# University Currents

A Newsletter For and About the University Nuclear Engineering and Science Community

*U. S. Department of Energy* *Winter 2005*


## World Nuclear University -- Passing the Torch

By any measure, the World Nuclear University's Summer Institute, conducted at Idaho National Laboratory (INL) over the Summer of 2005, was a success. This premier global event brought together 77 young nuclear leaders from 34 nations for intensive study, discussion and interaction on a wide range of nuclear issues and topics.

The Summer Institute was sponsored by the Office of Nuclear Energy, Science and Technology; Cogena; IAEA; WNA; INL; AREVA; and others. INL hosted the Summer Institute as part of its leadership role in advancing nuclear science and technology for America and the world. The institute was sponsored by the Office of Nuclear Energy, Science and Technology. Among the Institute's goals are:

- Creating lasting bonds among nuclear professionals from many nations, and
- Inspiring participants to commit themselves to advancing the global contributions of nuclear science and technology.

Roy Freud, WNU Fellow from Israel, put it this way: "I wouldn't exaggerate by saying that WNU Summer Institute was a once-in-a-lifetime experience." Freud, a reactor operator at the Nuclear Research Center – Negev, not only learned leadership from some of the world's top nuclear professionals but by the end of the Summer Institute, he also demonstrated it in a special way.

And he was not alone in his satisfaction with the six-week course. "WNU was very useful for me — most useful was the opportunity to communicate with other students from other countries," said Andre Chernoknizhnikov. "I am very interested in the technical aspects of nuclear power."


"Our government is concerned about climate change," said Chernoknizhnikov, who is from Russia. "We depend on the snow. It's a problem from the agricultural side and also from the Kyoto protocol point of view. Our carbon emissions are not as great as the U.S. or Western Europe because we have less industrial production since the breakup of the Soviet Union."

"Nuclear power has big potential," said WNU Fellow Igor Vukovic of Croatia. "Oil and gas prices are rapidly increasing and that trend will continue. Oil and gas are concentrated in a few places in the

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Passing the Torch

world. This is a big opportunity for nuclear. It's clean technology compared to fossil fuels. The organizers of WNU did their best, I would say. The lectures were excellent."

**Necessary for the future**

"Egypt has no nuclear power plants but only plans," said WNU Fellow Mohamed Gaheen. "It is an advantage to know the comparison between nuclear and other energy sources as the climate changes."

"Nuclear power is necessary for the future, not only for production of electricity, but also to develop our industrial power," Gaheen said. "It's a good investment for our national life. The nuclear plant site has been selected and characterized – it's very important to build a nuclear power plant."

Dr. Yanek, a Bulgarian from the International Atomic Energy Agency, reflected that India has 14 operating nuclear plants with eight more under construction. He also remarked that since the year 2000, 47 nuclear plants have come online or begun construction around the world — most in Asia. Yanek is pleased to see that growth.

"Everybody knows it will be good to get there [resurgence of nuclear power providing needed energy across the globe]," Yanek said. "It's how we get there that's the problem. There are developing countries — particularly China and India — whose economies are growing like crazy. People want to work and produce — and they need energy. They either will burn fossil fuels, or you help them with nuclear power and with renewables."

WNU arrived on the scene as the factors of worldwide interest and demand, environmental concerns, and new national commitments to nuclear power were coalescing. One indicator is the nations represented at the Summer Institute: Argentina, Armenia, Brazil, Bulgaria, Canada, Chile, China, Croatia, the Czech Republic, Egypt, Finland, Germany, Ghana, Hungary, India, Italy, Israel, Japan, Kazakhstan, Lithuania, Mongolia, the Netherlands, Mexico, Romania, Russia, Slovakia, Slovenia, South Africa, Sweden, Turkey, Ukraine, the United Kingdom and the United States.

**Appropriate human infrastructure**

Another indication of the growing importance of nuclear power is the WNU approach – building a network of young global nuclear leaders who can articulate the benefits of nuclear technology to their peoples and governments.

"To run such a heavily knowledge-loaded technology, you need an appropriate human infrastructure. Not every country can do that. They can't afford to," Yanek said. "For those nations that can and do participate, we have an excellent university group of very enlightened professionals. WNU is a political platform, but most of all it is a partnership — academia, industry, everyone is bringing to the table everything they have."

WNU fellows attending one of the Summer Institute lectures

As part of their study, the "students," who were divided into teams, worked closely with mentors and technical experts on numerous projects in the broad areas of nonproliferation, energy policy, and nuclear cancer therapy.

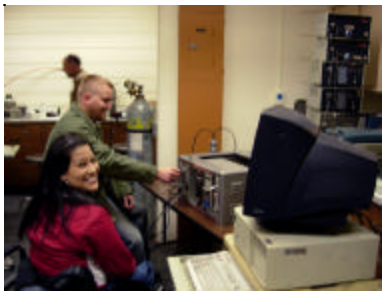
Simply speaking, the students got fired up. World Nuclear University charged their batteries with new enthusiasm for the peaceful use of atomic power – and renewed their vision of nuclear power's ability to help an energy-hungry world.

"This is an exceptional group of future world leaders of the nuclear enterprise," said James Lake, INL Associate Laboratory Director for Nuclear Programs. "INL has been proud to contribute to this six-week Institute, and we are eager to host future activities of this kind. We all hope that the Institute Fellows have developed strong relationships with their peers from around the world that will serve them and us well in promoting the peaceful uses of nuclear technology in the future."

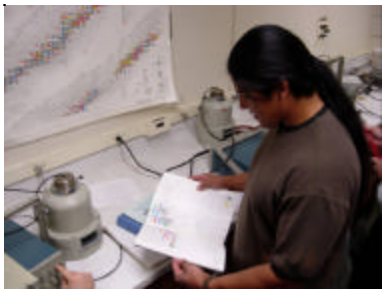
# United States Department of Energy's Nuclear Engineering University Partnership Award

The Chemical and Nuclear Engineering Department (ChNE) and Institute for Space and Nuclear Power Studies (ISNPS) at the University of New Mexico (UNM) are proud to introduce the University of New Mexico's Nuclear Engineering Seniors who have been supported by the Department of Energy's Nuclear Engineering University Partnership Award (DOE-NEUP). Pictured below from left to right are Abin Fairbanks, Senior; Julia E. Fulghum, Chair, Chemical and Nuclear Engineering Department; Tri Trinh, Senior; Scott Emerson, Senior; Terry Morton, Senior; Steven Saavedra, Senior; Robert Busch, Assistant Professor; Mohamed S. El-Genk, Professor and Director of the Institute for Space and Nuclear Power Studies; and Danielle Hensen, Senior. These students, who will graduate in May of 2006, have consistently maintained a GPA between 3.5 – 4.06. These students are 6 out of 12 graduating students that have been supported through this DOE program over the last 3 years.

