

# UNIVERSITY CURRENTS

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

U. S. Department of Energy

Spring 2007

## FY 2007 Advanced Reactor, Fuel Cycle, and Energy Products Workshop for Universities

The Department of Energy (DOE)'s Office of Nuclear Energy held a workshop for universities on March 20, 2007, at the Gaithersburg Hilton Hotel in Gaithersburg, MD. The workshop provided U.S. universities the opportunity to understand the new Nuclear Energy Research Initiative (NERI) Funding Opportunity Announcement (FOA) format and to become familiar with the research and development (R&D) requirements of the various programs of the Office of Nuclear Energy.

Welcoming remarks were made by Assistant Secretary for Nuclear Energy Dennis Spurgeon and Principal Deputy Assistant Secretary for Nuclear Energy Shane Johnson. After overview presentations by Paul Lisowski, John Gutteridge and Beth Dahl, the 14 subject areas for NERI research were discussed in detail by technical leads. On March 28, 2007, two new Funding Opportunity Announcements (FOA), valued up to \$14 million, were released. These FOAs are designed to better integrate the United States' universities into DOE's nuclear research and development (R&D) programs and contribute to assuring a new generation of engineers and scientists necessary for pursuing nuclear power. These FOAs support the Global Nuclear Energy Partnership (GNEP) University Readiness and the Nuclear Energy Research Initiative for Consortia (NERI-C). These new awards will bring total Fiscal Year (FY) 2007 Office of Nuclear Energy funding to universities supporting nuclear energy programs to over \$54 million.

"These Funding Opportunity Announcements demonstrate our commitment to pursuing nuclear research, and we are eager for our next generation of scientists and engineers to make scientific breakthroughs that will help diversify our nation's energy sources," Mr. Dennis Spurgeon said. "Supporting

education and training is critical to developing secure, competitive and environmentally responsible nuclear technologies to serve the United States' present and future energy needs."

For the [GNEP University Readiness](#)

[FOA](#), DOE seeks applications from universities for capability expansion that will directly support GNEP R&D programs. Capability expansion includes laboratory upgrades; faculty support; graduate fellowships; reactor improvements; equipment purchases or upgrades; curriculum development and enhancement; and international student exchange or other similar activities that directly impact a university's ability to compete in future GNEP R&D solicitations. Estimated funding for the one-time GNEP University Readiness awards total \$4 million, with a maximum of \$100,000 per award.

[DOE's Funding Opportunity Announcement for NERI-C](#) seeks applications from university consortia for R&D that will directly support a broad range of programs in the Office of Nuclear Energy; including: the Advanced Fuel Cycle R&D Program, the Generation IV Nuclear Energy Systems Initiative, and the Nuclear Hydrogen Initiative. Estimated funding for the NERI-C awards totals \$10 million. This will be the first year funding for multi-year research grants that could receive total funding of about \$30 million. Additional university grants are planned in subsequent years.



Assistant Secretary for Nuclear Energy Dennis Spurgeon

visit us on the Web at -- [nuclear.energy.gov](http://nuclear.energy.gov)

# Florida Memorial University and University of Texas at Austin Radiochemistry Educational Cooperation

In cooperation with Dr. Rose Stiffin, Chair of the Chemistry Department at Florida Memorial University in Miami Gardens, a Historically Black College, Dr. Sheldon Landsberger from the Nuclear and Radiation Engineering Program in the Mechanical Engineering Department at the University of Texas, is helping design an undergraduate radiochemistry technical option. Dr. Stiffin received a National Nuclear Security Administration (NNSA) grant to specifically set up a program which will help train future nuclear and radiochemists. Dr. Landsberger is using part of his DOE/NE Radiochemistry Education Award Program (REAP) to support these efforts. Several courses are being designed that fit within a chemistry department rather than one in engineering. Courses include Concepts in Nuclear Science, Introduction to Radiochemistry and two Laboratory sections, Radioactive Waste Management, Principles in Radiation Health and Laboratory, Advanced Radiochemistry and Laboratory, Special Topics in Nuclear Chemistry and a Senior Projects Laboratory.

The first course in Concepts in Nuclear Science is a one hour class that was given via distance learning from the University of Texas to six students at FMU. All other future courses are to be given by FMU faculty members.



Faculty members and students at Florida Memorial University enrolled in Dr. Landsberger's distance learning class on Concepts in Nuclear Science.

From left to right: Dr. Dimitri Tamalis, Professor in the Department of Chemistry, students Tenishka Storr, Chanika Symister, Icelyn Sweeney, Tiffany Graves, Vanessa Sanders, Danielle Bayoro and Dr. Rose Stiffin, Professor and Chair of Department of Chemistry and Principal Investigator on NNSA contract.

## Wisconsin -- Nuclear Energy Research Initiatives Funded



Competing in an overall field of 79 proposals, University of Wisconsin-Madison research teams received three of ten recently awarded Department of Energy University-Nuclear Energy Research Initiative (U-NERI) grants, which support innovative research in advanced nuclear technologies.

Under the grants, which total approximately \$1.73 million over three years, the researchers will conduct multiscale modeling and experimental projects to study fission product transport in TRISO-coated particle fuels, oxidation and surface modification treatments of candidate materials for very high temperature reactor pressure vessel applications, and materials corrosion and heat transfer issues in the use of liquid salts as media for process heat transfer from very high temperature reactors. The researchers include Engineering Physics Professors Michael Corradini and Gerald Kulcinski, Assistant Professor Todd Allen, Research Professor Kumar Sridharan and Associate Scientist Mark Anderson, and Materials Science and Engineering Assistant Professors Izabela Szlufarska and Dane Morgan.

## NERAC Meeting Held February 20-21, 2007, in Idaho Falls, Idaho

Approximately 50 people attended a two-day meeting of the Nuclear Energy Research Advisory Committee (NERAC). The meeting was held at the Bennion Student Union in Idaho Falls, Idaho, February 20-21, 2007. Many of the attendees were from Idaho National Laboratory (INL). Others were members of the public, local politicians, and several from France and Japan.

NERAC is an advisory committee that periodically reviews the various projects and programs under the aegis of the Office of Nuclear Energy (NE). The committee provides advice and recommendations to NE that address the scientific, education, and engineering aspects of NE's research and development efforts and its long-range plans, priorities, and strategies. The committee also provides advice on national policy.

An important goal of the Idaho Falls meeting was to provide NERAC with the current status of NE's nuclear programs and facilities. The meeting was chaired by NERAC committee member William Martin. Dennis Spurgeon, Assistant Secretary of Nuclear Energy (NE), provided welcoming remarks.

Among the presentations given were the current status of Idaho National Laboratory, now in its second year as NE's premier research laboratory; an overview of the Global Nuclear Energy Partnership (GNEP); the FY 2007 budget and out years; the Advanced Fuel Cycle Initiative R&D program; the Nuclear Power 2010 program; and the status and overview of the Next Generation of Nuclear Power. Jared Furhiman, Mayor of Idaho Falls, spoke of the importance of INL to Idaho and the nation.

For more information, see <http://nuclear.energy.gov/nerac/neNeracMeetings.html>.

## University of Tennessee's Department of Nuclear Engineering Celebrated 50th Anniversary on March 3, 2007



The University of Tennessee Department of Nuclear Engineering celebrated its 50th anniversary at a gala event on March 3, 2007.

All Department of Nuclear Engineering alumni, friends and supporters were invited to attend the 50th Anniversary Celebration at the Knoxville Convention Center. The event, "Celebrating the Past, Empowering the Future," began with a reception and included a banquet and a special program.

The program, established in 1957, has had three department heads: Dr. Pete Pasqua, for whom the building that houses the department Pasqua Hall is named, founded the department and served as depart-

ment head from 1957-1988; Dr. Tom Kerlin, head from 1988-1996; and the current department head, Dr. H.L. "Lee" Dodds.

The UT program is now the third-largest nuclear engineering program in the U.S., based on total student enrollment, and is ranked 11th Nationally by *U.S. News and World Report* among approximately 40 nuclear engineering programs in the U.S.

"I am excited about the celebration," said Dodds. "We have a wonderful heritage, and it all came together with the 50th anniversary celebration."

Dr. Tony Buhl, President and CEO, EnergX, and General Manager, Oak Ridge TRU Waste Site, Oak Ridge, Tennessee, a three-time graduate of the program, chaired the event.

# University of Wisconsin Energy Institute

The University of Wisconsin Energy Institute is leveraging several renowned UW-Madison energy education and research programs in its unique, multidisciplinary approach to understanding and addressing key global energy issues.

“These are elite scientists with very active and internationally recognized research efforts,” says Paul Meier, energy institute director. “They’re seeing not only a need to collaborate and connect their own expertise with research from other areas, but also to reach out and to engage with energy decision makers and the public. They see a larger energy conversation as vital to the prosperity of both the state and the nation.”

Formally created earlier this year, the institute pools the expertise of more than 50 UW-Madison faculty and staff in disciplines that range from chemistry, physics and engineering to geology, life sciences, environmental studies, public policy, business and law. It includes representatives from the UW-Madison Engine Research Center, Solar Energy Laboratory, Fusion Technology Institute, Center for Sustainability and the Global Environment, Power Systems Engineering Research Center, Wisconsin Electric Machines and Power Electronics Consortium, and Wisconsin Institute of Nuclear Systems, among others.

