding the physics of such discharges, a very real application of this research is water purification. Millions die each year from water-borne illnesses. A non-thermal plasma initiated in water produces ultraviolet light, peroxides, ozone, and free radicals. These short-lived components will attack bacteria, viral particles and harmful microbes. The application of such technology is point-of-use water treatment. Such a technology has distinct advantages over filter and UV-based point-of-use treatment systems. The target users for such technology are underdeveloped countries. Imagine a plasma-based water treatment system located at a local village water site powered by solar panels. It is also anticipated that the technology could be applied to water recycling for military and space applications. Major components for this experiment were purchased this summer.

Other environmental plasma processing applications are also being investigated in the PSTL. One entails the development of a coaxial, barrier discharge. Plasmas typically are generated at reduced pressures to reduce collisions that would otherwise damp out the exchange of energy between the applied field and the charged particles. The barrier discharge, like the plasma discharges in water, occur at the comparatively high pressures typical of Earth's atmosphere. "Barrier" in the name of this discharge type stems from the fact that insulators typically cover one or both of the powered electrodes. The barrier discharge is actually a series of short-lived plasma discharges. These discharges are driven by alternating high-voltage that breaks down the gas, producing a plasma. These short-lived discharges locally produce copious quantities of excited molecules and reactive radicals. In this manner, activation energy for a particular chemical process is provided. Presently, these plasmas are being investigated for the destruction of toxic emissions and greenhouse gases such as nitrogen oxide. They hold great promise in the quest to reduce greenhouse gas emissions. These discharges will be studied at PSTL to obtain a better understanding of the plasma physics of the discharge itself and of how the electrons and free radicals control the dynamics of chemical reactions and synthesis. The present barrier discharge source is student built. The discharge initiated with this hardware will also be used as a test bed for the development of high-pressure plasma diagnostics.

As the PSTL grows, our understanding of these exciting plasma processes will also grow, propelling us into deeper frontiers of research and application. Low-temperature plasma physics is a very rich and interdisciplinary field.

## Peggy Jo Gramer Honored



Peggy Gramer received one of the Excellence in Staff Service Awards on May 4 of this year at the annual awards banquet for College of Engineering staff. One of six staff (out

of 500!) in the College to receive these awards this year, Peggy was recognized for her outstanding work as the NERS Graduate Coordinator.

She is committed to meeting the diverse needs of the NERS student body, and she demonstrates that commitment daily. She began this position in 2000 and serves as the sole coordinator for a large class of graduate students. In this role, she provides guidance and mentoring to these students during their entire graduate career, from the application process through their graduation preparations.

Peggy consistently makes time to listen to prospective and current students' needs and, most important, successfully and thoroughly addresses them. Her wealth of knowledge about the University and the graduate program is an invaluable resource to both students and faculty. Time and again, she finds ways to make the graduate experience easier for students.

Peggy's responsibilities are diverse, but in every task, she advocates for students. She made vast improvement to the graduate student application, review and decision process, and through her outstanding efforts, she diligently coordinated the complete overhaul of the department's website. Her attention to detail resulted in an outstanding four out of seven competitive Rackham Engineering Award (REA) Fellowships for prospective students.

Previous NERS awardees are: Pam Derry (1993), Ali Mashayekhi (1995), and Edward Birdsall (1997).

## Students Tour Nuclear Power Plant



Eighteen U-M ANS members visited the D.C. Cook Nuclear Power Plant in Bridgman, Michigan for the third year in a row. It remains one of the most popular ANS events. Freshman to PhD students attended, many of whom had never been to a nuclear power plant before.

They toured the Energy Information Center, viewing the scale model of the Cook reactor and the intake and output pumps from Lake Michigan. Senior Reactor Operator Vince Lauricella gave an overview of the plant and the reactor operator training program at the Training Center and the Control Room Simulator. In the Simulator, accident scenarios were practiced and members were able to manually scram the reactor. Real events and responses by safety systems and operators were discussed such as the Northeast Blackout of 2003. At the end of the tour, Andy Zuber and Joe Tanko trained members how to use radiation detectors and proper techniques for wearing anti-contamination clothing.

An article about the D.C. Cook trip was published in the February



14, 2007 AEP Newsletter. UM-ANS appreciates its continued relationship with D.C. Cook and thanks all of the AEP employees who came in on their day off to mentor and share their industry knowledge.



## Industry Forum and Career Fair

The Kick-Off Seminar for the 10<sup>th</sup> Industry Forum and Career Fair, held November 10, 2006, was presented by NERS alumnus James Fici, Sr. Vice-President, Customer Relations and Sales, Westinghouse Electric Company. The title of the presentation was “Nuclear Power and Westinghouse—Preparing for Unprecedented Growth.” James Fici projected an economic model of the world in 2042 and provided an up-to-date perspective of the reliance and interest in commercial nuclear power. By describing today’s positive market signals he explained how this translates into growth challenges and opportunities. Participants in this year’s Career Fair included: Areva NP, Duke Power, Eli Lilly & Company, General Electric-Nuclear, Knolls Atomic Power Laboratory, Nuclear Regulatory Commission, Pacific Northwest National Laboratory, Schlumberger, and Westinghouse. The five-hour career fair provides an opportunity for students to speak and interview with recruiters, and to distribute resumes to various companies. In addition, interview schedules are arranged for those companies/laboratories who wish to conduct interviews.



If you would like to represent your company or laboratory in the 11<sup>th</sup> Industry Forum and Career Fair to be held on Friday, November 2, 2007, please contact Pam Derry at (734) 936-3130 or [pgderry@umich.edu](mailto:pgderry@umich.edu). This is a great opportunity for you to visit Ann Arbor and the department, to talk with faculty, and to meet the students who are the future of the nuclear engineering field.