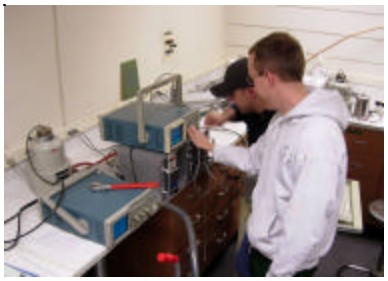
The University of New Mexico's Chemical and Nuclear Engineering laboratory equipment has been updated and expanded by funds, in part, from our partnership with DOE-NEUP. We are proud now to accommodate twice the number of students in these classes, which were previously limited by the amount of equipment available.



Students Paul Smith and Veronica Padilla working with a scintillation detector and multi-channel analyzer (MCS) identifying radionuclides.



Student Conrad Valencia working with the Chart of Nuclides and a Geiger-Mueller detector to identify beta radiation energy.

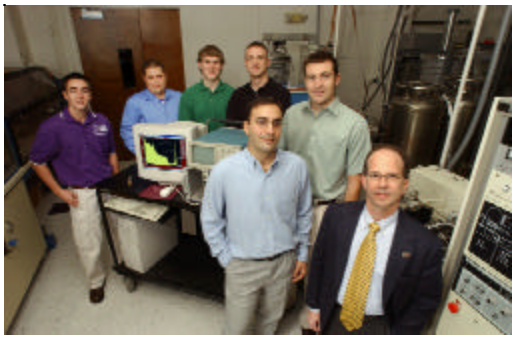


Students Triston McDonald and Bryce Greenfield working with a multi-channel scaler (MCS) system to determine the half-life of an isotope.

The University of New Mexico

# Advances in Detector Technology at the Kansas State University SMART Laboratory

In 2002, Prof. Douglas McGregor moved the Semiconductor Materials and Radiological Technologies (SMART) Laboratory to the Mechanical and Nuclear Engineering (MNE) Department at Kansas State University (KSU). Since then, the lab has more than doubled in size and now supports 12 undergraduate and 12 graduate students through research projects involving development of various new types of radiation detectors. The SMART Laboratory is fully equipped with all tools necessary to develop semiconductor radiation detectors from start to finish. This includes crystal growth, detector fabrication, electronics design, characterization, packaging, and deployment. Its establishment at KSU, along with revitalization of the KSU TRIGA Mark II nuclear reactor facility, has helped increase interest and student enrollment in the nuclear engineering undergraduate and graduate programs.

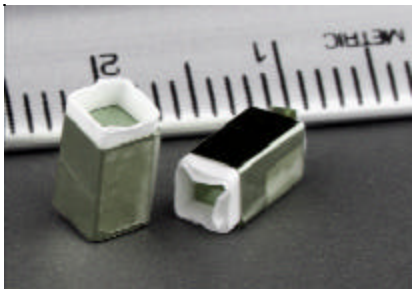


From left to right: Chris Ward, Adam Graebner, Andrew Jones, Mark Harrison, Alireza Kargar (front), Walter McNeil, and Professor Douglas McGregor. The group collectively grows CdZnTe crystal ingots, and fabricates CdZnTe Frisch collar gamma ray spectrometers, and characterizes their performance.

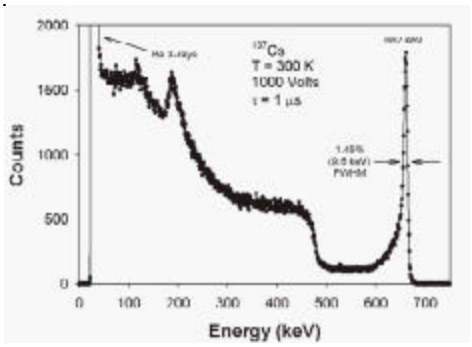
Recently, a novel form of a gamma ray spectrometer has been designed, developed, and characterized in a project funded by a Department of Energy's Nuclear Engineering Education Research (NEER) grant. The detectors, built from a heavy-element semiconductor, CdZnTe, utilize a simplistic solution to a complex problem. CdZnTe allows for enhanced radiation detection because of its ability to efficiently absorb gamma radiation and operate at "room temperature," unlike typical Ge-based gamma ray spectrometers that must operate at cryogenic temperatures. Unfortunately, due to material imperfections, CdZnTe performance has been inhibited by its inability to produce uniform signals for gamma ray interactions.

Professor McGregor's team (pictured above) starts with blocks of CdZnTe semiconductor and cuts, polishes, and shapes the pieces, and then puts metal contacts at either end, the most basic and simple detector design. The trick to increasing performance turns out to be astonishingly simple. Using the concept applied to Frisch gridded gas-filled ion chamber detectors, they wrap the detector block in Teflon and copper tape, which works to negate the influence of the crystal imperfections, and ultimately results in the planar detector's outstanding energy resolution and performance. The easily manufactured detectors operate with inexpensive, commercial "off-the-shelf" electronics, and cost only a fraction of other spectrometer designs to produce.

The invention was conceived by Prof. McGregor and Ronald Rojeski of Rojeski Research Engineering and Design. Two patents have been allowed on the detector, and this year the device, in a collaborative research effort between the SMART Laboratory and Brookhaven National Laboratory, won an R&D 100 Award for being one of the 100 most technologically significant inventions for the year 2005.



Two CdZnTe Frisch collar gamma ray spectrometers. The simple construction, composed of a planar detector wrapped in Teflon and copper tape, produces outstanding spectrometer performance at a fraction of the cost of other designs.




A gamma ray spectrum, taken at room temperature with one of the many CdZnTe Frisch collar spectrometers fabricated in the SMART Laboratory.

# Innovation in Nuclear Education -- Idaho 2 +2 Scholars Program

The 2 + 2 Scholars Program is a new concept in undergraduate education in nuclear science and engineering. The three Idaho research universities, Idaho State University (ISU), University of Idaho (UI), and Boise State University (BSU), are cooperating under the auspices of the Institute of Nuclear Science and Engineering to advance nuclear education by participating in this program. Students take courses for their first two years on their home campuses. They are admitted to the 2 + 2 program as juniors and spend their junior and senior years at Idaho State University working to complete the coursework for their Bachelor of Science degree in Nuclear Engineering.

This program is affiliated with the Idaho National Laboratory (INL) and the Center for Advanced Energy Studies in Idaho Falls. Its goals directly serve the vision of DOE and INL to revitalize nuclear science and engineering research and education in the United States. The students work closely with top experts in the field. During the summer after their junior year and in the fall of their senior year, they hold paid internships at INL working on projects that will lead to the senior project required for graduation.

In addition, AREVA Inc., the leading U.S. nuclear supplier, is providing funding for full tuition and fees and a book allowance, as well as offering a monthly stipend for some living expenses. The program includes special field trips and pays for attendance at national nuclear conventions and meetings.

Six students received 2 + 2 scholarships this year. Here are statements from some of these first recipients.

Kurt Vedros, BSU, says, "The 2 + 2 Program offers a great opportunity that I wouldn't have if I were elsewhere and that is being able to work with a mentor at INL. This kind of hands-on experience will prove invaluable towards getting me up-to-speed and shorten the learning curve as a nuclear engineer, whether that be in industry or research. I definitely would not have been able to pursue this degree without the financial help I am receiving."

