

Idaho State University Receives \$2.5 Million in Grants; CAES Faculty on Research Teams

By Kortny Rolston, CAES Communications

The U.S. Department of Energy has awarded Idaho State University approximately \$2.5 million to conduct cutting-edge nuclear energy research.

ISU won three of the 42 university-led research and development projects awarded by DOE through its Nuclear Energy University Programs. CAES affiliate faculty are key members of all three research teams.

Some of the research will be conducted at the CAES facility in Idaho Falls.

"This is great news for Idaho State University. Our faculty members are creating solutions to the nation's major energy challenges. In receiving these awards, ISU is in the company of great research universities," said Pamela Crowell, ISU's vice president for research.

ISU received:

- **\$650,000 for a Fuel Cycle Project** titled "Fuel Performance Experiments on the Atomistic Level, Studying Fuel through Engineering Single Crystal UO₂." The principal investigators are George Imel and Eric Burgett, CAES/ISU professors. They have several collaborators including Alan Hunt from ISU. Their research focuses on developing novel and more cost-effective options to improve the storage, recycling and disposal of used nuclear fuel.



- **\$1,287,921 for a Generation IV Reactor Project** titled "Studies of Deteriorated Heat Transfer in Prismatic Cores Stemming from Irradiation-induced Geometry Distortion." The principal investigator is Brian Williams, a CAES/ISU professor. He is collaborating with Richard Schultz and Donald McEligot from Idaho National Laboratory, both of whom are affiliated with CAES. Their research focuses on developing new reactor technolo-

gies with higher safety, economic and sustainability performance.

- **\$597,252 for a "Blue Sky" Nuclear Energy Project** titled "Development and Testing of an Open-Loop Oscillator for Small Reactivity Worth Samples." The principal investigator is George Imel, who leads ISU's nuclear engineering department and is also a CAES associate director. He is collaborating with Gilles Youinou from INL, and Eric Burgett and Jason Harris, both of whom are CAES/ISU researchers. This research area focuses on creative, innovative, or "blue sky" research. Examples of topics of interest are new reactor designs and technologies; advanced fuel cycles, including advanced nuclear fuels; alternate aqueous and dry processes, including volatility and ionic liquids; instrumentation and control/human factors; radiochemistry; and fundamental nuclear science.



Discuss sustainability

University of Idaho College of Law Dean Donald Burnett will be leading a discussion on sustainability on June 21 as part of an ongoing colloquia series sponsored by CAES and the ATR National Scientific User Facility. The event will be held at CAES and runs from 4:30 to 6:30 p.m. It is open to the public and refreshments will be served.

Robotics Open House Inspires and Educates Future Scientists

By Mike Wall, INL Communications and Governmental Affairs

Attending Idaho National Laboratory's robotics open house was a big day for Edgar Herrera. The Idaho Falls sixth-grader spent nearly two hours on April 14 playing with some of the most advanced, intelligent robots in the world — and thinking about his future.

"I didn't know some of this stuff was possible," Herrera said. "Now all I want to do is robotics. It's totally changed my life."

This sort of reaction is just what INL was hoping for when it organized the open house, an event helping to celebrate the first National Robotics Week. INL and University of Idaho roboticists showed off their machines at the Center for Advanced Energy Studies (CAES). And so did two robotics teams from Idaho Falls schools — one from Dora Erickson Elementary and the other from Hillcrest High.

The main goals of the open house were to educate the public about the importance of robotics in modern society, to inform people about some of INL's cutting-edge capabilities and to inspire youngsters like Herrera, a member of the Dora Erickson club.

"There are a lot of gee-whiz things here that get kids excited," said Kevin McCarty, a computer science doctoral student at U of I. "The hope is some of that excitement will stick in their minds and lead them toward a career in science or engineering."

INL's roboticists had a lot of gee-whiz to go around. They demonstrated several unmanned ground vehicles (UGVs) outfitted with the lab's revolutionary Robot Intelligence Kernel software, which allows bots to perform complex tasks more or less on their own. Some of the UGVs on display can map and navigate hazardous environments such as tunnels; others can find and mark hidden land mines.

INL scientists also let the public try out their unmanned aerial vehicle simulator, a training platform rigged up on a Macintosh laptop. This station was a hit with Dora Erickson sixth-grader Austin Chesak.

"This is definitely addicting," Chesak said as he piloted a small helicopter toward a landing target on a stretch of computer-generated earth. He hit the

bull's-eye, then looked up with a big grin. "Look at that!"

The University of Idaho's robotics demonstrations also engaged young minds. Several of their stations featured advanced haptics: technology that uses tactile feedback to improve the ways that people and computers interact. For example, U of I demonstrated a small remote-control car that becomes more difficult to drive forward the closer it gets to a wall. And a basketball-shooting computer game allowed players to feel the weight of the virtual ball in their hands.