“Our mission is to integrate all energy activities at UW-Madison and to focus them as a resource to serve Wisconsin and beyond,” says Meier.

The breadth of energy research at UW-Madison enables energy institute participants to tackle energy policy, as well as technical issues such as rising fuel costs, greater energy demands, and cost-effective alternatives from many perspectives.

In addition, the researchers’ discipline-specific knowledge — in essence, an internal system of checks and balances — sets the institute apart as an unbiased source of energy information, says Michael Corradini, a professor of engineering physics and an energy institute founding member. “We’re trying to present the facts in common, uncomplicated, understandable language, so that other people — including the public — can come to their own judgment about what could be done and what are the alternatives,” he says.

In addition to research, the energy institute approach centers on interaction with and input from key energy stakeholders, including those from state and federal government, industry and the public. To help members connect with those audiences, the institute has joined efforts with the Wisconsin Public Utility Institute, which for more than two decades has provided forums for discussion and debate of public policy issues in the electricity, gas and telecommunications industries.

“There’s a real belief among the energy institute participants that energy issues are societal issues and that productive solutions are going to collectively involve government, industry and the public,” says Meier. “Education is vital to raising awareness about the issues.”

One unique component of that educational effort is the “My Power” energy simulation tool that Meier developed. The simulation currently enables users to choose combinations of various electricity generation sources — for example, conventional coal, nuclear, hydroelectric, wind, solar and biomass, among others — to meet projected electricity needs in a particular region. Based on those choices, the program calculates the cost to produce electricity and the amounts of carbon dioxide



Paul Meier

# Engages Stakeholders in Creative Solutions

and nitrogen and sulfur oxides that system will produce.

The simulation is a tool designed to start conversations about energy alternatives. In 2005, Wisconsin energy expenditures jumped to nearly \$18 billion, up from \$15 billion the year before, says Meier. “For a typical household, energy will be their third largest expense, behind housing and health care,” he says. “Being strategic about energy can save Wisconsin households billions of dollars in the long run.”



Paul Wilson

While electricity is an important piece of the energy equation, he says, energy institute researchers also are looking to expand the concept of interactive simulation to include energy usage for transportation, as well as for decisions at home. In one project, Engineering Physics Assistant Professor Paul Wilson is improving a web-based

personal environmental calculator, which allows users to catalogue their real-life energy-related decisions and gauge the corresponding environmental impact. “It’s an easy way to learn that you can really reduce your personal environmental footprint with little changes in your daily life style,” says Meier.

Beta versions of the My Power simulation and the Personal Environmental Calculator are available on the energy institute website, [www.energy.wisc.edu](http://www.energy.wisc.edu).

Led by Mechanical Engineering Assistant Professor Greg Nellis and Scientist Scott Schuetter, undergraduate and graduate members of several UW-Madison student organizations also are developing educational materials to help K-12 students and their teachers understand the underlying science that governs energy issues.

In addition, a bi-weekly on-campus energy institute seminar series creates a forum at which academics and representatives from government, the energy industry and the public can discuss key issues. The series brings national energy experts, such as BP Chief Scientist Steve Koonin, former California Energy Commission Chief of Program Evaluation Mike Messenger, and University of California-Berkeley Nuclear Engineering Professor Per Peterson, to discuss current topics, recent research or emerging energy challenges. The talks, which are open to public audiences and also videotaped and archived online, collectively have drawn several hundred attendees, says Meier.

This dialog-based format is an energy institute cornerstone — a model based on the Wisconsin Idea in which stakeholders draw on objective university information and innovation to form collective conclusions and solutions.

“I do get asked if we’re planning to solve the world’s energy problems,” says Meier. “I think our philosophy about how that happens helps make us

unique. We realize that technology innovation is one of the necessary pieces, and that the University of Wisconsin-Madison is an international research leader in many of the key areas. But a bigger and more important piece is to create an all-inclusive civic discussion so that, armed with objective data, all stakeholders can



Gregory Nellis

proactively seek solutions. If we can achieve real results in Wisconsin, then we’ve created a model for energy solutions through civic forum that has implications for the entire globe.”

# Southern Nuclear to Support Radiation Physics Laboratory at Georgia Tech

Jeff Gasser, chief nuclear officer, donated \$135,000 to the Nuclear and Radiological Engineering (NRE) Program in the George W. Woodruff School at Georgia Tech on behalf of Southern Nuclear Operating Company. A total of \$125,000 will go to support the Radiation Physics Laboratory and the remaining \$10,000 will be used for graduate fellowships and/or undergraduate scholarships in the name of the donor. A check presentation ceremony was held on April 19<sup>th</sup> announcing the new Southern Nuclear Radiation Physics Laboratory.

The Radiation Physics Laboratory is a senior-level laboratory class designed to challenge the students' theoretical knowledge of radiation physics, radiation detection and reactor physics concepts through experiments. In the beginning of the semester, students complete a series of laboratories on a sub-critical graphite and natural uranium assembly using radioisotope neutron sources. In these experiments, students measure basic concepts of nuclear engineering, such as diffusion length and material buckling. During the second part of the course, students conduct reactor-based experiments through a videoconferencing setup with the North Carolina State PULSTAR reactor.

The majority of the funding for the Radiation Physics Laboratory will be used to purchase a small sealed-tube neutron generator and associated detection equipment to conduct pulsed neutron experiments in the sub-critical pile. This new equipment will allow a series of experiments to be introduced to the graduating seniors of the NRE program beginning spring semester 2008. Two of the new experiments introduced will be the measurement of the  $\alpha$  eigenvalue and the determination of the delayed neutron fraction. The remaining funds will be used to provide additional laboratory equipment to support the growing enrollment in the Georgia Tech NRE program.

Southern Nuclear, a subsidiary of Southern Company, operates the Edwin I. Hatch Nuclear Plant in Baxley, Ga., the Joseph M. Farley Nuclear Plant in Dothan, Al., and the Alvin W. Vogtle Electric Generating Plant, located near Waynesboro, Ga.



With 4.3 million customers and more than 40,000 megawatts of generating capacity, Atlanta-based Southern Company is the premier energy company serving the Southeast. A leading U.S. producer of electricity, Southern Company owns electric utilities in four states, as well as fiber optics and wireless communications. Southern Company brands are known for excellent customer service, high reliability and retail electric prices that are significantly below the national average. Southern Company has received the highest ranking in customer satisfaction among U.S. electric service providers for seven consecutive years by the American Customer Satisfaction Index.

## **Proposed 5 year B.S./M.S. degree program for the Georgia Tech / Clark Atlanta University Partnership**

In May 2006, Georgia Tech received funding from the Department of Energy to establishing a Minority/Majority partnership between the Nuclear and Radiological Engineering/Medical Physics Programs (NRE/MP) at Georgia Tech and the Department of Physics at nearby Clark Atlanta University. When the partnership began, students at Clark Atlanta could participate in the partnership through the established Dual Degree Engineering Program run by Georgia Tech where students at pre-approved minority institutions could spend 3 years taking prerequisite courses at the participating institution, followed by 2 years of study in a specific engineering discipline at Georgia Tech. After completing their studies the student would then receive a B.S. degree from both Georgia Tech and the participating institution. It was also possible for students at Clark Atlanta to apply directly to the NRE graduate school after graduating from Clark Atlanta. Recruiting efforts by the NRE program

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# Oak Ridge Neutron Sciences Programs

Oak Ridge National Laboratory has integrated the neutron sciences programs at the steady-state High Flux Isotope Reactor (HFIR) with the new accelerator-based pulsed Spallation Neutron Source (SNS). Together, these two complementary facilities funded by the U. S. Department of Energy make Oak Ridge the world's foremost center for neutron sciences.

HFIR has the world's highest steady-state neutron flux. At 85-MW, it supports diverse user communities in neutron scattering, medical/industrial radioisotope (including transplutonium) production and research, materials irradiation and radiation effects, and neutron activation analysis. HFIR restarts this spring with general user programs for the triple-axis and residual stress instruments. It has designed and installed a cold neutron source capability that is now in the commissioning process with two small-angle neutron scattering (SANS) instruments.



Aerial view of the High Flux Isotope Reactor



Aerial view of the Spallation Neutron Source

At full power, SNS will provide the most intense pulsed neutron beams in the world for scientific research and industrial development. Construction of the SNS was completed early, below budget and with increased scope, and generated its first neutrons on April 28, 2006. SNS is ramping up to its full-power capability of 1.4 MW; on February 19, 2007, the SNS accelerated the beam to 1.01 GeV, a world energy record for proton beam acceleration in a linear accelerator. Initial users are expected in summer 2007 for the first three instruments (backscattering spectrometer and liquids and magnetism

reflectometers); the SNS general user program will begin in fall 2007.

For information on neutron scattering capabilities at SNS and all workshops at ORNL involving neutron sciences, visit <http://www.sns.gov>; for details on HFIR, go

to <http://www.ornl.gov>, click on User Facilities, and find HFIR in the list.

Southern Nuclear  
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and the Department of Physics have resulted in two graduate students applying to the Ph.D. program at Georgia Tech. One student has been accepted into the program and the second application is still being reviewed.