Nathan Zohner, UI, said he switched his major from mechanical engineering to nuclear engineering because "This is absolutely an excellent program. It is an amazing time to be in nuclear energy. The students appreciated the groups actually stepping up and giving money to help the students pursue their nuclear engineering degrees." Nathan is currently on an INL internship during the fall semester and will continue during the spring semester working on the material condition assessment for the Advanced Test Reactor Life Extension Program.

David Boyter, ISU states "Anyone considering this program should know that hard work is required. But I believe that the benefits will far outweigh the demanding journey."

Francine Rice, ISU reports, "I chose to enter this field because I feel there is an urgent need in this country for real energy alternatives, and I believe that nuclear power addresses that need. What I like about this program is that we are a tight group and help each other; and, even better, we are all excited about the same thing."

Until recently Christopher T. Laws was pursuing a degree in electrical engineering to gain a background before entering a graduate school where he would study Nuclear Engineering.

"My decision to apply for the 2+2 scholarship is due to my interest in the nuclear field," Chris states. "Idaho State University recently established a nuclear engineering degree, such that I can apply the knowledge and some coursework I had gained in electrical engineering to focus

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# Happenings at North Carolina State University's Nuclear Engineering Department

## Science Teachers Benefit From University-Utility Partnership

North Carolina State's Nuclear Engineering Department and Progress Energy's Shearon Harris Nuclear Power Plant jointly conducted the 2005 Science Teachers' Workshop. It was an opportunity for teachers to interact with professors, graduate students, engineers, and professional staff. The goal was to provide teachers with information and resources that they can take back into the classroom. Teachers from as far away as Asheville attended this two-day workshop offering a combination of lectures, laboratories, demonstrations, and tours. The topics covered included: basics in fusion and plasma concepts, radiation and radioactivity, radiation and biological effects, nuclear power generation and the neutron life cycle, and plant controls and decision-making processes to name a few.

Attendees are the first group to participate in a joint NC State Nuclear Engineering Department-Shearon Harris Nuclear Power Plant two-day science teachers' workshop

## Future Nuclear Engineers At Three-Week Camp

If the 2005 Young Investigators' Summer Program in Nuclear Technology is any indication, nuclear engineering is a subject of interest for future generations. Young Investigators date back to the mid 1980s and offer an opportunity to juniors, seniors, and graduated high school seniors to get up close and personal with the technology. Students from North Carolina, New York, Connecticut, Maryland, Tennessee, Florida, Texas, Georgia, and South

High school students get instruction on radiation detection lab from current NC State Nuclear Engineering student, Robert Knox at 2005 Young Investigators' Summer Program

Carolina spent three weeks participating in lectures, laboratories, small group projects and industry field trips. The projects this year included: benchmark experiments for an existing radioactive particle tracker, PULSTAR nuclear reactor facility operator training, real-time neutron imaging of oil foaming in internal combustion engines, and a light-sensitive monitor for the measurement of nuclear reactor power.

## International Collaborations with NC State's Nuclear Engineering Department

At North Carolina State University (NCSU), nuclear and textile engineers have joined forces with textile scientists from Egypt to create textiles that have permanent antimicrobial properties. Dr. Mohamed A. Bourham, professor of nuclear engineering, and Dr. Marian G. McCord, associate professor of textile engineering, chemistry and science and biomedical engineering, are working with Professors Samiha Gawish and Ameera Ramadan from the National Research Center in Cairo, Egypt, to produce this new generation of antimicrobial textiles.

NC State's Nuclear Engineering Professor, Mohamed Bourham, along with textile professor, Marian McCord, hosted Professors Gawish & Ramadan from the National Research Center in Egypt.

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Using atmospheric plasma and glycidyl methacrylate (GMA), a chemical catalyst, to open the molecular bonds of fibers, the research team has been able to successfully attach antimicrobial agents to the molecular structure of fibers, creating a permanent bond between the fibers and the agent so that washing and wearing do not reduce the efficacy.

Sponsored by the National Science Foundation (NSF) and the United States Department of State through the US Embassy in Egypt, the joint research project has potential for defense, homeland security, and health care applications. For example, a soldier or emergency responder wearing clothing made of this special fabric could be protected from biological agents. Other applications include surgical scrubs and hospital bedding, which could lead to reduced infection rates among patients.

**Idaho National Laboratory Director Speaks at North Carolina State University**

Mr. John Grossenbacher, Executive Director of Idaho National Laboratory, spoke at North Carolina State's Department of Nuclear Engineering as their 2005 Distinguished Executive Lecturer. His lecture and small group meetings with faculty and students focused on shaping a new paradigm and joining the immediate and future needs of the nuclear industry with the capabilities of a national laboratory and associated university research entities, all focused on nuclear energy development for the nation.

NC State Nuclear Engineering students met with Mr. John Grossenbacher, executive director of Idaho National Laboratory, during his visit to campus. Mr. Grossenbacher was the 2005 Distinguished Executive Lecturer.

**Students Active On & Off Campus**

Elijah Martin is one of many students in the NC State's Nuclear Engineering Department engaged in research. He is one of the 2005 Undergraduate Research Award recipients, a student reactor operator in NC State's Nuclear Reactor Program, and participant at the 2005 NC State University Undergraduate Research Symposium. His symposium topic, which was co-authored with Greg Hahn, was entitled "*Characterization of Arc Generated Plasma Interactions with a Liquid Metal Medium*". This past summer he received the National Undergraduate Fellowship in Plasma Physics and Fusion Engineering. The fellowship took him to Princeton for a week and then onto his research site—Los Alamos National Lab—for the remaining nine weeks.

**Nuclear Engineering Students Give Back Through Engineers' Council**

This past year the Engineers' Council sponsored the largest Engineering Career Fair in the college's history. The event attracted more than 100 companies to the campus, and 1,685 students attended. This annual event, which brings potential employers and current students together, is so successful that the Engineers' Council has recently pledged to increase their endowment to $100,000 over the next five years.

At the annual Engineers' Council banquet, council president and nuclear engineering undergraduate senior, Tyler Schweitzer, presented a check to the NC State Engineering Foundation for $25,000 to supplement the Engineers' Council endowed scholarship fund. As part of the university's current fund-raising campaign — *Achieve! The Campaign for NC State* — the Engineers' Council presented the College of Engineering with an additional $12,500 and pledged to create a $100,000 endowment over the next five years. The announcement was made at the Campaign Kickoff in September 2005.

**NC State to Receive $1 Million NSF Grant to Establish Intense Anti-Matter Beam -- *Facility will be the only one in the U.S.***

The Department of Nuclear Engineering at North Carolina State University, in collaboration with researchers from Oak Ridge National Laboratory (ORNL) and the University of Michigan, has received a $1 million major research instrumentation (MRI) grant from the National

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Science Foundation (NSF). The funding will support the establishment of an intense positron (anti-matter) beam at the NCSU PULSTAR nuclear reactor and the development of an intense positron annihilation spectrometry system for nanophase characterization. The facility will be the only one of its kind at a university research reactor in the U.S.