# Student Profile

## Douglas Fynan (BSE '07)

I decided to pursue a degree in nuclear engineering and radiological sciences at the University of Michigan about five years ago during my senior year of high school. This was during a



time when my close friends were headed off to college to study fields such as forestry, wild-life management, and geology. Most of us were accom-

plished outdoorsmen and students, so pursuing higher education in natural resources and “environmental” fields was natural to us. This was also several years after the international community had accepted the reality of global climate change.

Knowing that an environmental career would be right for me, I asked myself, “What is the largest environmental challenge facing our society?”

The answer to me was energy and how we obtain and use it. Being a solution-orientated person, I chose engineering as a potential career path. From there, I narrowed down my choice to nuclear engineering.

At this point I must admit, I didn't know much about nuclear power. I knew that nuclear power plants didn't emit carbon dioxide, which is a great thing even though it was not being commonly discussed in the United States at that time. I knew that the process involved neutrons and splitting nuclei and that the nuclear waste left over was a problem, and that's about it.

In the fall of 2003 when I arrived as a freshman, I immediately had to start to define my reasoning for choosing nuclear engineering despite having never set foot in the Cooley Building. While making new friends on the first day, “What's your major?” is

the common icebreaker question. My answer was different from most and engaging dialogue usually followed. I have found that, like myself during those early days, most people know very little about nuclear engineering, but most people are knowledgeable about subjects that are related to the complex issues surrounding nuclear power and energy in general. These could range from international politics to the psychology of people's perceptions of nuclear power plants. When discussing nuclear engineering, it is much more effective to engage the audience rather than handwaving and spouting off “facts” from the NEI's website. When speaking with someone new about nuclear power, I have almost always learned something new about the subject from that person.

My NERS core courses and electives were fascinating and intellectually challenging. The NERS faculty deserves credit for being by far the best at the University. For my free electives I took several geology courses so I could better understand the complex challenges of nuclear waste disposal.

I will be pursuing a Master's in NERS in the Fall of 2007. I look forward to an invigorating career as a nuclear engineer, especially as the nuclear industry becomes involved in the dialogue of global climate change and energy poverty.

(Douglas was the 2006-2007 President of the U-M Chapter of the American Nuclear Society, a Class of 1931E Scholar, and a Rogel Scholar. His other areas of interest include geothermal energy, photovoltaics, green building design, and off-the-grid energy systems. Douglas has traveled extensively throughout Alaska and Australia.)

## Undergraduates Benefit from Scholarship Funds



Professor Martin presents the Kikuchi Award to Matt Orians (above) and Andrew Till (not pictured).

### Donors Fiscal Year 2007

Dr. Osman S. M. Ahmed  
Todd and Joanna Allen  
Kathleen and George Baldwin  
Mr. & Mrs. Raymond M. Berg  
Dr. Yoon Il Chang  
Inan Chen  
Ron and Pam Derry  
Max E. Fenstermacher  
Mr. James Albert Fici  
Ronald and Catharine Gilgenbach  
Dr. & Mrs. John E. Kelly  
Drs. Edward & Deborah Klevans  
Glenn and Gladys Knoll  
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Dr. Ellen M. Leonard  
Dr. Leonard J. Lorence  
Norman and Lynne Lurie  
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Todd and Amy Urbatsch  
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Applied Materials Foundation  
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Lockheed Martin Corporation

**Congratulations to the U-M ANS Student Section for earning an Honorable Mention in the 2007 Samuel Glasstone Award competition. This award is given each year “...for accomplishing the most notable achievements in public service and the advancements of nuclear engineering.”**

# Alumni Profile

## Mark J. Colby (BSNE '76, MSNE '77)

NERS alum Mark J. Colby received his BSNE degree in 1976 and his MSNE degree in 1977. At the end of



his University of Michigan education, he took off running at life full speed. He got married, defended his Master's project

the very next day, then moved to San Jose, California to begin working with General Electric (GE) the next week.

Mark has been with GE ever since. He spent 13 years in San Jose, then three years in Tokyo before moving to his present location in Wilmington, North Carolina. His titles have included Senior Engineer; Technical Leader; Manager, Japan Core Engineering; Fuel Project Manager, Germany; Engineering Quality Manager; Six Sigma Engineering MBB; Reload Licensing Team Leader and Stability Team Leader. In his current position of Nuclear Analysis Center of Excellence Leader his team is responsible for Fuel and Core Design, Safety Analysis (LOCA, Transients, Stability), Reload Licensing, Radiological and Containment Analysis. "If you want to have nuclear analysis done," Mark says of his team, "you come to us."

Mark returned to visit the NERS Department on April 13, 2007 and to present a colloquium on the GE Economic Simplified Boiling Water Reactor (ESBWR). The ESBWR is GE's new Generation 3+ nuclear reactor system. It has the ability to

produce 1,520 MW(e) and utilizes natural circulation coolant flow during normal operation. By using the force of gravity and boiling to drive water coolant through the core, the ESBWR design negates the need to employ recirculation pumps. The ESBWR also incorporates passive safety systems that rely on geometry and gravity to provide supplemental coolant to the reactor core during LOCA and severe accident events, with 72 hours of passive capability. Less safety grade equipment and piping simplifies the system, leading to both lower cost and increased safety. "The probability of a catastrophic event is an order of magnitude lower than other reactor systems," explains Mark.

Mark fondly remembers his U-M days, especially going to Michigan football games on Saturday. He also recalls his first class with Professor John Lee as his most inspiring learning experience. He scored 20 out of 200 possible points on his first test in the class, with the highest score being less than 100. Mark explains, "We were used to a different testing evaluation method. In other engineering courses you didn't need to complete all test problems to get significant credit, as long as you could describe how to solve those problems you did not finish. Professor Lee knew we would all fail that test. He wanted us to understand that when we worked in the Nuclear Industry it would be critical not only to know how to do something, but to actually do it and get accurate results." Professor Lee's classes were some of Mark's toughest,

but the lessons learned during that instruction turned out to have the most value when applied to future work challenges Mark faced working for GE.