Through this partnership Georgia Tech and Clark Atlanta have also proposed a joint 5 year B.S./M.S. degree program to allow top students at Clark Atlanta the opportunity to complete a B.S. in Physics and a M.S. in Nuclear and Radiological Engineering in 5 years. Under the proposed program, students who have completed 60-75 credit hours of study at Clark Atlanta with a 3.5 GPA or higher would be able to

apply to the Georgia Tech NRE graduate program with a simple application. Once in the joint program the students would be required to maintain a 3.3 GPA at Clark Atlanta and take 2 to 3 NRE courses at Georgia Tech in preparation for their graduate studies. Students in the joint program will also be encouraged to take part in a Georgia Tech Summer Experience where they would receive a small stipend to spend the summer at Georgia Tech studying Nuclear Engineering, taking part in undergraduate research, and touring local nuclear related facilities. This joint 5-year program is currently in the approval process at Georgia Tech.

# MIT Nuclear Science and Engineering -- Energy Night

On October 13<sup>th</sup>, over 20 graduate students and 5 professors from the MIT Department of Nuclear Science and Engineering showcased their cutting edge research at the second annual MIT Energy Night to an estimated 800+ attendees.

In May 2006, the MIT Energy Research Counsel concluded in their report that “the need for new global supplies of affordable, sustainable energy is perhaps the single greatest challenge of the 21<sup>st</sup> century.” These findings coupled with the September launching of the MIT Energy Initiative by President Susan Hockfield have catalyzed a whirlwind of activity in the energy research sector at the institute.

This escalating interest allowed for considerable expansion of the second annual MIT Energy Night which sought to bring together professionals from the science, engineering, policy and business energy communities as well as showcase the most exciting energy activities going on at MIT. The Department of Nuclear Science and Engineering in conjunction with the MIT Center for Advanced Nuclear Energy Systems produced two posters describing the work currently being performed on near term advanced light water reactor technology and longer term advanced fast reactor technology for the next generation of reactors.



The crowd in front of the Nuclear Science and Engineering Department’s display

The posters drew quite a bit of interest from the participants as the crowd in front of the display didn’t dissipate until the event ended over two hours later. A slightly exhausted Nuclear Science and Engineering graduate student Tyler Ellis remarked, “The event was a rousing success. I’ve had the ability to speak with professors, students, and industrial professionals about the advanced nuclear energy research being conducted in our department. One representative from the financial industry even invited me to speak on the future potential for nuclear energy at an energy panel in the New England area.”

## **Nuclear Power and the MIT Energy Club**

The student-run MIT Energy Club ([http://web.mit.edu/mit\\_energy/](http://web.mit.edu/mit_energy/)), with more than two hundred members, has organized a broad range of discussions, lectures and forums since its inception in 2004, with nuclear power playing an increasingly prominent role in several recent events.

## **“Kicking the Carbon Habit”**

On January 31, NSE Professor Andy Kadak moderated a half-day workshop co-sponsored by the Nuclear Science and Engineering department and the Energy Club, “Kicking the Carbon Habit.” The workshop brought together experts from key energy sectors – wind, solar, conservation, natural gas, coal sequestration, and nuclear power — to discuss options in the face of global warming. In a lively debate before a standing-room-only audience, the experts agreed that nuclear power had an essential role to play in meeting world energy demands while reducing carbon emissions.

In addition to Professor Kadak, speakers included Travis Bradford (Director, Prometheus Institute), Howard Herzog (MIT LFEE), Robert LaCount (Director, Cambridge Energy Research Associates), Dan Sosland (Executive Director, Environment Northeast), Joshua Magee (Emerging Energy Research), and keynote speaker William Sweet, author of the recent book, “Kicking the Carbon Habit: Global Warming

# U.S. Senator Burr and N.C. Senator Foriest Visit NC State's Nuclear Engineering Department

In late fall 2006, U.S. Senator Richard Burr visited the campus of North Carolina State University. Included in his trip was a visit to the Department of Nuclear Engineering. He serves on the Energy and Natural Resources Committee; the Health, Education, Labor, and Pensions Committee; the Indian Affairs Committee; the Veterans Affairs Committee; and, the Select Committee on Intelligence. Of particular interest is his work on the Committee on Energy & Natural Resources. It deals with energy resources and development, including regulation, conservation, strategic petroleum reserves and appliance standards; nuclear energy; public lands and their renewable resources; surface mining, federal coal, oil, and gas, other mineral leasing; territories and insular possessions; and water resources.

Then in February 2007, N.C. Senator Tony Foriest visited the department. Foriest has served in North Carolina's legislature since 2006. He sits on several committees including appropriations on education/higher education; appropriations/base budget; com-

merce, small business and entrepreneurship; education/higher education; health care; information technology; joint select committee on economic development initiatives; and, pensions, retirement and aging.



U.S. Senator Burr (middle) with Drs. Bourham (l) and Hawari (r)



N.C. Senator Foriest (l) with interim department head, Dr. Bourham (r)

MIT Energy Night  
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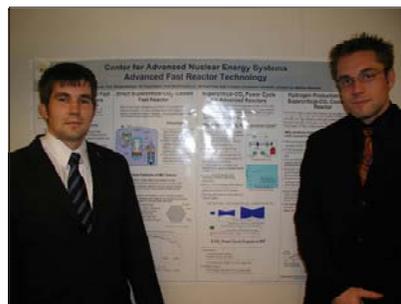
and the Case for Renewable and Nuclear Energy” (Columbia University Press, 2006).

*More information: <http://mit.edu/kadak/www/energy/splash.html>*

## “The Renaissance of Nuclear Energy and the Fear of the Bomb.”

On alternating Wednesdays throughout the school year, the Energy Club sponsors a discussion series at MIT's Thirsty Ear Pub. Lara Pierpoint and Nicolas Osouf, graduate students with a double-major in Technology and Policy and Nuclear Engineering, played point-counterpoint in their February 28 discussion, “The Renaissance of Nuclear Energy and the Fear of the Bomb.”

What makes the Energy Club's discussions especially lively is the fact that members are drawn from across the Institute, so that questions and comments range from carbon tax issues to “not in my backyard” policy issues. When asked what she thought the most important safety issue facing a nuclear renaissance, Lara Pierpoint said waste disposal, then added, “But global warming concerns me more.”



MIT Nuclear Science and Engineering Graduate Students Matt Memmott (left) and Tyler Ellis (right) in front of one of the posters

## University of Cincinnati -- MNE ACCEND Sophomore Charles Stratton Receives ANS Scholarship

Charles Stratton, a sophomore in the College of Engineering's Mechanical-Nuclear ACCEND Program, is one of only four students nationwide to receive an Undergraduate Scholarship award of \$2000 from the American Nuclear Society (ANS). Charles, who was valedictorian of his class at Sidney (Ohio) High School, is a sophomore in the College's Mechanical-Nuclear (MNE) ACCEND program where students earn two degrees, a BS in mechanical engineering and MS in nuclear engineering, in just five years.

There are currently over thirty students in the MNE ACCEND program.



Charles Stratton displays his Undergraduate Scholarship certificate from ANS. On the right is Dean of Engineering Carlo Montemagno. On the left is Associate Professor Ivan Maldonado.

Charles also received a Cincinnatus Century Scholarship to attend UC and enrolled in the Honors Program. He entered as an Advanced Placement Scholar with over 43 credits of advanced standing. Among his numerous honors are the Ohio State Board of Education Award of Merit - Honors Diploma, Ohio Board of Regents Certificate of Achievement, and President's Award for Outstanding Academic Excellence.

Commenting on what the award means, Charles said, "I am very honored that ANS has awarded this scholarship to me. It will allow me to continue to pursue my academic goal to become a nuclear engineering professional and ultimately work in research or the power industry." While this particular ANS scholarship is non-renewable, Charles will be eligible for a number of other ANS scholarships as he continues his undergraduate studies.

### University of Cincinnati NRE Graduate Student Maisha Murry Awarded CIRMS Travel Grant

Maisha Murry, a graduate student in Nuclear and Radiological Engineering, has been awarded one of only four grants to present her research at the 15th annual meeting of the Council on Ionizing Radiation Measurements and Standards (CIRMS) held on October 23 -25, 2006, at the National Institute of Standards and Technology (NIST), in Gaithersburg, Maryland.

CIRMS is an independent, non-profit council, affiliated with the National Institute for Standards and Technology that draws together experts involved in all aspects of ionizing radiation to discuss, review and assess developments and needs in this field.

The theme of the meeting was, "Implications of uncertainty in radiation measurement and applications." International experts from academia, industry and government with expertise in areas such as radiation protection, industrial applications and radiation effects, medical applications, and homeland security will address the implications of the dynamic and diverse aspects of uncertainty.

As an undergraduate Maisha participated in the Tuskegee University (TU)-University of Cincinnati Nuclear and Radiological Engineering (UCNRE) "Bridge Scholars" Program. The TU-UCNRE is a summer program collaboration between Tuskegee University and the University of Cincinnati, begun in

# University of Tennessee -- Capital Campaign for NE Department

The University of Tennessee nuclear engineering department celebrated its 50th anniversary recently with approximately 300 alumni and friends of the department attending the celebration event at the new Knoxville Convention Center. At the event, UT Dean of Engineering Way Kuo announced a \$3 million capital campaign for the nuclear engineering department. The money will help fund a new facility, along with another \$4 million provided by the university. The new \$7 million facility is intended as a reward to the nuclear engineering department for 50 years of outstanding productivity and service.