The unique facility will provide two different spectrometers for the nondestructive probe of matter, giving next-generation materials researchers a new way to "see" the structure inside nanomaterials. One spectrometer, a positronium PALS spectrometer, will be able to study nanoporous thin films and patterned microelectronic devices. The other instrument, a time-bunched positron PALS spectrometer, will be used for studying metals and semiconductors. "These probes are essential for the further development of nanotechnology," said Dr. Ayman Hawari, Associate Professor of Nuclear Engineering and Director of the Nuclear Reactor Program at NC State. "Intense positron annihilation spectrometry will give researchers a more powerful tool — by several orders of magnitude — for studying the structure of newly developed materials."

*Engineers' Council leaders Tyler Schweitzer, Joe Morrow, Alex Carter, Laura Shearon, Casey Fields and Sara Brumbaugh meet on the steps of Page Hall.*

The NC State, ORNL, and Michigan team built a prototype instrument that demonstrated the ability to produce and extract positrons near the core of the PULSTAR reactor. Once completed the new facility, complemented by PULSTAR facilities for neutron scattering, will form the centerpiece for North Carolina National Center for Nanophase Characterization (NC)3. Then, it will be available to academic researchers.

**The positron beam project grew out of the Multi-University South-east INIE Consortium (MUSIC) that is led by the Department of Nuclear Engineering at NC State and funded through the Innovations in Nuclear Infrastructure and Education (INIE) program. The INIE program provides funding for developing ways for university research reactors to perform unique fundamental and applied research.**

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"Idaho 2+2"

on my interests. The scholarship program provides an excellent education along with an internship at the Idaho National Laboratory between my junior and senior years."

"There are also opportunities for the participants to be able to attend American Nuclear Society student and professional conferences as well as visit and tour facilities that will increase our understanding of our classroom education," says Chris. "In short, it has provided me with a chance of a lifetime."

Chris is currently an intern at INL working on system dynamic modeling of the U.S. nuclear fuel cycle. He began his internship in the summer of 2005 and will also continue an internship during the spring semester.

The 2 + 2 scholarship affords students involved with an opportunity to gain hands on experience with professionals who are working on current engineering challenges in the nuclear field. Eventually, it is planned that a dozen or more students per year will be able to enroll in the program, which organizers predict will become ever more competitive to enter.

# Rensselaer Polytechnic Institute's Nuclear Engineering and Engineering Physics Program

Some of the developments at Rensselaer Polytechnic Institute include:

Dr. George Xu leading a team of researchers was awarded a three-year, $2.1 million grant from the National Institutes of Health (NIH) to develop 3-D virtual patient models that will more accurately compute radiation doses for CT imaging, nuclear medicine, and radiation treatment of cancer patients. The grant is funded by the National Cancer Institute, part of NIH. Additional researchers from Rensselaer, Vanderbilt University Medical Center, the University of Florida, and Massachusetts General Hospital are bringing expertise in the diverse fields of computer science, CT imaging, nuclear medicine, and proton therapy to the multi-disciplinary project.

Rensselaer's 100 MeV Electron Linear Accelerator is currently undergoing a major upgrade. The $750,000 project includes the installation of a new electron gun and injector system, which will enable the research facility to move into intermediate-to-high energy neutron measurements.

Dr. Robert C. Block, Director of Rensselaer's Gaerttner LINAC Laboratory, was awarded the Seaborg Medal at the recent ANS winter meeting in Washington, DC. Established in 1983, this award recognizes an individual who has made outstanding scientific or engineering research contributions to the development of peaceful uses of nuclear energy. Recipients reflect a high degree of scientific acumen, imagination, and unusual talents in scientific research.

**Rensselaer's student chapter of the American Nuclear Society is preparing to welcome visitors from across the US to the 2006 ANS Annual Student Conference, which will be held on the historic Troy campus from March 30th to April 1st. The theme for the conference is "Nuclear Power: A Look at the Future."**

# Robert E Uhrig Honored by ASME

Dr. Robert E. Uhrig (left in photo), University Distinguished Professor Emeritus at The University of Tennessee (UT) and Distinguished Scientist Emeritus at Oak Ridge National Laboratory (ORNL), was recognized by ASME for more than five decades of high achievement and leadership in the power field, resulting in safer and more effective power generation. He received the Society's ASME Medal, ASME's highest award. The medal, established in 1920, is awarded for eminently distinguished achievement and includes a cash award of $15,000. It was presented to Uhrig during the 2005 International Mechanical Engineering Congress and Exposition, which was held in Orlando, Fla., Nov. 5 through 11.

Uhrig retired, December 31, 2002, from a joint appointment as distinguished professor of engineering in the nuclear engineering department at UT, Knoxville, and as distinguished scientist in the Nuclear Science and Technology Division at ORNL under the UT/ORNL Science Alliance Program (1986-2002). His work at both institutions concerned the application of artificial intelligence methods to nuclear power plants and other complex systems.

Uhrig received his bachelor's degree, with honors, in mechanical engineering at the University of Illinois, Urbana-Champaign, in 1948. He earned his master's and Ph.D. in theoretical and applied mechanics (now part of aerospace engineering) at Iowa State University in 1950 and 1954 respectively. He is a registered professional engineer in Florida and Iowa.

Founded in 1880 as the American Society of Mechanical Engineers, today's ASME is a 120,000-member professional organization focused on technical, educational, and research issues of the worldwide engineering and technology community. In 2005, ASME celebrated 125 years of continued service and leadership –*setting the standard* – for professional engineering societies worldwide.

# University
# Nuclear & Radiological

The highlight of the Nuclear and Radiological Engineering (NRE) Department's 2004-05 academic year was when NRE Alumnus and NRE Professor-Emeritus Dr. Nils Diaz, Chairman of the Nuclear Regulatory Commission, received the University of Florida (UF) Distinguished Alumnus Award at the spring commencement. According to the University, Dr. Diaz's contributions made a "…significant impact on the security and future of the United States and the world." He was cited by College of Engineering Dean Pramod Khargonekar for playing a leadership role in security issues affecting NRC licensees and was instrumental in strengthening security post-9/11 by using realistic and practical nuclear plant scenarios.

College of Engineering Dean Pramod Khargonakar presents Dr. Nils Diaz with the Distinguished Alumni Award at spring commencement in the O'Connell Center in April.

"This is indeed an honor for Dr. Diaz and also his former department," said Department Chairman, Dr. Alireza Haghighat. "The tribute to him is long overdue and accords him the measure of respect he well deserves." Dr. Diaz has been a long-time contributor to the success of NRE.

Dr. Diaz received his Ph.D. in nuclear engineering in 1969 and was a department professor for more than 25 years. During this time, he founded (and for 11 years directed) the Innovative Nuclear Space Power Propulsion Institute (INSPI), a national consortium of industries, universities and national laboratories located on campus.

Introducing Dr. Diaz to the packed commencement crowd and 800 awaiting graduates, Dr. Haghighat offered these encouraging words: "Graduates, I hope you take Dr. Diaz's career as an example. Work hard, believe in yourself, and believe in our nation and mankind."