Known as a "firefighter" of sorts during his career, he was often put on projects that needed fast, effective outcomes. He described a high-pressure situation when he was about eleven years into his GE career. He and his team were notified on a Friday evening that a fuel bid using the then latest GE fuel design was in trouble. The team was directed to utilize an advanced fuel design concept that was being developed by his team and come up with a significantly more economic fuel and core design offering by the following Monday morning. At this time they were using early generation minicomputers to run their evaluations, which was extremely time consuming, giving the team only a few iterations to develop the design. The team barely slept between Friday night and the Monday morning deadline. Mark recalls getting only about two hours worth of sleep. GE ended up winning the fuel bid. Three years later, a fuel cycle evaluation that used parameters from the first operation cycle that used the new fuel design validated the original fuel bid savings estimate. Working so hard and succeeding in this task was a pivotal point in Mark's career, as it gave him confidence to continue to take on increasingly tougher projects.

Mark remains "cautiously optimistic" on the future of nuclear energy in the U.S. He credits the Energy

## Dr. Wehe Promoted



**David K. Wehe** has been promoted to Professor of Nuclear Engineering and Radiological Sciences effective September 1, 2007.

Professor Wehe's research interests are in radiation detection and measurements, and he is particularly active in the new initiatives in homeland security. He serves as editor for *Nuclear Instruments and Methods in Physics Research*, is a senior member of IEEE, and an elected member of the Radiation Instrumentation Steering Committee, as well as serving on numerous DOE advisory panels.

He can be seen flying around North Campus on a Segway scooter, risking life and limb (not necessarily his own), to show how science and engineering interweave.

Policy Act of 2005, which renewed the Price-Anderson Act, created production tax credits for power produced by advanced nuclear power facilities, and provided financial incentives for the construction of advanced nuclear power facilities, for the current surge in interest that gives hope for a "nuclear renaissance." He states, "It is also now becoming politically convenient to discuss nuclear energy and its ability to help reduce production of greenhouse gases. Environmentalists such as James Lovelock [the British atmospheric scientist and father of the Gaia Theory] and Patrick Moore [co-founder of Greenpeace] who once shuddered at the mere word 'nuclear' are now promoters of nuclear energy as a clean and safe energy source."

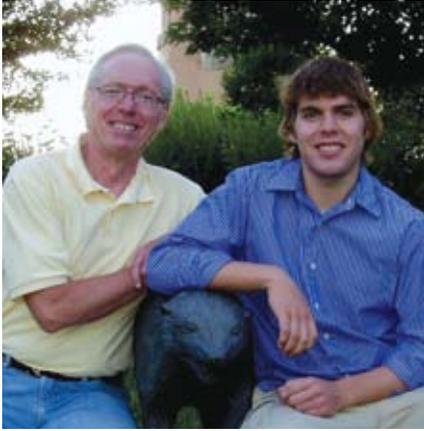
However, some people are still concerned about a repeat of the Three Mile Island (TMI) or Chernobyl accidents. "Plants are safer now," says Mark. "Lessons learned from TMI have been applied to prevent similar occurrences. Control room ergonomics and the operators' ability to effectively monitor critical plant parameters during an accident were improved. Emergency Procedure Guidelines (EPGs) were also developed for plant operators to use during and following an accident. Yet, any unplanned event at a nuclear plant can be viewed negatively and they still make the news headlines. Sheer vigilance, maintaining an excellent record of safety in existing operating plants and the availability of safer advanced reactor systems are all required to keep the nuclear energy option open."

As a hiring manager and nuclear professional with 30 years of experience under his belt, Mark has some advice for those who are currently studying Nuclear Engineering and Radiological Sciences. "I can't stress enough the importance of communication and teaming skills. You need to be able to effectively write reports and verbally express your ideas to colleagues, management and customers. Getting along with your team members and leaders is also critical.

"When I interview for prospective employees, I look for those who can both solve problems and fit well into the culture of our team and our organization. If you leave an interview and feel like it's not going to be a good cultural fit, it probably won't be. You can't expect to change too much or for an organization to change its culture, at least not in the short term.

"I look for people who enjoy working hard, can handle conflict, are willing to listen to other points of view, have great communication skills and see obstacles only as delays, not show stoppers. One of the most important things you need to do to advance in any career is determine what your strengths and weaknesses are, mitigate the weaknesses and enhance the strengths. Remember that the workplace is a competitive environment. You must continually improve and expand your skills. While it's useful to improve areas where you are weak, focus on improving your strengths; they are the key to your future success."

# Father-Son Alumni Profiles



Kurt M. Haas (BSENE '71) and Jason R. Haas (BSE-NERS '06) (Jason is a NERS graduate student)

**K**urt: With his mother, his two other siblings and me, his father, all graduates from the University of Michigan, it really came as no surprise when Jason announced his intention to enroll at the university too. Later, we were pleased to hear that he had been accepted in the College of Engineering. But when Jason decided to follow in my footsteps and pursue a degree in Nuclear Engineering, I was surprised and delighted.

During a family visit to the department just before his graduation in April 2006 to look over senior project poster presentations, we met Pam Derry in the hallway. Pam pointed out to us that very probably Jason and I were the first father-son pair to graduate from the department—father, and then son, graduating with the same degree from the same university nearly 35 years apart. **Hold on just a minute!** How could this possibly be, I thought? After all wasn't it *just yesterday* when I was roaming these very hallways late at night to complete an NE 445 Reactor Lab analysis? And hadn't I just run into Professor Akcasu and Professor Kammash in this hallway before talking with Pam? Wasn't the building I saw across the

street (the University Computing Center) and to the west (the Phoenix Memorial Lab) the same as during my student days? And weren't many of the names on the faculty chart on the wall familiar too—names like Fleming and Martin?