The school robotics clubs showed off their own work, too. Dora Erickson's 25 fifth- and sixth-graders brought out the remote-control LEGO cars they built themselves. The Ammoknights demonstrated PELE, the robot they built in a six-week rush for this year's First Robotics competition. The robot is aptly named: PELE (People Enjoying Learning Engineering) kicks a soccer ball with a pneumatically powered "foot."

Michael Rynders, a Hillcrest junior who handles a lot of the programming for the Ammoknights, was busy getting PELE up and running. But he had time to wander CAES and learn from the professionals, too.

"I'm pretty excited about this," said Rynders, who is planning a career in science or engineering. "You get to see cutting-edge robotics."

Staging the open house was a lot of work. But Derek Wadsworth, manager of INL's Robotics and Intelligent Systems group, said it was definitely worth it.

"Robots and computers are fascinating to kids," he said. "At the opening, when we turned them loose, you could really see that. You could see the excitement in their eyes."



Wadsworth cited other benefits of the open house beyond inspiring young people. Most people in southeastern Idaho, he said, know very little about what INL does; they just have a vague idea that the lab is engaged in some sort of nuclear-energy research. And the lab is so large — it employs about 4,000 people — that many INL employees may not be aware of what their colleagues are doing one building over, or right down the hall.

“Events like this are really important,” Wadsworth said. “They expose the breadth of research we do here at INL.”



CAES Research Update

By Kortny Rolston, CAES Communications

CAES' research focuses on five areas – nuclear science and engineering, advanced materials, carbon management, bioenergy and energy policy.

Here is the latest news from our research initiatives:

Nuclear Science and Engineering

- Idaho State University has been awarded approximately \$2.5 million by the U.S. Department of Energy to conduct cutting-edge nuclear energy research. ISU won three of the 42 university-led research and development projects awarded by DOE through its Nuclear Energy University Programs.
- Dr. George Imel, a CAES associate director and head of the center's nuclear energy research initiative, has been named interim founding dean of ISU's new College of Science & Engineering.

Advanced Materials

- Boise State University recently hired Dr. Kerry Allahar to work as its lead materials researcher at CAES. Allahar is the first BSU researcher to be based out of the CAES building in Idaho Falls. He works under Dr. Darryl Butt, a CAES associate director from Boise State University. Before moving to Idaho Falls, Allahar taught classes and conducted materials research at North Dakota State University.

Carbon Management

- CAES Associate Director Bob Smith presented at the University of Idaho Law Review Symposium on April 9. This year's symposium was titled *Energy Independence: Challenges Facing the West in Adopting Alternative and Renewable Energy Resources*. Dr. Smith presented "The Challenge of Sustainable Energy."
- INL scientists Travis McLing and Rob Podgorney, both of whom are based at CAES, traveled to Norway this month to present their work on carbon sequestration and subsurface science to researchers at the University of Oslo. They also are meeting with representatives from Royal Dutch Shell at the Hague.

Bioenergy

- Bioenergy researcher Greg Bala presented information about a project CAES is working on with the city of Meridian during an Idaho National Laboratory Technology Showcase on June 7. The city has offered to let CAES researchers use its wastewater treatment plant as a pilot site for the project, which involves using a new anaerobic technology design to treat municipal waste.

Energy Policy

- The Energy Policy Institute recently revamped its website and now has a whole new look. Go to <http://epi.boisestate.edu/> to check it out.
- Dr. Susan Mason, an EPI affiliate faculty member, led a team of Boise State University researchers in the production of an important new work on green building and energy efficiency, "Green Building in the Pacific Northwest: Next Steps for an Emerging Trend." View the complete report on EPI's website: <http://epi.boisestate.edu/>.
- EPI Director David Solan presented at the University of Idaho Law Review Symposium on April 9. This year's symposium was titled *Energy Independence: Challenges Facing the West in Adopting Alternative and Renewable Energy Resources*. Dr. Solan presented "Transmission Siting: Renewable Energy and the Push for Federal Solutions."

Nearly \$10 million Equipment to Arrive at CAES

By Kortny Rolston, CAES Communications

The Center for Advanced Energy Studies' labs are filling up.