**Nobel Prize Winner Adds Honor to Nils Diaz Award**

To further honor Dr. Diaz, NRE sponsored a lecture by distinguished professor Dr. Samuel C. C. Ting, the 1976 Nobel Prize winner in Physics. Dr. Ting is the Thomas Dudley Cabot Professor of Physics at MIT. His presentation was on his research into space travel using nuclear power – which appeals to both Dr. Diaz and current INSPI director, Dr. Anghaie. A large group of professors, students, and others attended the lecture and the luncheon that followed.

Dr. Haighighat joins Dr. Nils Diaz and Dr. Samuel C. C. Ting, MIT professor and Nobel Prize winner in Physics, to celebrate Dr. Diaz receiving the UF Distinguished Alumnus Award.

**Society of Health and Medical Physics Workshop**

UF's Nuclear & Radiological Engineering Department conducted a one-day workshop in April for introduction of high school teachers to the health and medical physics professions and overall application of radiation. This workshop was organized by the Society of Health and Medical Physics Student (SHMPS) Chapter; and twenty teachers from Florida counties participated at the workshop. SHMPS is a newly combined group of graduate students. Faculty presentations were made by Drs. Baciak, Bolch, Haghighat, Hintenlang and Vernetson.

"This type of educational activity is essential for our discipline/profession which is highly misunderstood. Moreover, teachers represent the best group who can help

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us both in spreading our message and recruiting excellent students," said NRE Chairman Dr. Haghighat.

**Faculty and Student Highlights**

Medical Physics graduate student Kyle Jones was awarded the American College of Medical Physics' (ACMP) prestigious Graduate Student Award for 2005. The award recognizes Kyle's outstanding research efforts and leadership activities in preparation for a career in Medical Physics. The award provided full expenses for Kyle to attend the 2005 ACMP Meeting. Kyle is a Ph.D. student of Dr. David Hintenlang's and is the first University of Florida graduate student to be nominated for the Graduate Student Award.

The total research contribution brought into UF by the Nuclear & Radiological Engineering department has reached $3.7 million. What's more, in 2004, the NRE faculty was awarded the highest amount of funding per faculty at the College of Engineering.

- Prof. James Tulenko has completed his term as president of the ANS at the June, 2005 meeting. As ANS president, Prof. Tulenko gave presentations to nearly all ANS chapters across the U.S. and met with nuclear representatives in China, France, Japan, Taiwan, and Austria. Prof. Tulenko has eight ongoing research projects, including one investigating how nanofluids could help to improve the heat transfer from the fuel rods to the coolant.

Dr. Bill Vernetson, Director of the UF Training Reactor, gives one of four College of Engineering-sponsored day-camp visits to middle school students during the summer.

- Prof. Wesley Bolch was featured at the UF College of Medicine-sponsored annual "Cancer Center Grand Rounds." Dr. Bolch and two other professors from the Medicine and Pathology departments delivered session lectures on the topic, "Bone Marrow: Target or Victim of Treatment." The lecture drew dozens of people from industry and medical centers to discuss the function of bone marrow, identify how cancer affects bone and bone marrow, and identify new techniques to deliver radionuclides to skeletal tissue. The College of Medicine offers credits toward the AMA Physician's Recognition Award.
- Associate Prof. Edward Dugan continues successful research on radiographic imaging techniques applied to nondestructive examination. For example, in Lateral Migration Radiography (LMR), the patented techniques are being used to inspect NASA Space Shuttle external fuel tank insulation for flaws. The system can locate even the smallest of voids and tiny cracks in composite materials and also airplane metals. The X-ray system was recently patented by Dr. Dugan and Emeritus Prof. Dr. Alan Jacobs.

**UF's Nuclear Program Promoted in Mexico**

Information about UF's Nuclear & Radiological Engineering Department was published on the web site of the Asociacion de Jovenes per la Energia Nuclear en Mexico (AJENM), the Youth Association for Nuclear Energy in Mexico (YANEM). Armando Torres, the AJENM's leader, works at the Instituto Nacional de Investigaciones Nucleares, and the organization is seeking to start a course in PENTRAN next year with help from Dr. Ali Haghighat, UF's nuclear department Chairman. Armando is founder and actual president of Youth Association for Nuclear Energy in Mexico. YANEM is a branch of the North American Young Generation in Nuclear, which unites professionals under the age of 35 who believe in nuclear science and technology and are working together throughout North America to share their passion for nuclear energy.

Mr. Torres says, "El hombre sin sueños que se resigne a tener dueños," which translates to mean, "A man without a dream is a slave."

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# World Nuclear University Fellow Builds Global Ties With Isotope Donation

**An Israeli researcher** came halfway around the world this summer to study nuclear technology and leadership at Idaho National Laboratory – then demonstrated his skills by an act of humanity that will help cancer patients in two developing nations.

Roy Freud was one of 77 Fellows from 34 nations at the World Nuclear University Summer Institute recently completed at INL. On nearly the last day of the six-week course, Freud – a reactor operator at the Israel Atomic Energy Commission Nuclear Research Center – heard a presentation showing that Mongolia and Ghana both need iodine-131, a radioisotope, to use in cancer treatment. Iodine-131 is not a weapons grade material and cannot be used in a nuclear weapon.

Roy Freud

**"I thought there was** something I could do about this," Freud said. "I called my father (Dr. Amos Freud), who is the head of radiochemistry at the research center, and asked him if it would be okay to donate this radioisotope, which is used in treating thyroid cancer. He gave his approval and was very enthusiastic about it."

There were some limitations – Israel could only agree to provide the isotope at cost – but that is a substantial savings from the market price for the two recipient nations. The U.S. government is not a party to this transaction, and all International Atomic Energy Agency regulations will need to be followed.

"The WNU Fellows were excited that this happened," said WNU coordinator Karen Leibert. "Here they have been learning both technical things and how to show leadership, and Roy Freud gave a valuable demonstration of it. WNU is focused on developing increased international cooperation in nuclear technologies – and that's exactly what Israel did."

INL Associate Laboratory Director James Lake was not surprised.

"This is an exceptional group of future world leaders of the nuclear enterprise," Lake said. "INL has been proud to contribute to this six-week Institute, and we are eager to host future activities of this kind. We all hope that the Institute Fellows have developed strong relationships with their peers from around the world that will serve them and us well in promoting the peaceful uses of nuclear technology in the future."

**Now, WNU will be working** with the International Atomic Energy Agency to see if further international help can be arranged to pay shipping costs and even part or all of the isotope cost.

"Israel is not the U.S. We are not able to donate it free of charge, but it is an act of charity for us to give it at cost," Freud said. "Who knows? Perhaps when you hear the words 'Israel's nuclear industry' in the future, you will think more positively of it."

In one of the closing addresses of the six-week WNU Summer Institute, INL Laboratory Director John Grossenbacher spoke to the international group on qualities of leadership.