Closer observation and analysis, however, quickly brought me around to my senses that it was not "*just yesterday.*" While I had in fact just encountered the honorable professors in the corridor and while it was true that some of the surrounding structures and faculty names were here years before, during my student days, nearly everything else inside and outside of Cooley Building had changed. There wasn't a slide rule to be seen. Gone, too, were the large noisy mechanical calculators that we used to grind out those atomic mass change problem solutions. I couldn't find a mimeograph machine anywhere. Where in the world did all the copiers and printers come from? These were very rare devices during my studies in the 60s and early 70s. The "high speed," 10-character-per-second teletype terminals and punch cards for computer data entry were all gone, replaced with keyboards, thin color monitors and small portable laptop computers. Even the telephones and coffee pots had taken on new forms. The senior project poster presentations are **in color!** What a diverse collection of people I saw moving around! Ah, and many more female students, faculty and staff were in evidence. North Campus is no longer wide open spaces with a few buildings spread about, but now, truly it is an entire campus. Is there now more public parking available or are my eyes playing tricks on

me again? No, it is not "*just yesterday.*" It is **better** than yesterday!

There certainly have been significant physical changes across the department over the last 35 years. With the possible exception of the loss of the Ford reactor, most of these changes have been for the good. I have had the pleasure to meet and work with a few of the current students and recent graduates from NERS. They are a very capable, highly skilled and motivated group of young engineers. Certainly, they have significantly more accurate and powerful computing tools at their disposal than we did in the early 1970's. But more importantly, these professionals typically also have far more hands-on experience working with these tools during their studies and through meaningful summer and intern work assignments in the nuclear industry. This very impressive group of new engineers is ready to take over where my generation is leaving off.

It's particularly important that they are ready. They will play a vital role solving the environmental and energy issues that loom before us as a world community today. During my undergraduate days I participated in the first "Earth Day." We were concerned about pollution and its effect on the environment. We discussed the limited supplies of fossil fuels. Interestingly, one of my senior papers in 1971 was titled "Environmental Effects of Producing Electricity." In the years that followed we experienced the first energy crisis, saw the booming expansion of nuclear power and the promise of clean nuclear energy slowed and then stopped, learned clear lessons from the events of Three Mile Island and Chernobyl

and began to be concerned about global warming. Today the old issues appear even more compelling, but the solutions are basically the same—more conservation, and a greater percentage of our energy produced from clean, environmentally friendly, safe sources—wind power, solar power, and yes, nuclear power. Thanks to the dedicated, talented, professional NERS faculty and staff, this next generation of “atomic” engineers stands ready and able to take up the call.

It is not “*just yesterday.*”

**J**ason: Each nuclear engineer has taken a path to the Cooley building for different reasons; some are environmentalists, others are looking for a challenge or possibly just a good job opportunity. I, however, grew up with a Michigan grad reactor operator, turned-engineering-manager father. While growing up I developed a nuclear curiosity which I wouldn’t fully realize or tell my father about for nearly a decade. It was that curiosity which led me to register for the first introductory class NERS 250, and that is all it took. I, like many others, was hooked partly because of the subject and partly because Pam Derry made us all want to stay. I still recall my father’s unexpected response after I finally told him I was a nucE, “Now why would you go do something like that?”

I believe he was half joking, but it’s hard to blame him for his response considering the path nuclear engineering has taken during his 30 plus years of service. He graduated at the tail end of the boom years of the industry. During his four years in Ann Arbor eight new reactors were either commissioned or had their operating licenses granted. He witnessed

the continued growth through the 70s and the following decline of the industry thereafter.

Now, after nearly two decades, the industry is again on the brink of an expansion. A lot has changed in the meantime. Gone are the relic tools of engineering. Punch cards now only exist in the water cooler stories from silver haired co-workers describing the “old” days. An unthinkable time to my generation. A time without complex reactor modeling codes or dual-processor servers.

Some things haven’t changed over the years though. We still use the same Lamarsh and Duderstadt textbooks; a few of the same professors still roam the hallways, and Michigan football again can’t win a Rose Bowl.

We are entering extremely exciting nuclear times, though. The public and politicians are finally coming to accept nuclear power as a plausible base load power source for curtailing CO<sub>2</sub> emissions. Exciting times. But we have learned from the generation before us that nothing is certain. Engineers of my father’s generation fought through the nuclear hard times, developing the needed solutions and procedures for safe plant operation. These engineers are now passing their knowledge and expertise to my generation, having faith we will continue to strive for perfection and understand how vital that is.

### 2007 Alumni Society Merit Awardee

Keith W. Cooley, Director  
Department of Labor and  
Economic Growth  
State of Michigan

## Kudos



**Professor  
Rodney C. Ewing**

Russian Academy of Sciences  
*Lomonosov Gold Medal*  
University Pierre et Marie Curie  
*Honorary Doctor*



**Professor  
James Paul Holloway**

U-M College of Engineering  
*Associate Dean for Undergraduate  
Education*  
University of Michigan  
*Arthur F. Thurnau Professorship*



**Professor Emeritus  
Glenn F. Knoll**

IEEE/Nuclear Sciences and Society  
*Radiation Instrumentation Outstanding  
Achievement Award*



**Professor  
Karl Krushelnick**

UK Institute of Physics  
*Charles V. Boys Medal and Prize*



**Professor  
Gary S. Was**

University of Michigan  
*Walter J. Weber, Jr. Professor of  
Sustainable Energy, Environmental, and  
Earth Systems Engineering*

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# Imaging Systems Laboratory Moves to Cooley

Zhong He's research group has a new home. Last summer, Professor He's lab moved from the Phoenix building to this more-spacious area on the second floor of Cooley. Here, the group is developing 3D position-sensitive semiconductor detectors capable of high-energy resolution while operating at room temperature. The detectors record the interaction location of photons striking the detector to within a fraction of the crystal's size, making it possible to reconstruct the distribution of photon-emitting isotopes around the detector and even to reconstruct the true energy spectrum of photons coming from a specific direction. As a proof of their methods, they were able to map the sources of background radiation in a room of their lab.