Construction of the new facility is expected to begin within a year, provided the department and the

engineering college successfully raise \$3 million in private donations, said H. L. Dodds, IBM professor of engineering and head of the department. Professor Dodds stated, "The new facility will help us attract more and better students as well as new faculty members."

The new facility will provide the University of Tennessee's 218 undergraduate and graduate students pursuing nuclear engineering degrees with 25 percent more space for state-of-the-art technology, Dodds said. The new nuclear engineering facility will be part of a new building that will be shared with the UT department of civil and environmental engineering.

## MNE ACCEND

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Autumn 2001 with support from the Department of Energy Nuclear Engineering University Partnership Program, designed to increase the number of minority engineers and professionals in the nuclear industry. The program is open to Tuskegee undergraduates during the summer of a student's sophomore or junior year.

Commenting on her trip and career direction, Maisha says, "I am very grateful for the opportunity to have participated in the CIRMS-NIST conference. My experience as a Bridge Scholar inspired me to pursue a career in the field of Health Physics - Radiological Engineering."

## DOE Awards Scholarships to Five MNE Students

Five MNE ACCEND students were awarded Nuclear Engineering Scholarships by the Department of Energy (DOE). Justin Maurer and David Chandler of the class of 2008 and Tom Greifenkamp, Jeffrey Markland and Nicholas Bishop of the class of 2009 will each receive a renewable award of \$2,000 per year.

According to Ivan Maldonado, associate professor of nuclear engineering and MNE ACCEND program coordinator, "These are highly and nationally competitive awards. We are extremely proud of these students and are delighted that their hard work and commitment to the field of nuclear engineering is being recognized at a national level."



Maisha Murry, flanked by Professor Henry Spitz (left), explains details of her presentation to Dean of Engineering Carlo Montemagno (right).

# South Carolina State University is Moving Ahead with Nuclear Science and Engineering Education



In 2000, the Department of Energy Office of Nuclear Energy (DOE/NE) launched the Nuclear Engineering University Partnership (NEUP) Program, in response to the decline in the number of nuclear engi-

neering programs in the US. Recognizing also that minorities are traditionally under represented in nuclear engineering, the NEUP Program was further developed to foster partnerships between minority universities and universities with established nuclear engineering programs at the undergraduate level. South Carolina State University (SCSU), a Historically Black College/University (HBCU), is paired with the University of Wisconsin, Madison (UW). In this partnership, SCSU provides its students with a general nuclear engineering background and the UW Engineering Physics program gives these students coursework in reactor systems and physics.

The SCSU Nuclear Engineering Program (NEP) is a unique program in that it is the only established Bachelor of Science program in Nuclear Engineering located at an Historical Black Institution in the United States. In September 2002, the SCSU NEP received final approval from the South Carolina Commission on Higher Education to award a Bachelor of Science degree in Nuclear Engineering. This was a major step forward in that all of the other degrees offered at SCSU were in “engineering technology”. At present, the NEP is supported by three full-time faculty members, a full-time administrative assistant and two part-time staff members.

The mission of the SCSU NEP is to enhance excellence and diversity in the field of nuclear energy by increasing the number of minorities prepared for graduate studies and employment within the nuclear industry. To accomplish this mission, SCSU has implemented the following strategies.

- Publicizing and recruiting students traditionally under represented in the field of nuclear engineering, including placing ads and articles in magazines

such as U.S. Black Engineer (see March 2007 edition); attending college fairs statewide and in adjoining states; sending fliers out to all national alumni chapter presidents, enlisting their aid to publicize the program; sponsoring and/or participating in “open house” recruitment events at the University; and visiting local high schools;

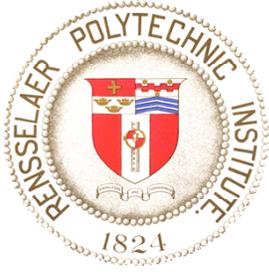
- Fostering relationships with industry, national labs, and other universities to provide a well-prepared workforce (developed through the promotion of collaborative ideas and opportunities for applied problem-solving; research and advanced studies) that will meet the needs of industry and the scientific research communities; and
- Providing an atmosphere for all students to develop academically, professionally and socially, through various campus activities with their peers, participation in activities of research and development, conference participation and networking that focuses on nuclear engineering.

In February 2005, space was allocated in the Lewis Laboratory Annex for a nuclear radiation laboratory. State and Title III funds were released to purchase the detection devices, including six sodium iodide detectors, a high-purity germanium detector, six hand-held survey devices, and several sources. The laboratory has been formally designated as the “Applied Radiation Sciences Laboratory”. Through additional support from DOE/Nuclear Engineering, which was coupled with a large NNSA grant to establish a Radiochemistry minor at SCSU, additional equipment has been placed in the laboratory. This includes an alpha spectroscopy unit; six G-M tube kits with absorber sets, scalers and seal sources; a student training single sample liquid scintillation counter; and a research-level multiple sample liquid scintillation counter.

In addition to the expansion of the laboratory, work has continued with funds from the NRC to support in assessing computer codes used to model releases of radioactive material. Several SCSU students are working on this project. Students have also received sum-

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# Rensselaer Polytechnic Institute – Creativity From the Bottom Up



Creativity is sometimes described as a balance of imitation and innovation. Learning creativity as an ability, an attitude, and a process is fundamental to making the problem solvers of today and the entrepreneurs of

tomorrow. Most university students want creative outlets, sometimes desperately, no less so engineering students. But learning engineering fundamentals – nuclear or otherwise – comes mostly from practicing imitation, far less so innovation.

The latest iteration of the sophomore level course *Nuclear Phenomena for Engineering Applications* at Rensselaer is trying to shift that balance. It was designed by an instructional team as a “hybrid” course that includes the use of communal/web-centered synchronous and asynchronous streaming video content, self-assessment quizzes, discussion forums, web-site content, and internet links. By reducing “sage-on-the-stage” lecture time, more time can be spent in the face-to-face class applying the course material, often by working real-world example problems that require more time to present, discuss, and answer questions about than would be feasible if part of a longer lecture.

The creative outlet comes from the on-line discussion forums. Along with far higher participation

rates, these allow significantly more time for students to formulate ideas, test them, and reflect on how their ideas register with their peers, and how their peers’ ideas sit with them. Some of the discussion topics mimic the Mr. Tompkins in Wonderland stories by George Gamow that so many top scientists have credited as influencing them to pursue a career in science: “While you are reading this, Plank’s constant has suddenly increased by 20 orders of magnitude. How has the world you observe changed?”. Others begin to prepare them for interactions with the public: “the average U.S. population dose due to the nuclear power industry is 0.003 mrem/year, which is more than four orders of magnitude smaller than the average U.S. population dose due to medical applications of radiation. However, some people contend that medical uses involve choice while nuclear power plants are imposed. Others question what it means to be ‘average’, and do we have an obligation to protect those significantly above average (if there are any).” Through such discussions students can self-evaluate and instructors can align technical concept mastery, social understanding, and other educational subtleties, all in a creative environment.

Anyone who would like to see some screen shots of the course site and data on course effectiveness are invited to point their browser to

<http://www.sloan-c.org/conference/proceedings/2006/ppt/1163457086680.pdf>

SCSU Moving Ahead  
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mer internships at the Savannah River National Laboratory, Oak Ridge National Laboratory and the BWXT-Y12 facility in Oak Ridge.

The NEP has established important relationships with industry supporters such as Exelon, AREVA and Duke Power. This support has been instrumental in helping us to provide scholarships and equipment for our students, faculty, and staff. A Mentor-Protégé partnership with BWXT-Y12, and a Memorandum of

Understanding (MOU) agreement with the Savannah River Site have been completed.

With the dedication of the faculty, students, sponsors and external advisors the Nuclear Engineering program at SCSU is maturing and experiencing measures of success. SCSU currently has four graduates and twenty-three full-time students. It is expected that a minimum of twelve new students will be enrolled in the program in the Fall of 2007.

# University of Florida Research Reactor

In 2006, the University of Florida Training Reactor (UFTR) was converted to utilize low-enriched uranium fuel (LEU), after more than 35 years of operation with high-enriched fuel (HEU).

The UFRR's HEU-LEU fuel conversion was completed from start-to-finish in 15 months, an unprecedented record time for such a project under the leadership of Prof. Haghighat, with major contributions by Profs. Sjoden and Baciak, and support of the RERTR group of ANL. Besides the faculty, eleven students worked on the design, analysis, and licensing of UFTR. One exceptional effort was put forth by UF's **Benoit Dionne**, a Ph.D. candidate, who received NRE Department's *Outstanding Contribution Award* in recognition of his exceptional contributions to the Fuel Conversion Project. The following organizations played key roles in the conversion:

- UF's Nuclear & Radiological Department faculty and students,
- The U.S. Department of Energy,
- The Idaho National Engineering Laboratory,
- The Argonne National Lab,
- The National Nuclear Security Administration,
- The U.S. Nuclear Regulatory Commission,
- Security Transportation Services, and
- BWXT Services, Inc.