"The WNU Summer Institute is a huge occurrence," he said. "Don't underestimate the impact you can have through the relationships you've developed here and the perspectives you have gained. Be bold and exercise initiative. "

Freud acted to alleviate a demonstrated need – and WNU chalked up a contribution to greater global cooperation in using nuclear energy – peacefully – for all mankind.

# Annular Fuel Post-Irradiation Examination at the Massachusetts Institute of Technology

A post-irradiation examination (PIE) at the Massachusetts Institute of Technology (MIT) research reactor of two prototype fuel segments was completed in September 2005. The purpose of the examination was to verify fuel burnup and fission gas release and to determine if fuel relocation and densification had occurred. Gamma spectroscopy was employed in a specially designed hotbox facility that provided a cost-effective means for non-destructive examination of the irradiated rods.

Hotbox facility (interior) with shielding to examine the irradiated fuel

Hotbox facility (interior) at the MIT Reactor Laboratory

This PIE was a part of a Nuclear Energy Research Initiative (NERI) project to examine the potential for a high-performance advanced fuel for pressurized water reactors (PWRs). The prototype rods used an innovative annular design that allows the reactor coolant to flow over the outside of the rod and through a central channel, thus increasing heat removal relative to the standard pencil-like fuel design. This new design will allow existing PWRs to run at higher power densities while maintaining current thermal safety margins.

Extensive computer modeling was used, along with a variety of materials and manufacturing methods, to optimize the geometry of the annular fuel and predict its behavior during irradiation. The resulting designs, manufactured by Atomic Energy of Canada, consisted of an annular Zircaloy cladding filled with 5% enriched $UO_2$ powder packed to about 82% theoretical density. At MIT, these rods were sealed into annular aluminum capsules to isolate the rod from the primary coolant in the event of a cladding failure.

Prototype annular fuel segments, designed at the MIT Center for Advanced Nuclear Energy Systems (CANES) and manufactured by Atomic Energy of Canada.

Fuel segments sealed in aluminum capsule.

Following three months of irradiation in the core of the MIT research reactor, the capsules were removed and cooled for one year in spent fuel storage.

During that time of involvement in the design of the PIE facility at MIT, the procedures were written for transferring the capsules by cask from the spent fuel pool into the hot box for examination.

Remote manipulators were used to perform a visual examination of the capsules, and then a series of gamma scans at points along the axis of each capsule were conducted. The scanner was collimated to view only a slice 1/16" at a time, allowing an analysis of the spatial distribution of isotopes in the capsule. An analysis of the spectrum at each location enabled an estimate of the location of the fuel rod within the capsule and of the fuel within the rod. It was then possible to compare these to the as-manufactured specifications.

Using the spectra generated during the scans, calculations were made of the activity of several important isotopes, such as Cesium and Krypton, within the fuel and plenum, and those activities were used to estimate burnup and fission gas release. Measurement of the ratio of Cs-137 to Cs-134 in the fuel lead to the generation of burnup predictions within 6% of what was calculated using an MCNP analysis. In addition, measurement of the activity of Kr-85 in the fuel versus the activity in the gas

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# DOE Announces Grants to Clark Atlanta/Georgia Institute of Technology and Lincoln University/University of Missouri-Rolla

The Department of Energy (DOE) awarded grants to two university partnerships to establish a collaborative nuclear engineering program. The partnership between Clark Atlanta University, a minority-serving higher education institution in Atlanta, Ga. and Georgia Tech, and Lincoln University and Missouri-Rolla will provide new opportunities in nuclear science and engineering for undergraduate students at Clark Atlanta and Lincoln Universities.

The DOE grants, awarded over three years through a competitive peer review process, will help students from the two minority institution by providing an undergraduate minor in nuclear engineering. It will also allow several outstanding students to enroll in the master's and doctoral programs at Georgia Tech and Missouri-Rolla. Under this program, the students will learn about the technical and scientific issues associated with nuclear science and engineering and gain the opportunity to enter one of the highest-paying technical careers in the United States.

This new partnership will involve a significant effort on the part of the faculty and administrators from both institutions. The program will involve developing a new curriculum to support the Clark Atlanta and Lincoln minor degree program. The students entering the program will have greater access to DOE national laboratories, research programs, and educational assets.

Under the Energy Department's Nuclear Engineering University Partnership Program, more than 60 students at minority-serving institutions have entered studies in nuclear science and technology.

# Sharing Adventures in Engineering and Science (SHADES)

SHADES is an annual activity designed to promote science among 6th and 7th grade female students.

On Saturday November 5, the 25th SHADES Workshop was held at Pellissippi State Technical Community College in Knoxville, Tennessee. Attendance was excellent with 68 girls representing 10 schools from 5 different counties in Tennessee. Staff from the Nuclear Science and Technology Division (NSTD) at Oak Ridge National Laboratory (ORNL) helped in the organization of the workshop. Peggy Emmett of NSTD has been instrumental in the SHADES series of workshops. Julie Ezold and Katherin Goluoglu from ORNL also were on hand for the varied activities. Two University of Tennessee (UT) Nuclear Engineering students, Julia Danzer and Cheryl Eddy, also assisted.

Several grade school teachers accompanied the students and participated in a workshop on "The Joy of Toys", presented by Dr. Kristen Rearden of the UT College of Education.

Among the student topics covered were: The Molecule of Life - DNA, Microbiology and Food, T-Shirt Chromatography, Confectionery Chemistry (Making Ice Cream), Mathematics of Spinners, and Measuring What You Can't See.

The Design Competition was entitled "Flood Rescue Raft", an exercise in building a raft to use to rescue people who are stranded due to a flood. The winning raft was the one that could rescue the most people without either sinking or causing people to fall overboard. The overall favorite session was the T-shirt design followed by the session on making ice cream.

Haley of Tellico Plains Junior High School participated in designing a flood rescue raft.

# Course on Innovations in Nuclear Infrastructure and Education

From July 11 to 15, 2005, the University of Missouri-Columbia hosted a course supported by the U.S. Department of Energy's Office of Nuclear Energy, Science and Technology Innovations in Nuclear Infrastructure and Education program grant to the Midwest Nuclear Science & Engineering Consortium on nonproliferation issues for weapons of mass destruction. The course attracted 36 students from Tennessee, Oregon, Puerto Rico, Georgia, Massachusetts, Michigan, Wisconsin, Ohio, Washington, Iowa, and Missouri. They represented 14 colleges or Universities (University of Tennessee, Oregon State University, Polytechnic University of Puerto Rico, Iowa State University, Georgia Tech, Inter American University of Puerto Rico, MIT, Washington State University, University of Michigan, University of Missouri-Rolla, University of Missouri-Columbia, University of Wisconsin, University of Massachusetts at Lowell and Calvin College). The keynote speaker was Julie A. Bentz, Director for Response Operations, Homeland Security Council, The White House. The instructors were Professors Mark Prelas, Tushar Ghosh, Dabir Viswanath, and Carolyn Heising. The teaching assistants were Sean Branney, Brandon Middleton, Zebadiah Smith, Alexis Sotomayor-Rivera, and Angel Velez.