Most recently, the group has designed and constructed a detector-



From left to right: Weiyi Wang, James Berry, Cedric Herman, Nathan Bennett, Suzanne Nowicki, Jae Cheon Kim, and Christopher Wahl

array system and associated electronics to improve detection efficiency and angular resolution in these images. A major thrust of the research is in homeland security applications to find and identify possibly threatening sources in the field. The group is enjoying their new lab space, but they are already outgrowing it. A few students will be moving to a room in the Biomedical Engineering building across the street.

## NERS Alumni Present Friday Colloquia

**Mark J. Colby**, *General Electric Co.*  
**Economic Simplified Boiling Water Reactor (ESBWR) Core Engineering**

**Mihaela Rosu**, *U-M Radiation Oncology Department*  
**4-D Radiotherapy of Lung Tumors—How Much is Enough?**

**Robert Grove**, *Knolls Atomic Power Laboratory*  
**New Particle Transport Methods for Reactor Simulations at KAPL**

**Todd Palmer**, *Oregon State University*  
A Comparison of Monte Carlo and Deterministic Transport Dose Calculations of the Mammosite™ Breast Cancer System

**Kurt M. Haas**, *Big Rock Point Restoration Project*  
**Big Rock Point—Lessons Learned During Decommissioning**

If you would like to participate, please contact Professor Ed Larsen (edlarsen@umich.edu) or Professor Y. Y. Lau (yylau@umich.edu).

# A Glimpse into the Life of . . .

## Bob Talbert (BSEP '75, MSNE '76)



**Bob in Canada during Ann Arbor period.**

**Bob at 59 with grandchild.**

**Bob now. (He's the one with the long gray hair and no tail.)**

I received the following from Rick Migliore, a friend:

*"The last time this [NERS Notes] went out, you agreed to submit if I agreed to submit. So I submitted something, and then you left me holding the bag! So you are obligated to submit something this time."*

So I'm submitting something due to Rick's importuning. It will cover graduation through retirement, so it's lengthy. And I'll also mention a few other U-M Nuke grads I've met here at Battelle.

I received both degrees almost at the same time. Long story. Married to one woman, Georgia, 41 years! One child, daughter (who taught thermo under Sonntag at U-M), two grandkids, one is autistic. I carry a recessive PKU gene, and never knew it until my grandchild was born. Stupid me!

Worked in the National Lab system, and also started up a commercial reactor as Chief Nuke. Also did the startup of the LOFT reactor as Chief Nuke. At Battelle, met several delightful fellows from the Michigan Nuke program, Chris Gesh (MSNE 1990 or thereabouts), Eric Hawkes

(same class as Gesh) and Rick Migliore (MSNE 1994, give or take).

Chris Gesh has his PhD from Texas A&M, is an everyday Christian and comports himself as such. He's a fine active father, a great husband, a caring brother and a right fine scientist and engineer, along with being a good friend. Eric Hawkes was a delightful fellow, albeit our encounter was brief. He abated with Nukism around 1995, joined a company in Palo Alto and wrote software, possibly with his brother, who started Hotmail.com and became rich beyond his wildest expectations. Not sure what Eric is doing now. Rick Migliore and I became friends through mutual interests in music and film. He became Prez of the Battelle Film Club. We saw Floyd in Vancouver, Canada and The Dead in Portland. Rick has had a challenging life since being a teenager, but he *never* complained regarding the cards life had dealt him. He's a great dad, a fine man, a fine engineer, and a righteous friend. Rick has writing talent, and has written several screen plays, mostly mirthful, of the Woody Allen mold.

He has a great play about three days in Seattle with a woman who was an established part of the Seattle underground alternative society. It's hilarious. Perhaps someday we'll see a film he wrote.

Most important thing I've done since leaving Michigan: I've saved two lives. In one case, it required unarmed me to take on an assailant with a six-inch meat knife who was killing another man. I fought him (Shorin Rhu classes in Ann Arbor suddenly became of some use), disarmed him, disabled him, and struggled to hold in the blood pouring from the victim, having to plug the spleen hole with my knee as both hands were occupied while 30 people stood there, did nothing and watched. The victim was a *very* tough guy, and miraculously lived. Sounds preposterous? Ask Rick. He read the papers. Second lifesaving was perfunctory. A teen in Los Alamos had been hit by a car and lost a large chunk of scalp. I gathered the scalp chunk and held the bleeding from the head until pros arrived.

Lowest day of my life: 1977, Wyoming. Climbing accident above us. A guy was beamed. I was thrust onto the world stage and presented with an opportunity to save a life. Due to arrogance, hubris, and lack of knowledge, I failed. Were there but a single hour I could relive...

Professionally I did OK. Retired from Battelle as Chief Scientist. Lofty title, but there are *scores* of Chiefs running around Battelle, so it "jest ain't no big deal." Did a couple of interesting things. I did a lot of the early work on pre-det weapons material attribution. Tom Clancy stuff, kinda. Who made it? Where? When? Who

**CONTINUED ON NEXT PAGE**

## Talbert

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separated it? Where? When? Who “blacksmithed” it? Where? When? Did the original physics on another interesting project. A fellow gives you a couple chunks of graphite. You can smell it, burn it, taste it, hit it with a hammer, whatever you want. Then they tell you *exactly* from whence it came, and you tell them how much weapons-grade Plutonium the reactor had made since the beginning of time, with statistics, of course. Kind of a neat trick.

Never did weapons work!!! Hard to be in the National Lab system and avoid it. I did crit work on the Pit disassembly project, which is kinda anti-weapons work.

I spent a *lot* of time in Ukraine, and as such, speak Russian and Ukrainian. Not well enough to present or discuss things technically. Well enough to communicate on the streets of Kyiv (or any other Russian or Ukrainian city). Ukraine is a *marvelous* country covered with four feet of the blackest dirt you ever saw. Kinda like Iowa cubed. Regrettably, farming is often done by horse. I had a marvelous photo I took outside Kuznetzov of a farmer and wife bringing their crops to market in a horse drawn wagon, with the natural draft cooling towers of Rivne 3 and 4 in the background. A thousand years of technology in one shot. Ukrainians are most gregarious individuals. Family is *paramount*, nothing more important!! I love Ukraine! I still correspond with many friends there. Mnye Ochin Nravista Ludi Ykraina!