Following conversion and prior to reactor re-start, UF held a ceremony with university, industry and regulatory dignitaries, to thank participants and to mark progress with the fuel conversion.

With its new low-enriched uranium fuel core, UFTR now is better prepared to continue its mission as a teaching, research and service resource for new generations of educators and researchers for decades who are interested in advanced research and analysis.

Following the fuel conversion, Prof. Haghighat started discussions with regulators and suppliers concerning a new, digital control system and console for the research reactor. Funding for the new console

and control system has been secured through a generous contribution from Progress Energy Florida and one-to-one state matching. More information on this new system is planned for the next issue of *University Currents*.



Senior Reactor Operator Matt Berglund performs a procedure under the watchful eye of University of Florida RSO Don Munroe and BWXT Technician.



Senior reactor operator Matt Berglund watches as DOE technicians use the crane to reset the plug after the core was replaced in the UF Research Reactor.

## ABET REVIEW

UF's Nuclear & Radiological Engineering successfully completed an ABET review recently, and the department passed with high marks and praise, according to Department Chair Dr. Alireza Haghighat. The ABET reviewer had excellent comments about the department's program. In particular he praised the

# Refueled In Unparalleled Operation

NRE's capstone design course, and commented that "... it was exactly what ABET wanted."

The reviewer also cited efforts to improve student's communication skills, and praised the department's dedicated faculty. The reviewer said NRE had good students who respect their faculty, had a dedicated advisory board which is engaged in NRE's activities, and had excellent recent faculty hires. Based on observation and reviewing documents, the ABET reviewer said he consider UF NRE a strong Nuclear Engineering Program.

For his efforts in collection, preparation and coordination of all materials necessary for a comprehensive presentation to the ABET Committee, NRE presented Prof. Ed Dugan with the Department's Outstanding Contribution Award for 2006 in recognition of the outstanding role he played to help NRE.

## **PROGRESS ENERGY FLORIDA FUNDS NEW UF DETECTION LAB**

Due to a generous contribution from Progress Energy Florida, a new Advanced Radiation Detection (ADRAD) Laboratory was recently dedicated, and UF research already has begun using the lab for national security-related work.

The dedication ceremony also honored Mr. William Habermeyer, President of Progress Energy Florida (PEF).

On hand for the dedication were Mr. Habermeyer, Dr. Janie M. Fouke, UF Provost and Senior Vice President for Academic Affairs, the College of Engineering Dean Pramod Khargonekar, and Department Chair and Professor Alireza Haghighat. A number of other UF administrators and PEF's high ranking officers were present. "We are pleased to open this new laboratory, for it holds promise to help our university and our nation in its effort to screen more incoming packages and containers in the U.S.," said Dean Pramod Khargonekar.

UF Provost Janie M. Fouke, herself a Fellow of the American Association for the Advancement of Sci-

ence, said it is important for the university to conduct research that is relevant to industry's needs. "And the biggest indication of that relevance is that Progress Energy Florida is with us here today for this dedication," she said.



William Habermeyer (left-center), retiring President of Progress Energy Florida, gets congratulations from NRE Department Chair and Professor Alireza Haghighat on the dedication of NRE's new ALRAD Lab. Joining in the celebration are College of Engineering Dean Pramod Khargonekar (l) and UF Provost Janie M. Fouke (r).

## **UF'S NUCLEAR ENROLLMENT SOARS TO ALMOST 200**

Enrollment at the University of Florida's Nuclear & Radiological Engineering department shows a continuing trend toward more undergraduate and graduate students. The 2006-2007 enrollment is 194 students including 115 undergraduate students and 79 graduate students.

"This is the highest enrollment since the nuclear plant-building years of the mid-1970's," said NRE Chairman and Professor Dr. Alireza Haghighat. (For a breakdown, see chart below.) UF's program uses a three-prong approach. While nuclear engineering and medical physics students represent the lion's share of

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# University of Florida Research Reactor Refueled In Unparalleled Operation (continued from page 15)

## UF RESEARCH REACTOR

Built in 1959, the University of Florida Training Reactor (UFTR) was one of the first nuclear reactors built on a university campus. Today it is one of over two dozen non-power reactors used for education, training, research and testing at educational institutions around the United States.

In November 2000, the Board of Directors of the American Nuclear Society awarded the UFRR the distinction as a Nuclear Historic Landmark. Originally licensed to operate at 10 kWatts, the reactor currently operates at a thermal power level of 100 kWatts.

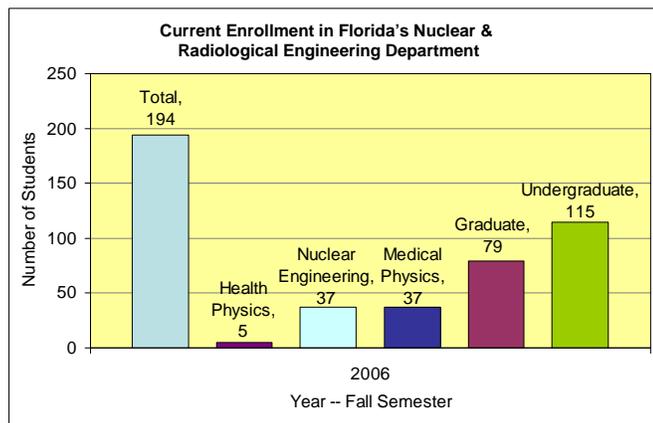
In terms of usage, the facility serves hundreds of college-level and pre-collegiate students each year from within and outside the University. These groups number approximately 2,000 visitors to the facility annually.

enrollees, health physics still accounts for a small portion of students who want to major in that field.

“This is a far higher number than we envisioned so quickly for the department, which continues to have its resources stretched,”

Dr. Haghigat said. “Not

only do we need more faculty – for which we are currently conducting a search – but we are quickly outgrowing our physical space.” According to Dr. Haghigat, the resurgence in enrollment is proof of a renaissance in nuclear power.



## NEW KAPL LABS SCHOLARSHIP AWARDED

Kristin Whitlow (undergrad, NE) was awarded the first Knolls Atomic Power Laboratory (KAPL) Elite Nuclear Engineering Scholarship for the spring, 2007 semester. Kristin was selected from among a number of her peers to receive \$5000 during the

academic year, and also will intern at KAPL during the summer. Kristin is starting her junior year, has a 4.0 GPA, has studied abroad and already has interned at two national labs. “We are very pleased to be sponsoring Kristin with a KAPL scholarship,” said Ray Gamino, Manager for Lockheed-Martin, the contractor for KAPL. “She will make a great ambassador for KAPL,” he said.

## UF NRE WINS TOP ENGINEERING FAIR AWARD

UF’s annual Engineering and Science fair is the largest event held to help students and visitors celebrate Engineers’ Week. And this year, a joint collaboration between ANS and SHMPS (Society of Health and Medical Physics Students) chapters led to receiving the top honors among thirty student societies. Student volunteers (led by Nelson Royal (ANS) and Matt Hough (SHMPS)) gave away fresh strawberries to demonstrate food irradiation, used M&Ms to visualize isotopic half-life, and displayed a big ANDROS robot from the Robotics Lab to draw attention to other exhibitions and slide shows. Hundreds of students, faculty, staff, and members of the community usually attended the event, which takes two days and covers the entire Reitz Union Ballroom. Representatives from thirty societies and multiple research centers were on hand to showcase some of the best of what engineering has to offer, plus hands-on exhibits which entertained and inspired people of all ages.



UF Medical Physics graduate student Deanna Hasenauer demonstrates how X-rays are generated and used for the diagnosis of disease to Claudette O’Toole and Neri Garagatt, who teach seventh grade science at Gainesville’s Queen of Peace Academy.

# Team Teaching Reactor Operations and Systems Courses Using a Network of DLRs

In a pioneering effort, the University of Cincinnati and the Ohio State University are team teaching a Nuclear Power Plant Operations and Systems course sequence using Distance Learning Rooms (DLRs) on four Ohio campuses. The senior instructors for the courses are Professors John Christenson [UC] and Brian Hajek [OSU]. The DLRs are located in Cincinnati, Columbus, Xenia and Mentor. The 22 students are from various academic programs at Wilberforce University Central State University, Ohio State University and the University of Cincinnati.

During class sessions the four DLRs are fully interconnected, so the class can be taught in a completely synchronous mode to all locations. The 22 students and the faculty at all four locations are able to interact with each other in real time just as if they were all in the same classroom. The courses are supported 24/7 by an electronic class management system which provides access to all of the presentation graphics, contains links to an extensive set of references, supports on-line quizzes and enables the participants to interact with each electronically at all times.

Important components of the course are trips to nuclear training centers. Classes have traveled to the Westinghouse Training Center in Madison, Pennsylvania, and to the Perry Nuclear Power Plant in Perry, Ohio.

At Westinghouse, the students saw evolutions on the SNUPPS simulator and had a “hands-on” tour of

several mockups of actual plant equipment including fuel handling equipment, a reactor vessel head, a reactor coolant pump, steam generators with robotic inspection tools, and nuclear instrumentation channels. All of the mockups are actively used for training nuclear facility personnel.