Students and mentors at INIE Midwest Nuclear Sciences Engineering Course on nonproliferation and weapons of mass destruction

Students enjoy beautiful July weather in Columbia

The course examined the role of nuclear technology, biotechnology, and chemical technology from the basics of the industries that drive the technologies to the infrastructure, workforce, and resources that are required to use these technologies for the development of weapons of mass destruction (WMD). However, the course went beyond just the technical aspects and examined the relative risks associated with each category of WMD, the historical perspective for their development and use, the human factors (*e.g., the motivations that lead countries or groups to seek WMDs*), and how negotiations and treaties have been used to stem WMD proliferation. The future of WMDs was examined looking at the risks that may be posed by states, rogue nations, terrorist groups, and disturbed individuals and the strategies that can be used to mitigate these threats. The course text book was Nonproliferation Issues for Weapons of Mass Destruction, by Mark A. Prelas and Michael S. Peck, CRC Press, 2005.

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"University of Florida"

**Training Reactor Tours**

The training reactor continues to be a popular tour site for high, middle, and elementary school visitors and was featured during the recent tour of Outstanding High School Scholarship Recipients. Lectures, tours, and demonstrations of the UFTR facility, including radiation detectors, were provided for various UF-sponsored summer camps and workshops. There were four College of Engineering summer camp visits: GatorTRAX for middle to high school students, PEEK (Pursuing Early Engineering Knowledge) for middle school boys; Project ATHENA for middle school girls; and the Eye on Engineering program for high school students. UF's Center for Precollegiate Education (CPET) Science Quest workshops included two visiting groups of honors middle school students.

# Aggie Working on "Very Hot" Research

Nolan Anderson, a graduate student working on his Masters of Science in Nuclear Engineering at Texas A&M University, has spent 2 summers at the INL on a NE graduate internship and is scheduled to continue through July 2006.

Nolan is assigned to the Very High Temperature Reactor (VHTR), which is a Generation IV reactor design concept that is currently being pursued because of its high efficiency energy conversion cycle and its potential for hydrogen production. The geometry of the VHTR outlet plenum design is being evaluated to determine if there will be sufficient thermal mixing of the hot exit gases from the core. If the thermal mixing is insufficient, the hot exit gases may cause structural damage in the outlet plenum.

To analyze the outlet plenum design the computer codes RELAP5-3D© and Fluent are being coupled, taking advantage of the strengths of these two codes. RELAP5-3D© is a systems analysis code which can analyze fluid flows across wide thermodynamic ranges and states. Fluent is a Computational Fluid Dynamics (CFD) code, which effectively models detailed, multi-dimensional flow behavior. RELAP5-3D© cannot model the flow field to the detail that Fluent can, but using Fluent alone is not a viable option because it is very expensive.


Nolan Anderson discusses his Summer internship work at DOE/ INL Internship Poster Session

The aim of this project is to successfully couple RELAP5-3D© and Fluent using the Parallel Virtual Machining (PVM) message passing software. A reactor model created in RELAP5-3D© consists of a nine-ring core configuration representing the coolant flow channels in the reactor. The Fluent model is also separated into nine separate regions. The RELAP5-3D© core exit conditions of temperature, velocity, and pressure act as the inlet boundary conditions for the Fluent model. By coupling RELAP5-3D© and Fluent in this manner the two codes will directly interact, and the strengths of both codes will be utilized.

Nolan's perspective on his involvement, "I am on the forefront of doing coupling problems with RELAP and Fluent. Through this experience, I have learned a lot about both codes, and I can see how using this coupling tool will be valuable in the future to achieve accurate results with reduced computation time."

"My summer project is now continuing as my thesis work. In working with these tools, I will do sensitivity analyses in efforts to show that Fluent can be a valuable computational tool in determining the flow field in complicated geometries such as the current VHTR outlet plenum design."

"I have enjoyed my stay here in Idaho Falls," said Anderson. "The weather is definitely much cooler here than in Texas. I have made some good friends here, and I have really enjoyed my experience. The people here at INL have been great. Although I am not a permanent employee here, I have felt welcome. There are many people who are willing and able to help me with my project. This is a learning community, and I am glad to have had a chance to be here."

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"MIT"

plenum above the fuel lead to the calculation of a maximum fission gas release that correlated well with what was predicted by computer analyses.

Such projects are the result of the MIT Undergraduate Research Opportunities Program (UROP) with the principal investigator, Professor Mujid Kazimi, working under the supervision of Dr. Gordon Kohse as the principal research engineer at the MIT reactor.

# American Nuclear Society Programs Benefit Students and Universities

The American Nuclear Society (ANS) continues its outreach to high school teachers and students, making them aware of nuclear science and technology career opportunities for their students. In the fall of 2005, ANS participated in three regional conferences of the National Science Teachers Association (NSTA) (Hartford, CT; Chicago, IL; and Nashville, TN) providing materials to teachers and conducting workshops. In addition, ANS exhibited at the CAST conference for Texas science teachers. Thousands of teachers attend these conferences and hundreds visit the ANS exhibit at each event to pick up materials, which help them teach about nuclear science and technology. At the three NSTA conferences 90 teachers attended workshop sessions. In addition, local sections, student sections and individual ANS members have conducted five teacher workshops, four career presentations, and three Boy Scout Merit Badge workshops since July. ANS appreciates the assistance of local and student sections in this outreach to teachers and students.

Teachers in an ANS workshop get hands-on experience with an activity to demonstrate the concept of "seeing the unseen," as part of teaching nuclear science and technology topics.

The ANS winter meeting provided university students an opportunity to network with more than 1,000 professionals in nuclear science and technology. There were 215 students registered for the meeting. Some presented papers, and some assisted during sessions. Students receive travel funding and other assistance from ANS. ANS student members at the national level now number 1,275.

The Student Section at Rensselaer Polytechnic Institute (Troy, NY) will host the 2006 ANS Student Conference (March 30-April 1, 2006), *Nuclear Power: A Look at the Future*. Students are organizing the event. Information about the conference is available at http://ans.union.rpi.edu/Conference/

In order to help meet the special needs of young professionals leaving the academic world and entering the workforce, ANS established a Young Members Group in June. The November ANS meeting featured a day-long *Young Professionals Congress* designed to address the special interests and needs of this group.


Teacher workshop participants try out an activity to introduce some of the issues to be considered in disposal/storage of radioactive waste materials.

# Innovative 'Recycling' Project Could Reduce U.S. Inventory of Spent Nuclear Fuel

Hoping to reduce the nation's growing inventory of stored spent nuclear fuel, a group of nuclear engineering faculty, scientists, and students from the Big 10 universities, the University of Chicago, and the U.S. Department of Energy's Argonne National Laboratory will develop innovative nuclear fuel cycles that will recycle and dispose of this high-level radioactive material. The project also will educate the next generation of scientists and engineers.

The group will base its studies in the Center for Advanced Nuclear Fuel-Cycles (CANF), a new initiative housed at Argonne. Co-directors at Argonne and the University of Wisconsin-Madison will lead the center.