I hadn’t played chess since Ziya pushed my pathetic butt around the

board back in college, and I started again in Ukraine. The main pastime on the train from Slavutych through Belarus to Chernobyl Station is Chess and Bridge. I lost many games on that 80-minute ride to Chernobyl. Won a couple eventually. Those guys are *good*. Not Ziya good, but *very* good. I won’t bore you with tales from Chernobyl, but I might write a book about it some day. Hundreds of stories of bravery and intellect. Pretty amazing.

Oh, yeah, I have some patents and all because I firmly embossed my thumbprints on the coattails of a Russian friend. He and I have collaborated on many different projects. One in which we couldn’t engender DOE interest involved a reactor design where the fuel elements are made of tiny spheres, a few mm in diameter, TRISO fuel. A bundle is made by two concentric cylinders with the fuel captured between the two. Water flows up the center tube and horizontally out through a few cm of fuel. Because of the huge heat transfer area, one can raise water 35 degrees C without problems in just a few cm of flow through the fuel. The design can be used for BWR or PWR. The safety implications are obvious. Peak central meat is barely above cladding temp. It can withstand a LOCA and ATWS at the same time and not melt.

Fleming suggested that a thermal breeder could be created with thoria if one used HEU to get the machine

started. Combined with the microfuel technique described above, you’d have a passively safe machine that could run for a decade or so, and with the thallium 208 buildup, total self protection. Ron and I still shoot emails back and forth. It’s a friendship that’s lasted nearly 40 years! I often thought that if I ate his diet, I might grow up to be smart like Ron. The regret is it’s way too late now! I’ve come to the sad realization that I ain’t gonna make it! I’m bald like Ron, however!

I wept openly when I heard about George! Hadn’t shed a tear in decades, and haven’t since. I last saw him around ’92. He was recovering from the stroke, right side of his body still in paralysis. Didn’t complain about his problems. He just wanted to swap tall tales like always. He was a helluva guy!!

I still climb on occasion, but my partner is in Africa running an orphanage, and yes, he’s a *far, far*

better man than I, Gunga Din. Hard to find someone in their later 60s that hasn’t given it up. I cycle daily, swim in the summer, ski all winter (alpine, rondonee, telemark, Nordic), wind surf on occasion. I’ve had cancer, and Pd-103 with the itty bitty x-rays took care of it. Electron capture followed by conversion electron. 125 *gray* of itty bitty



Top half of Stelvio.

radiation, mind you. Currently in vogue is Cs-131 for brachytherapy. Same decay scheme, shorter half life. A close friend, Leroy Korb, was the

first radiation oncologist to use the Cs seeds. If you get prostate cancer, I can put you in touch with the world's expert. The neat thing about brachytherapy, no incontinence, no impotence! Ya don't know ya ever had a problem!! Let's hear it for medical radioisotopes!

By the way, if you're over 50, *get a PSA* and a *colonoscopy*! A thallium 201 for the heart ain't such a bad idea either! If you catch cancer or heart disease *early*, it can be trivial, as mine was. Catch it late, and you *die*!! Don't be stupid, as so many who die of prostate cancer obviously are.

Most impressive athletic accomplishment? I cycled the Italian side of Passo Dello Stelvio at age 55. Steepest continuous paved road in the world (12% grade *average* from Tofoi), containing 48 numbered switchbacks. *Much* steeper than anything in Le Tour De France! Google it. Amazing ride. Got passed a dozen times by Italians who were *way* stronger than me. I passed three riders. All Americans. I came away realizing that as far as cycling mountains, Americans are wimps (including *me*). Sections of Passo Dello Mortirolo are steeper (18%!!!) but much shorter. Stelvio is generally thought to be the more difficult ride due to its length. I'm not so sure.

Two things I gotta do before I die... See the aurora in color and trek to Thang Bau Che to see Ama Dablam.

In closing, a call out to Zisos Katsiapis. Hey, Zisos! If you read this, shoot me an email: bob.talbert@yahoo.com. I would *delight* in hearing from you. Hey, I'd travel to Greece to see you again! It would be fun! Maybe we could go climbing!

Bob Talbert - 2007

## Chang Kue Park Named 2006 Alumni Society Merit Award Recipient



Chang Kue Park (PhD '86) received the College of Engineering Alumni Society Merit Award for a

graduate of the Nuclear Engineering and Radiological Sciences Department. This award was conferred at the 15th Annual Alumni Society Awards Dinner, which was held on October 27, 2006. The Alumni Merit Awards were established to honor alumni who have achieved significant accomplishments in their professional lives. The award recipients are chosen by the NERS faculty.

Dr. Park is currently serving as President of the Korea Atomic Energy Research Institute (KAERI), a government-supported research institution devoted to the promotion of the peaceful applications of nuclear energy.

Since joining the Institute in 1989, Dr. Park has assumed a broad range of posts. He has served as the Vice President for Applied Research; Advanced Nuclear Technology Development; Advanced Reactor Technology Development; and Nuclear Hydrogen Development. Following on from these positions, he was appointed as Senior Vice President with the responsibility for coordinating all the major projects at KAERI.

As a person active in numerous

professional organizations, Dr. Park serves as a board member of the International Association for Probabilistic Safety Assessment and Methodology; an editorial board member for Reliability Engineering and System Safety; general coordinator for the Korea-Japan PSA Workshop; and public relations director of the Korea Fusion Industry and Technology Association.

In addition, he is a member of the Standing Advisory Group on Nuclear Energy of the International Atomic Energy Agency; a member of the Presidential Advisory Council on Science & Technology; and President of the Korea Nuclear International Cooperation Foundation. As a recipient of numerous professional awards, he has been honored with the Best R&D Award on Nuclear Reactor Technology by the Korean Nuclear Society; recognition as one of the Most Promising Scientists Leading Korea in the 21st Century by Monthly Journal Sindongah; the Best Paper Award by the Korean Institute of Industrial Engineers; and a Letter of Commendation from the United States Nuclear Regulatory Commission.