At the Perry Nuclear Power Plant, students toured nearly every part of the plant outside of Primary Containment. Places visited in the plant were chosen to give students an idea of the equipment they would be operating in the simulator the next day.

A highlight of the Perry trip was the opportunity to spend a full day performing operations on the plant full-function simulator used by plant personnel for

operator and crew training. The students performed normal operations such as startup and synchronizing of an Emergency Diesel Generator, placing of RHR in Suppression Pool Cooling mode followed by performing a full flow test of the Reactor Core Isolation Cooling System, startup and operation

of LPCS for a full flow test, swapping of Service water pumps, and withdrawing control rods to make the reactor critical followed by an increase in power to the point of adding heat.

Student responses to the tours indicate the importance of these activities to providing context both for the Operations and Systems course and also for other more theoretical courses in their curricula.



# Hannibal, Missouri High School Develops New Semester-long Secondary Nuclear Science Course

In June 2003, Brenda Hallbauer (*Biology teacher at Hannibal (MO) High School*) enrolled in the University of Missouri-Columbia's annual summer course NE 7001: Nuclear Science and Engineering for Secondary Science Teachers. As one of 24 teachers taking the course, Brenda wanted to gain an overall perspective on nuclear energy and its applications. For her home biology classroom, Brenda was especially interested in information about how nuclear science contributes to advances in medicine and agriculture, areas that she considered of most relevance for her students in a non-urban area of Missouri.

As part of the NE 7001 class requirements to receive the three hours of graduate credit associated with the class, Hallbauer developed and submitted to Dr. William Miller (*Professor of Nuclear Engineering at MU, and NE 7001 class director*) a teaching unit for use in her home school classroom.

In 2004, when her administration was looking for new courses for their curriculum, Hallbauer saw an opportunity to take the nuclear science teaching unit she had submitted and use it as the foundation for a new class at Hannibal High School. "I developed this course for two reasons," says Hallbauer. "At the time, the Science Department was being encouraged to develop courses that both general and upper level students would be interested. I also thought the topic of Nuclear Science would be intriguing and new to the students."

Adding additional information and resources to the teaching unit she had developed for the MU class, Hallbauer completed an outline and submitted it to Hannibal principal, Darrin Powell. Powell reviewed the course proposal and gave his approval.

With the new course approved, Hallbauer is finishing the first year of teaching her new "Nuclear Science" at Hannibal. "The first time the class was offered was the first semester of the 2006-07 school year. Twelve students took the class, with 11 completing the course. The second semester class has 19 student enrolled. The course is currently offered one block each semester," explains Hallbauer. Prerequi-

sites for Hannibal's new Nuclear Science class are that a student has to have passed Physical Science and be currently taking or have passed Biology.

When asked about the response from her students thus far, Hallbauer says, "The feedback from the students has been positive. They have enjoyed the course. They have liked that it is a new area that they are being exposed to. Many have voiced that they wish it was a 2 semester course."

"They have been surprised by the amount of radiation they are exposed to and the sources it comes from," she continues. "The students were also surprised by the many career opportunities that are available in the field of Nuclear Science. Several are even considering careers in the field now."



Students huddle near Hannibal Callaway Cooling Tower

As part of the Hannibal Nuclear Science class, students visit operating nuclear facilities and other organizations to provide experiential learning outside of the traditional classroom, as well as to provide students insights into careers in the nuclear industry.

The University of Missouri-Columbia has taught the summer NE 7001 class annually for 25 years. Financial support for the class is provided by the American Nuclear Society and the US Department of Energy, as well as MU's Graduate School. A gift from AmerenUE's Callaway Nuclear Power Plant to MU for nuclear education also supports the class. The upcoming NE 7001 class will be held on the MU campus during the week of June 18 – 22, 2007. Teachers interested in taking the class should contact: Dr. William H. Miller, 573-882-9692; [MillerW@missouri.edu](mailto:MillerW@missouri.edu).

# SUMMER in the School of Nuclear Engineering at Purdue University

## Summer Undergraduate Research Awards

The best students, who express interest in research, are given the monetary SURF award for the summer.

A summer internship and a research fellowship are helping two nuclear engineering undergraduates lay the groundwork for medical school.

For a pair of undergraduates who traveled from opposite ends on I-65 to arrive at Purdue's campus, a passion for nuclear science and some well-timed research projects are setting them both on the road to medical school. And it's all a part of their current five-year plans.

The world of the subatomic universe is not for the meek of mind, yet the School of Nuclear Engineering continues to attract students who may not fit the engineering stereotype. Patrick Kohtz, for example, is a fifth-year senior who's also completed his final year of eligibility on the football team. A Frankfort, Indiana, native and a former freshman walk-on now in possession of a full athletic scholarship, Kohtz is one of the few engineering students on campus who balances schoolwork with practices, games, and a steady dose of bumps and bruises.

Several players Kohtz has known have had to choose between engineering and football. "I'm not saying I've chosen engineering over football, but I would say I really have to put in a lot of time for it."

Likewise, Sheila Bolbolan, a junior from the Chicago area, knew she wanted to spend her time at Purdue turning whatever engineering studies she encountered into a medical application. That process began in her freshman year when she began working with Tatjana Jevremovic, a professor of nuclear engineering, in the "Nuclear 120" class. This past summer, as a participant in the Summer Undergraduate Research Fellowship (SURF) program, Bolbolan continued that work.

"With SURF, I worked in collaboration with the health sciences department to research the bystander

effect, using X-ray microbeams," Bolbolan says. "I created a computational model of a cell culture dish to be used in the microbeam, and I simulated a source to examine the dose distribution in the cell culture."

For Kohtz, his association with Jevremovic led to last summer's internship at Goshen Health Systems in northern Indiana. "I had spent the last four summers here [on campus] working out for football,"



Kohtz was able to observe life in the radiation oncology department of the hospital, making him an eyewitness to treatments, treatment planning, the calibration of equipment, and much more. Along with a few hands-on projects, that wide range of exposure has helped to solidify his plans for a future in oncology, to which he is now preparing for with prerequisite classes.

"The problem with nuclear engineering and football," Kohtz says, "is that if you take too many hours, you'll pay for it with your grades." Thus, Kohtz describes his five-year-plus plan as a "super super senior" route.

Bolbolan, who serves as treasurer for Purdue's American Nuclear Society, also anticipates a fifth year and a graduation celebration in 2009. "I'm definitely thinking about medical school," she says. "I plan on continuing my research in nuclear medicine throughout my educational career."

For now both students seem to be benefiting from the school's close-knit community, getting to know their classmates, professors, and even some of the alumni who have steered similar paths before them. And in another 10 to 15 years each may likely answer affirmatively to the query: "Yo, is there a doctor in the house?"

# UMass Lowell and UIUC Collaborate on Web-Cast Lab Experiment

Over the last few years with funding from the DOE University Reactor Instrumentation, Reactor Sharing, and INIE programs, the University of Massachusetts-Lowell (UMass) has developed capability to perform live reactor experiments and deliver archived reactor operations data via a web-based interface. Access is available through the UMass [www.nuclear101.com](http://www.nuclear101.com) educational website. In addition to an on-line link to the reactor, the website provides a resource for students, instructors, and working professionals interested in the nuclear engineering field. This capability was designed specifically to promote and enhance the use of the UMass research reactor within a much wider nuclear engineering educational community.

During spring semester '06, UMass and the University of Illinois Urbana-Champaign (UIUC) collaborated on delivering a live reactor-based laboratory experiment to UML and UIUC students. At UML, a standard personal computer acts as a web server using a dedicated software package to receive data from the reactor control room computers and then distributes it in a web-based format. A series of user interface screens allows a user to observe most of the same information that is accessible to the reactor operators within the UMLRR control room. This includes a variety of real-time operational indicators (power level, pool and reactor outlet temperatures, primary coolant flow rate, secondary flows and temperatures, etc.) as well as historical data for many of these variables.

At UIUC, a computer lab equipped with two large screen monitors, several computers, and a web-network-camera provides for audio-visual conferencing. However, for linkage to UMass, a web-based virtual classroom software package was



UML NE students participate from the UML computer lab

installed at both locations. The software provided bi-directional audio and video communication to and



UIUC Profs. Rizwan-uddin, Jim Stubbins, and students collect experiment data in their computer lab

from UIUC students, UML students, and the UMLRR control room. UML professor John White was able to conduct the laboratory experiment from a personal computer in his office. In addition to nuclear engineering education applications, Prof. White is working to expand the system for use by a wider base of non-nuclear engineering students, and in doing so, introduce them to nuclear concepts. For more information contact Prof. White at [John.White@uml.edu](mailto:John.White@uml.edu).



UML Prof. John White conducts the lab from his office

# Celebration at MURR After 40 Years of Operation

In October of 2006, the University of Missouri Research Reactor (MURR) celebrated 40 years of safe and productive operation as the most powerful university research reactor in the United States. More than 250 attendees celebrated four decades of research, development and production of radioisotopes. During its first 40 years, MURR has provided cancer-fighting medicines to the medical community, served as a platform for basic and applied research and has acted as a teaching tool for countless students. The event also highlighted the expansion of the reactor facility to include a building to house a cyclotron and new laboratories. In addition, the audience was informed that MURR had filed with the Nuclear Regulatory Commission to extend the operating life of the reactor for another 20 years.