Nuclear fuel used in current reactors has enormous available energy. As the fuel is used to produce electricity, only a fraction of this available energy is consumed, generating a small quantity of high-level radioactive waste within the solid fuel.

Currently, most spent nuclear fuel is stored temporarily in secure, specially designed pools at commercial reactors around the country or in leak-tight steel casks housed in above ground concrete vaults. When space there is full, the fuel could end up at a planned commercial temporary-storage facility in Utah or perhaps at the proposed Yucca Mountain high-level waste repository.

But these storage options are short-term approaches to dealing with the back-end of the nuclear fuel cycle, says Michael Corradini, a UW-Madison professor of engineering physics and the center's co-director. "We hope to develop a 'sustainable' fuel cycle—that is, an efficient, cost-effective way to reuse current spent nuclear fuel and minimize its by-products," he says. "Advanced nuclear fuel cycles can be recycled as a source of available energy as demand for uranium increases."

Some countries, including Japan and France, currently reprocess their spent nuclear fuel using a process known as PUREX (plutonium and uranium recovery by extraction). The CANF team will seek to improve upon these separation and recycling processes. "The major difference is that we are looking for ways to successfully extract specific radioactive species for separate uses and separate disposal," says Corradini.

The researchers will tackle the problem in a number of ways. Among their initiatives, they will develop sophisticated computer models and perform comprehensive simulations to predict key physics processes. They will develop innovative diagnostics and instrumentation techniques and collaborate with the U.S. Department of Energy to apply those tools to the nuclear fuel cycle. In addition, they will develop flexible fuel forms, unique materials, and advanced chemical-separations processes enabling them to establish a "just-in-time" fuel supply system that minimizes waste and the risk of proliferation.

A reduced proliferation risk is just one of the benefits of advanced nuclear fuel cycles, says Phillip Finck, deputy associate laboratory director at Argonne and the center's co-director. "They can significantly shorten the needed isolation time and reduce the amount of high-level waste housed in any repository," he says. "Ultimately, this should reduce the cost of the Yucca Mountain repository and may preclude the need for additional waste repositories."

# Center for Space Nuclear Research Launched in Idaho Falls, Idaho

The new **Center for Space Nuclear Research** was officially launched on October 25, 2005, in Idaho Falls with government, industry, and academia looking at ways to work together to advance research relating to space.

**Dr. Steven Howe**, founding director of the new center, explained to the participants of an opening ceremony and one-day Forum for Space Nuclear Technology that he hopes groups will work together in the development of space nuclear technology.

Howe said the Center for Space Nuclear Research will fill two roles. The first is like a "dating service" whereby the Center will be the hub where universities and students can approach the Department of Energy and industry for summer jobs.

"Space is the draw. We need to get students hooked on space research,- and we need to catch them early."

Dr. Steven Howe
CSNR Director

He said CSNR will be able to "mix and match" students with the hands-on experience they need. CSNR will also help attract students to space studies. "Space is the draw. We need to get students hooked on space research, and we need to catch them early."

The CSNR is operated by the **Universities Space Research Association** (USRA) in collaboration with INL. The University of New Mexico and the General Atomics Company support the CSNR as partners.

**David Black**, president of the USRA, spoke on the importance of space nuclear capabilities to science.

The CSNR is one of four independent INL research centers that will be co-located with the Center for Advanced Energy Studies (CAES). The co-location of these research centers within CAES is intended to foster technical collaboration.

The CSNR will be a focus for engaging university scientists in research and development of advanced space nuclear systems, including space power and propulsion systems and radioisotope power generators. CSNR will create opportunities for university researchers to collaborate with their counterparts at NASA, INL, and other Department of Energy laboratories.

# Nuclear Engineering Students Enjoy Summer at Oak Ridge National Laboratory (ORNL)

A total of 30 nuclear engineering (NE) students spent internships at ORNL in fiscal year 2005 and worked with research staff in the Nuclear Science and Technology Division (NSTD). Of these, 19 interned during the summer of 2005. The NE students represented University of Florida, University of Tennessee, Pennsylvania State University, University of Illinois, North Carolina State University, Oregon State University, University of Wisconsin, Purdue University, and Prairie View A&M. The students had several opportunities to attend a seminar series and also interact with laboratory management and researchers during a luncheon attended by Associate Laboratory Director David Hill, NSTD Acting Division Director Jim Rushton and NE University Program Manager, John Gutteridge. The students were also treated to an event at the American Museum of Science and Energy (AMSE), where local television reporter Bill Landry performed in a skit called "Einstein The Man".

Prairie View A&M students Eric Wright (left) and Jerrad Deason (3rd from left) with Professor Sukesh Aghara (right) and ORNL researcher, Dr. Jeff Johnson (2nd from left). The student/faculty team performed radiation transport modeling during the summer internship with Johnson as mentor.

# DOE-NE Announces New Junior Faculty Award Program

The United States Department of Energy (DOE) Office of Nuclear Energy, Science and Technology (NE) has recently announced a solicitation for the "Nuclear Engineering and Health Physics Junior Faculty Award Program" (JFAP). This program provides universities with ongoing programs in nuclear science and engineering (NSE) an incentive to either hire or promote individuals who have recently started their careers in a nuclear science (radiochemistry, health physics) or a nuclear engineering program which supports the mission and goals of NE. Recent data have shown that many NSE faculty members have retired over the past few years and many more are scheduled to retire in the next few years. Consequently, the intent of this program is to assist in alleviating the shortage of faculty members in related academic areas by providing assistance through start-up funding.


Further, this program is designed to assist DOE in providing appropriately trained personnel for the nuclear science and engineering research and development programs at DOE laboratories and facilities throughout the United States. Increasing costs for graduate education and a high demand for radiological scientists and engineers with advanced degrees have had a significant impact on the number of well-qualified applicants who are seeking employment as faculty members at related academic programs throughout the United States. As such the Nuclear Engineering and Health Physics Junior Faculty Award program is designed to encourage talented individuals, who have recently become or may become tenure-track faculty members, to seek employment and/or advance their employment in the country's institutions of higher learning.

In line with the program's objectives, prospective applicants are being encouraged to develop collaborative programs with the DOE national laboratories in one or more of the following areas: nuclear fuel cycle including reprocessing, nuclear reactor safety and safeguards; nuclear materials science and engineering; nuclear reactor engineering; advanced concepts in nuclear engineering; and radiation interaction, detection, and dosimetry; radiation protection standards and regulations; biological effects, risk assessment and as low as reasonably achievable radiation exposure (ALARA) concepts; facility design and nuclear safety; radiological emergency management; environmental monitoring and assessment; and nuclear waste management. Awards have been set at $50,000 with DOE matching an additional $25,000, which could bring the total award amount to $100,000. While the awards are renewable for an additional two years, post-fiscal year 2006 funding will be dependent upon appropriated funds.

## Important Dates to Remember

**2006**

- ✓ February 17: Student Summer Internship applications due
- ✓ March 30 - April 1: American Nuclear Society Student Conference, Troy, New York

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