Dr. Park is currently pursuing a degree in Chinese language and literature at the Korean National Open University.

### In Memoriam

#### Graduates of NERS who passed away during the past year

J. B. Bullock, MSE Nuclear Engineering 1959, died October 6, 2006

Philip E. Meyer, PhD Nuclear Engineering 1974, died May 10, 2007

# Alumni Notes

**Lay Kee (Ricky) Ang (PhD '99)** is an Assistant Professor at the Nanyang Technological University in Singapore. He was invited to visit as a research scholar by Professor Y.Y. Lau from May 21 until June 25 of 2007. His wife Widya and their five-year-old son Gerome, enjoyed their stay in Ann Arbor very much.

**Farzad Ardeshri (BSE '80, MSE ME '82, MSE NE '83)** has been with the Atomic Energy of Canada (AECL) for the past 17 years. He is currently the Licensing Supervisor in the Licensing and Risk Assessment branch. He lives in Mississauga, Ontario with his wife Mahvash and daughter Nisa.

**Brian Arnholt (BSE '95)** took a position with GE Energy in April of this year. He is currently working on the Economic Simplified Boiling Water Reactor (ESBWR) Nuclear Plant Project designing the Distributed Control and Information System and creating a "Digital Control Room." It is "first-of-a-kind-engineering," which is very exciting to him. He moved with his family, wife Linda and their two sons (ages 4 and 6), to Blue Ridge, VA. He invites anyone who is interested in employment opportunities in Salem, VA working with the distributed control systems for the plant or in Wilmington, NC to contact him at [bkarnholt@yahoo.com](mailto:bkarnholt@yahoo.com), or visit [www.gecareers.com](http://www.gecareers.com) to see a complete list of job postings.

**Sandy Cohen (PhD '64)** is still working "a respectable number of hours at my consulting firm (SC&A, Inc.)." He and his wife Gail have been spending a lot of time in San Jose, CA, where "one of our sons has blessed us with grandchildren. We also travel a lot, and I make travelogues as a hobby." They even



have a weekly show on their local public access TV entitled "Travel with Sandy and Gail." The picture was taken in Myanmar (Burma).

**Nesrin Dogan (PhD '93)** is currently an Associate Professor of the Radiation Oncology Department at the Virginia Commonwealth University Medical Center in Richmond, VA.

She was recently promoted to Director of Clinical Medical Physics.

**Richard "Dick" Gullickson (MSE '68)** is now at the Office of Naval Research, leading a joint ONR-DTRA project on nuclear terrorism "and using what I learned in the old NE radiation detection course."

**Colonel Donald Hall, PE (BSE '81)** is currently assigned to the 31<sup>st</sup> Combat Support Hospital, U.S. Army, at Camp Bucca, Iraq, where he serves as the Deputy Commander for Administration.



**John Hallahan (BSE '04)** was in Al Taqadum, Iraq, as of June, serving with HMM-161 (a helicopter squadron) performing as a CASEVAC (Casualty Evacuation) Corpsman (medic). His job there consisted of "flying all over the country and picking up wounded soldiers and Iraqis and transporting them to higher level of care hospitals." Upon his return to the states (scheduled to be in early August) he plans on taking some classes and "hopefully getting ready to apply to med school."



**Marc Keyser (BSE '00, MSE '01)** was married last year to Megan Bezier, who received a degree in Classical Studies from Hillsdale College. They are expecting their first child in mid-July.



**Ed Klevans (PhD '62)** served as a mentor/facilitator at the World Nuclear University Summer Institute held in Cheongju, South Korea from July 9 to August 24, 2006.

**John Luginsland (BSE '92, MSE '94, PhD '96)** was recently honored with the IEEE's Nuclear and Plasma Science Society's Early Achievement Award for contributions to high-current diodes and high power microwave source research. He continues to work for NumerEx, LLC and lives in Ithaca, NY with his wife Leigh Ann Vaughn (Michigan MA '94, PhD '98) who just received tenure at Ithaca College in the Psychology Department.



**Herman Miller (BSE EP '48, MS Physics '51)** comments, "My news is that I got past my 83rd birthday."

**William Price (PhD '72)** retired from a non-nuclear job in health care informatics. He says, "now having a greater degree of freedom, I will be moving back to Ann Arbor to enjoy the town and gown."

**Marc Rosser (BSNE '84, MSNE '85)** is currently serving as the Environment, Health and Safety Manager for the Westinghouse Columbia Fuel Fabrication Facility in Columbia, SC. He is also the proud father of a new graduate from Dutch Fork High School. Kaitlyn will be attending the University of South Carolina in the Pharmacy program. He says, "Michigan was too far away!"

**Joe Schumer (MS '94, PhD '97)** and his family, wife Amy and son Nate, welcomed into their "nuclear



family" a new baby boy. Samuel Clark Schumer was born "one day shy of a slot-machine jackpot" on 07/06/07, weighing 6 lbs and 9 oz, measuring 20.5 inches long.

**Steven Shannon (BSE '95, MSE '97, PhD '99)** has accepted a faculty position at North Carolina State University in the Nuclear Engineering Department, where he will be continuing his work in plasma assisted materials processing. He states "Having the opportunity to teach at NCSU is a

dream come true,” since he has been trying to return to academics for years. “The whole family is very excited about the move back east closer to our family and friends. My wife Deanne hopes to find a teaching job in the area the following fall and we are sure that our daughters, Erin (4) and Rowan (2) will have all sorts of fun when we arrive, as well as pick up cute little southern accents that will force me to become an even more protective father in about 10 years.”

**L. B. Shappert (MSNE '58)** retired from the Oak Ridge National Laboratory January 1, 2004. Most of his work has been in radioactive materials package design and testing. He is an author of numerous papers and two handbooks on the subject and continues to consult with the Laboratory.