Honored guests included former reactor directors Ardath H. Emmons and Robert M. Brugger.

Dr. Emmons came to the University of Missouri after working at Oak Ridge National Laboratory and the Ford Nuclear Reactor in Michigan. His flexible, powerful design has allowed the reactor to flourish for decades while other research reactors have been forced to shut down. Dr. Emmons worked as director of MURR until 1970.

Dr. Brugger was brought in as director of MURR in August 1974. His previous experience included nuclear physics work at Phillips Petroleum, Idaho Nuclear, and Aerojet Nuclear. His industry background helped him to move the reactor to its current operating schedule of 150 hours per week. This new schedule allowed for enormous growth in reactor utilization, and as MURR had just been upgraded to 10 MW(th), many new projects followed in its wake. With the new schedule and power level, the potential inherent in Dr. Emmons' flexible design bore fruit as work expanded in the areas of neutron scattering, radiation effects on materials, and neutron activation analysis. In addition, an extensive program of isotope

production ramped up, which led to the creation of three different Food and Drug Administration-approved drugs for analysis and cancer treatment by MURR researchers.

This celebration of past achievements was followed by a presentation by Ralph Butler, current director of MURR. Butler's presentation explained the vision of an expanded research facility serving as critical hub for radioisotope production and radiochemical analysis. The work done to fulfill this vision included:

- Facility expansions and improvements that have added new hot cells and radiopharmaceutical processing stations to the already extensive laboratory space
- Equipment upgrades made possible by the generous support of the Department of Energy (DOE)
- FDA approval in 2005 of MURR's "current good manufacturing practices" (cGMP) quality control program which will allow the reactor to further assist the development of life-saving medicines and diagnostic therapies

Butler described the groundbreaking ceremony held in September which kicked off construction of a 25,000 square foot building expansion that will house a cyclotron, expanded laboratories, and classrooms. He also described the role the reactor played in recruiting new faculty to the University of Missouri. These new faculty include Dr. Frederick Hawthorne, a renowned researcher into novel techniques for boron-neutron capture therapy. A new building to house the International Institute for Nano and Molecular Medicine, of which Hawthorne is a codirector, is being built across the street from MURR. The reactor was also key to assisting the Physics Department in hiring Dr. Maikel Rheinstadter, winner of the 2003 Young Scientist Award from the European Neutron Scattering Association, and Dr. Owen Vajk, winner of the 2004 Outstanding Student Research Award from the Neutron Scattering Society of America – two new faculty who will be expanding the neutron scattering program at MURR.

# Expanding the Minds of Middle School Girls in the State of North Carolina



On Wednesday, March 7, more than 400 eighth-grade girls, 100 teachers and 50 women scientists gathered at North Carolina State University to learn about science and perform experiments at the 15th annual Expanding Your Horizons (EYH) conference.

The EYH conference is a one-day event featuring demonstrations and hands-on science experiments designed to get young girls interested in science careers by giving them the opportunity to interact with female professionals in science, engineering, math and technology (STEM) fields.

Nuclear engineering is always well represented and this year was no exception. Nicole Holmes, alumna of NC State's Nuclear Engineering program, delivered the keynote address. Graduating in 1994 with a Bachelor of Science in Nuclear Engineering from NC State University, she continued and obtained her MBA from the University of North Carolina at Chapel Hill. Currently, Mrs. Nicole Holmes is the general manager of General Electric Nuclear Manufacturing in Wilmington, N.C.



NC State's Nuclear Engineering alumna, Nicole Holmes

Another contribution of nuclear engineering to EYH, is the topic specific workshops that follow the keynote address. For the last 6 years, Nuclear Engineering Director of Outreach Programs, Lisa Marshall, has led the nuclear specific workshop.

## Young Investigators' Summer Program in Nuclear Technology Motivates High School Students

Young Investigators started in the mid-80s and continues to be a beacon for young adults interested in nuclear science and technology. This national program attracts high school rising juniors, rising seniors and graduating seniors for a three-week residential academic experience. Students participate in lectures, labs, small group projects and industry field trips.



Students at AREVA's Training Center in Lynchburg, Virginia

Some of the topics covered include radioactivity, fission power systems, fusion and fusion power, and the US energy plan. Seminars covered the history of nuclear energy, nuclear waste management, and nuclear materials. Group projects involved the PULSTAR research reactor, and field trips were made to nearby commercial reactors and vendors.

There has been success in exciting students about the subject matter – there is a 40% application rate to the undergraduate program for 2007-08. The 2007 dates have been set for July 2 through 20.

# Seminar at The Ohio State University by U.S. NRC Chairman Dale Klein

In recognition of the 125<sup>th</sup> anniversary of the Ohio State Department of Mechanical Engineering, a series of seminars are being presented by eminent contributors to the field of mechanical (and nuclear) engineering. On January 26, Prof. Dale Klein, Chairman of the U.S. Nuclear Regulatory Commission, presented a seminar on the manpower needs facing the nuclear industry in light of the anticipated nuclear renaissance.

Chairman Klein began his talk by discussing public service. He described the contributions of two men that have dedicated their lives to public service, Senator George Voinovich of Ohio and Commissioner Ed McGaffigan of the NRC. Of Senator Voinovich, he stated, “He has been a great leader in the Senate in supporting the NRC’s human capital efforts, and in a broader sense, the issue of science and engineering education nationwide.” “Ed (McGaffigan) has amassed a wonderful record of accomplishment during 31 years of public service. The last 10 of those have been spent as one of five NRC commissioners, and late last year he became the longest-serving commissioner in NRC history.”

The Chairman primarily described the efforts of the NRC to provide the staff it needs to meet its regulatory commitments. “I am privileged to be presiding over the NRC during the industry’s reawakening. As stated earlier, later this year, for the first time in 30 years, the NRC expects to receive an application to license a new nuclear plant. To date, we have received letters of interest from several potential applicants that indicate we may expect that order to be followed by as many as 30 others.”

“Now, with the initial plant orders of this new nuclear cycle imminent, uncertainty in part based on that previous experience surrounds the regulatory treatment of the initial plant orders. I am making it a priority of my chairmanship to reduce that uncertainty by ensuring the clarity of regulatory requirements and the timeliness of NRC review. In my view, the most important contribution the NRC can make is to be a strong, stable regulator that makes timely regulatory decisions based on good science and high quality engineering practices.”

“In preparation for our expanded workload, the NRC plans to hire about 300 new technical staff a year through 2008... We will also look at some possible procedural changes in the review process in the future.

I would like to see the review time required for early site permits and combined operating licenses reduced, with no compromise on safety. That is not an unrealistic goal, if industry does its job at the beginning of the process by submitting high-quality applications for NRC review.”

The second potential barrier to the success of nuclear power in the future is in the area of manufacturing infrastructure... I believe that we can and will develop the rigorous inspection programs needed to ensure the quality and authenticity of the millions of components needed. But in terms of the logistics of quality control and safety inspections, it would be desirable to have as much of the content originate in the U.S. as possible. It is both easier and faster for our inspectors to visit a manufacturing plant in Indiana than in France - or China.”

“That brings me to the third potential barrier I want to discuss today — the capital needed to operate nuclear plants - not financial, but human capital... A nuclear industry survey shows that nearly half of current nuclear industry workers are more than 47 years old, and that nuclear energy companies could lose as many as 23,000 workers over the next five years - about 40 percent of the total jobs in the sector... At the same time, the key suppliers to the industry - the architect/engineering firms, fuel suppliers and reactor manufacturers, anticipate that 32 percent of their workers will be eligible to retire within the next three years. They clearly must be replaced and their numbers augmented if the nation is to restore its manufacturing capability sufficiently to supply the components for and build the new plants. However, the real challenge - and the real solution - is to increase the talent pool, and every segment of the nuclear industry needs to focus on this goal. The demand is there, and a goal must be to bring supply and demand toward equilibrium... As I have told the nuclear groups I have addressed, this is an issue that should be addressed, urgently, at the CEO level at every entity - in both the public and private sectors - with any involvement in the nuclear industry... The formula is a simple one, known to faculty everywhere: university administrators value programs that bring in research dollars and students, research dollars flow toward expanding technology segments and students gravitate toward careers that promise fulfillment and financial reward. Follow the money, and success will be yours.”

# NC State Alumnus Wins Innovative Thinkers Award

Dr. Medhat Mickael, senior staff scientist at Weatherford International Limited, has been instrumental in revolutionizing the design process for logging-while-drilling and



Dr. Medhat Mickael

wireline tools. Accomplishments have not gone unnoticed by the World Oil Awards Advisory Board, Dr. Mickael received the 2006 Innovative Thinkers Award. His pioneering use of numerical simulations, in lieu of physical prototypes by creating a state-of-the-art modeling environment for logging tools, has resulted in lower costs and higher measurement capabilities. Dr. Mickael also invented a new gain control method using a senior sensor internal radioactive source. The source emits a low-energy gamma ray that does not interfere with the measurement.

Dr. Medhat Mickael earned his doctoral degree from NC State's Nuclear Engineering Department in 1988. He is a 1989 recipient of the American Nuclear Society's Mark Mills Award. His academic adviser was Dr. Robin Gardner, Professor of Chemical and Nuclear Engineering in addition to the Director of the Center for Engineering Applications of Radioisotopes.