**Matt Studenski (BSE '05, MSE '06)** just finished his first two semesters at the University of Florida working on his master's and PhD in Medical Physics. He is currently working on research with Dr. David Gilland

involving a mobile PET/SPECT scanner that can be brought to patients that are critically ill or immobile and cannot be moved to a traditional scanner. The research involves determining the performance capabilities of both the PET and SPECT modalities and preparing the system for possible clinical applications.

**Kristine Svinicki (BSE '88)** was nominated by President George W. Bush in April 2007 to be a member of the Nuclear Regulatory Commission. If the Senate confirms her nomination, Kristine will succeed Commissioner Jeffrey Merrifield, whose second term is ending. Kristine's term would end in June 2012. Currently an energy issues staff member on the Senate Armed Services Subcommittee on Strategic Forces, she has previously served as a senior policy advisor on nuclear and environmental issues for Sen. Larry Craig (R-Idaho). Her experience as a nuclear engineer in the Energy Department's Office of Civilian Radioactive Waste Management, which is in charge of the

proposed Yucca Mountain nuclear waste repository in Nevada, would bring substantial technical expertise to the NRC. Kristine has also recently received a Presidential Citation for contributing to “outstanding work and tireless commitment to improve the nuclear energy, science and technology policies of the United States.”

**Katie Woch (BSE '05)** is starting as the Radiation Oncology Physics Resident at the U-Wisconsin-Madison in August of 2007 after receiving her MS from McGill in Montreal.

To update your U-M Alumni info: <http://www.engin.umich.edu/alumni/updateform.html>  
(This is the source of our newsletter maillist.)

To update your CoE grad alumni info: <https://www.engin.umich.edu/form/gad>

## PhD Recipients Since September 2006

NAME	THESIS TITLE	DATE OF DEFENSE	ADVISOR	AFTER GRADUATION
Davis, Jeffrey	Optimizing Fast Reactors Through Direct Adjoining Control Theory	04/27/07	Lee	U-M NERS
Ding, Tianhua	Self-Organization Process of Three-Dimensional Nano-Void Superlattice Formation in Electron Irradiated Calcium Fluoride	02/19/07	Wang	Cypress Semiconductor
Kiff, Scott	Coplanar Anode Implementation in Compressed Xenon Ionization Chambers	12/05/06	He	Pacific Northwest National Laboratory
Lee, Wonho	A Dual Modality Gamma Camera Using LaC3 (CE) Scintillator	04/24/07	Wehe	Brookhaven National Laboratory
Liang, Liang	Self-Organization Process of Three-Dimensional Nano-Void Superlattice Formation in Electron Irradiated Calcium Fluoride	06/20/07	Larsen	Univ of California-Irvine; Radiation Oncology
Matuszak (Coselmon), Martha	Controlling Beam Complexity in Intensity Modulated Radiation Therapy	07/31/07	Larsen and Fraass	William Beaumont Hospital
McClarren, Ryan	Spherical Harmonics Methods for Thermal Radiation Transport	12/18/06	Holloway	Los Alamos National Laboratory
Sturm, Benjamin	Gamma-Ray Spectroscopy using Depth-Sensing Coplanar Grid CdZnTe Semiconductor Detectors	12/18/06	He	Lawrence Livermore National Laboratory
Sorensen, Reuben	Systematic Method for Optimizing Plutonium Transmutation in LWRs	09/21/06	Lee	Johns Hopkins Applied Physics Laboratory
Tchou, Philip	Visual Performance in Medical Imaging Using Liquid Crystal Displays	09/11/07	Larsen and Flynn	Anderson Cancer Center Medical Imaging, Houston, TX

# Students Entertain at Spring Banquet



## The No "Glow Blue" Blues

Written by Steve Anderson  
Chinese words by Weiyi Wang  
As performed by the He-Men / sung by Weiyi Wang

Special acknowledgments to Peggy and Pam for convincing us to do this. Special thanks to Dr. He for letting us use his name, and encouraging us to do things other than lab work.

I was sit'en in Cooley  
Oh...Boy, I was feeling down.  
Then along came Burcin  
He asked... boy , what's with that frown.  
He said, is it the weather?

Or, is it the flu?

I said... I just can't move on  
...the glow blue is gone  
...so why do I stay  
...the reactor's gone away  
..... Ohhhh...oh.  
I got the blues  
No glow blue blues

Along came Holloway,  
He said, look -  
I've got a plan.  
He said, I'm gonna give you neutrons  
From this little old can  
I said - sorry professor!

Do you think I'm blind?  
Your generator's cool  
But I'm not a fool.  
Your neutrons are very hot  
But I'll tell you they aren't ... blue.....  
I got the blues  
No glow blue blues

Then Professor Martin said  
You should come and see me.  
I've got a little old program  
Its called MCNP  
I said fine, I'll try  
So I, loaded it up

I turned cards into decks  
My tallies were all set  
And then I let it go  
But it was so slow..  
Oh no no no~~~~.  
No glow blue blues

Good old Fleming,  
Came and said, I think you forgot  
We've got Cobalt sixty  
And... son we've got that a lot.  
So I went down to the dungeon of phoenix

I peaked inside,  
I thought he lied.  
How could it be  
I could see....  
the bright blue eyes of Cherenkov .... shining back at me!  
No `mo glow blue...Blues

他们这些美国人  
数学从来特别差  
从来不会做实验  
没完没了弹钢琴  
没法相信  
和他们一起唱

徐丹走了以后  
没人会做数学  
常常就我一个人  
积分到天亮  
始终没发相信  
和Willy一起唱

Those Americans  
Always bad at math  
Don't know how to do experiment  
Play piano all day long  
Can't believe  
With them, I am singing along

After Dan left  
Nobody can do math  
Always alone  
Integration till dawn  
Still can't believe  
With Willy, I am singing along

No `mo glow blue...  
Blues



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