## All Roads Lead to Nuclear Engineering: a US-India Connection

Professor K. Linga Murty was honored as one of five lecturers for the American Society of Materials (ASM) International-Indian Institute of Materials (ASM/IIM) Lectureship Program. He spoke at the Indian Institute of Metals (IIM) chapters in Kalpakkam, Madras, Visakhapatnam and Bombay, India. Dr. Murty also presented papers at the International Conference on Advances in Nuclear Materials (ANM-2006 in Bombay) and the International Conference on Recent Advances in Materials and Processing (RAMP-2006 in Coimbatore). And he continued

collaborative research at the Indian Institute of Technology-Bombay.

Prior to his trip, Dr. Murty conducted an interview with *The Global Educator* about the U.S.-India nuclear engineering education connection. At present, India has no institution offering such a curriculum so students specialize in mechanical engineering, nuclear physics, and materials science and engineering. For those who continue their studies abroad, North Carolina State's nuclear engineering graduate program is one destination. The interview also emphasized the global nuclear renaissance, referring to the Indian-U.S. nuclear agreement as further evidence. This agreement will provide expertise and nuclear fuel to meet India's rapidly increasing energy needs.

Dr. Murty is a professor of nuclear engineering and materials science and engineering at NC State's Nuclear Engineering Department. He is recognized for his outstanding contribution to the study of nuclear structural alloys, receiving the first American Nuclear Society (ANS) Mishima Award in 1991. He is an elected fellow of the ANS, ASM International, and a life fellow of IIM.



Dr. Murty was honored as one of five ASM/IIM lecturers by Dr. Abbaschian, the President of ASM International at the 2006 MST Meeting

# MIT Nuclear Reactor Laboratory Neutron Spectrometer

MIT Nuclear Reactor Laboratory (NRL) is working to web-enable a neutron spectrometer using a combination of LabVIEW™ software and a prototype iLab interface. Due to the limited number of university research reactors and other available neutron sources, many talented young people do not have the opportunity to explore basic neutron physics research. Remote access enables increased usage of an existing neutron-beam based facility in under-served communities without incurring any additional radiation dose per user; this is especially pertinent for students under eighteen who are limited by federal radiation restrictions. Interested teachers, professors, and teaching assistants will be invited to contact the NRL to register their class for participation in a series of web-based, interactive laboratory experiments and training modules. These training modules would demonstrate development of a thermal neutron beam in a research

reactor; properties of neutron flight using a mechanical chopper; properties of neutron diffraction using a crystal monochrometer; and properties of neutron scattering and absorption by allowing neutrons to interact with various shielding materials. Our fundamental outreach goal is to increase student interest in physics and nuclear science research by making laboratory experiments easily accessible.

Currently, the NRL is testing the LabVIEW™ interface with MIT undergraduates who are using the facility on-site in the local mode. Once the interface is evaluated and modified, the remote iLab architecture will be added to the interface. Deployment online is expected for Fall 2007. At that time, the NRL will be searching for volunteer participants to evaluate the online interface.

## Purdue -- The Future Looks Bright

Nuclear energy has faced many challenges since its introduction. One of the greatest challenges Nuclear Engineering faces is a misinformed public. In one instance, a Purdue University tour guide shared an elaborate story of her visit to the campus reactor. She explained in vivid detail how the equipment in the room is covered by tinfoil to protect it from radiation. One can be assured that the equipment is not covered in tinfoil; however, her story reflects one of the many myths surrounding nuclear energy.



Indy Car used to promote Nuclear Energy. Pictured (left to right) F. Limon, J. Hopkins, J. Webster, K. Walter, D. French)

The Purdue Chapter of the American Nuclear Society (ANS) seeks to dispel myths by creating public awareness of nuclear technology. In the Fall

2006 semester ANS put on an event dubbed “Nuke Week”. The event featured free food, games, campus reactor tours, music by The Iry, and comedian Jeff Havens. In addition, an Indy Car used to promote nuclear energy was provided courtesy of Paul Newman. Most importantly, it was an opportunity to discuss Nuclear Engineering and answer questions about radiation and job opportunities. The negative portrayal of nuclear energy in the media has led to fear of the technology. This fear can be likened to a fear of fire. Fire is a wonderful tool that has allowed humanity to advance from the stone ages, but if used improperly has the potential for harm. If used properly, nuclear energy has the potential to fulfill our energy needs for thousands of years. ANS takes this message to local schools with the intent to educate, rather than instill fear in the public. These students will hopefully take our message, along with their newfound knowledge, and discuss with parents, relatives, and friends the truths about nuclear energy. Indeed, the future does look bright, especially for a student in Nuclear Engineering.

# ORNL Has Extensive University Connections in Neutron Sciences

University connections with ORNL Neutron Sciences programs are extensive. The instruments and capabilities have been designed with input from the user community. Over 100 academic institutions are represented on instrument teams that established the science cases, defined performance specifications, encouraged funding of these instruments by government agencies, and will take part in initial experiments.

Over 100 undergraduate and graduate students are involved with activities at HFIR and SNS annually. Students may be part of summer programs in neutron or nuclear sciences; HFIR and SNS are integral parts of the summer student tours.

Students and faculty also participate in workshops and meetings because they will utilize neutrons to analyze samples in their studies in the chemical, physical, biological, or materials sciences or engineer-

ing. The *Imaging and Neutrons 2006* (IAN2006) Workshop was held at the Oak Ridge National Laboratory, Oak Ridge, Tennessee in October 2006. It was directed to an international scientific community wishing to advance progress in the use of neutrons in a wide range of imaging applications. The IAN2006 presentations cover many scientific disciplines and are available at <http://www.sns.gov/workshops/ian2006/>.

On October 8-10, 2007, the SNS-HFIR User Group (SHUG2007) will meet in Oak Ridge. SHUG2007 attendees will be the first to learn results of experiments using the newly commissioned instruments at the SNS and HFIR. SHUG2007 will provide an opportunity for biologists, chemists, materials scientists, and physicists to describe their needs for experimental apparatus including sample environments and new instruments. For more details including registration and scholarship information, please visit <http://www.sns.gov>.



More than 2,000 users attended the 2005 SHUG User Meeting

# Oak Ridge Chapter of ANS and WIN



Candy Chromatography



Separating DNA from fruit

## Family Science Night

The Primary School Science Club, started by the Oak Ridge/Knoxville sections of the American Nuclear Society and Women in Nuclear, joined up with students from the University of Tennessee's (UT) College of Engineering to put on a Family Science Night. The Family Science Night was held at Farragut Primary School in Farragut, Tennessee, and was hosted by the Farragut Primary School Parent Teacher Association (PTA) and the Farragut Primary School Science Club. Sixteen UT students from the student chapters of: American Nuclear Society, Society of Women Engineers, Tau Beta Pi and others donated their time to spend the evening with kindergarten through second-grade children doing science experiments related to chemistry. Over half of the students represented the UT Nuclear Engineering Department.

The experiments included extracting DNA from Fruit, chromatography, acid/ base reactions, exploring densities of materials, and learning about what makes soda pop fizzy. Over 100 primary school students attended the event, totaling over 300 people. No fee was charged, with the cost being paid by the science club and the PTA. It was a great success and a good time was had by all.



Seated, left to right: Carol Dudney, Emily Fraser, Heather Humphreys, Cheryl Eddy, Christy Farmer, Sarah Andrews

Standing, left to right: Justin Belles, Eric Moore, Carlos Juarez, Eric Powell, Adrienne Thrash, Robby Joseph, Jamie Garvey, Doug Tucker, James Henkel, Nathan Fisher

# Students Make Artistic Sense of Nuclear Concepts

Can't tell fission from fusion? Sure, you probably can, but most folks outside a certain pedigree or degree probably cannot. For today's nuclear engineering student, part of the maturation process is learning how to explain concepts to your average Joe and Josephine on the street.

That translation is what Tatjana Jevremovic, a professor of nuclear engineering, had in mind when she made a summer assignment. "I wanted students to turn a nuclear concept into a piece of art," she says. "I wanted them to see beyond mathematical results."

But there were still boundaries. From boxes to branches, discarded office supplies to donated crackers from Japan, the artwork had to be comprised entirely of things recyclable. Swapping thinking caps for berets, students who normally work with charts and graphs started tuning into the right sides of their brains. Their creations spilled into the hallways of the Nuclear Engineering Building.

In the end, Nader Satvat, a PhD student working on the DoE - INIE project, took the most votes for first

prize with his work entitled "Visible Fission." Maybe not much of a resume builder, but something to write home to Iran about. And while this handful of nukes has about as much chance of ending up in the Louvre as Van Gogh does resurfacing at Oak Ridge National Labs, perhaps they learned a little something about the creative process.



"Visible Fission" by Nader Satvat, 2006

## Important Dates to Remember

### 2007

- ✓ NERI-C Proposals due  
May 23, 2007
- ✓ GNEP University Readiness  
Proposals Due June 7, 2007
- ✓ ANS Meeting  
June 24-28, 2007  
Boston, Massachusetts
- ✓ TRTR Meeting  
September 17-20, 2007  
Lincoln City, Oregon

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