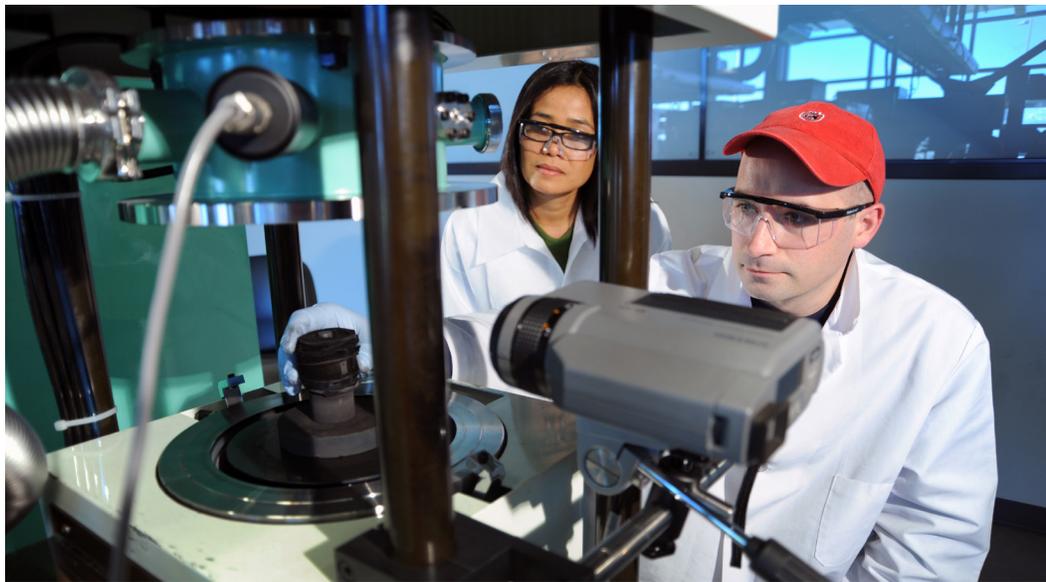
Several pieces of high-end research equipment have been delivered to the Idaho Falls facility and more is on the way. By the end of September, CAES' labs will be outfitted with state-of-the-art research equipment that includes nearly \$10 million in new major pieces of equipment.

"In some instances this equipment will establish research capabilities that are unique to CAES and can't be found anywhere in the region," said Oren Hester, the center's deputy director.

The money to pay for the equipment comes from a variety of sources.

Over the past two years CAES has received \$3.4 million in congressional appropriations. In addition, INL has made significant investments in CAES equipment capabilities and the Idaho universities also are contributing to the center's equipment portfolio.

Hester said the strategy is to purchase multi-purpose items that 1) provide CAES with unique and distinguishing research capabilities and 2) can be used by scientists across the center's research



disciplines – nuclear, carbon management, advanced materials and bioenergy.

Here are some highlights:

- INL purchased a powerful Local Electrode Atom Probe (LEAP) as well as other high-end microscopy equipment. There are only a small number of atom probes in the world. The LEAP is able to perform atomic-scale investigation of site-specific regions

within engineering alloys (e.g. at grain boundaries and in the vicinity of cracks) and also the atomic-level characterization of interfaces in multilayers, oxide films, and semiconductor materials and devices.

- By the end of June, CAES will be the only facility in Montana, Idaho, Utah and Wyoming with a CAVE – short for computer automated virtual environment. The CAVE will create highly realistic interactive simulations in which researchers can examine designs, data or environments. It may also be used to virtually train ATR operators and technicians.
- CAES' Spark Plasma Sintering system (SPS) allows researchers to combine metal and ceramic powders and produce materials that do not naturally exist in the world. The materials produced by the SPS have unique properties such as highly resistant to wear, heat, and other harsh conditions. Applications include advanced materials for weapons, optics, tooling and nuclear fuels. There are only a handful of the Spark Plasma Sintering systems in the United States.

"We are confident these capabilities will enable CAES to continue to complement and add more value to the missions of INL, Boise State University, University of Idaho and Idaho State University and to solve the energy challenges of the nation," Hester said.

State Board approves CAES funding

The State Board of Education recently set aside \$1.6 million to support CAES, a partnership between Idaho National Laboratory and the state's three public research universities. Board members voted in April to fund CAES for the third consecutive year. The money will be distributed equally to CAES' higher education partners – Boise State University, Idaho State University and University of Idaho. Each will receive approximately \$530,000 a year to support faculty and staff to conduct research and collaborate through CAES.

Mark Browning, the agency's chief communications officer, said CAES is a priority for the State Board, calling it "a great success story for collaboration in higher education in Idaho." "BSU, ISU, UI and INL are all working together to bring in millions of dollars in research funding into the state," he said. "Funding is a challenge, but you have a great story in CAES, which has turned \$1.6 million into more than \$13 million in new research money. That is the impact that higher education and collaboration has on the state of Idaho."

Director Harold Blackman called the board's decision a vote of confidence in CAES. "We appreciate the continued support of the state of Idaho especially in this difficult budget year," he said. "CAES is a worthwhile investment and we are grateful the members of the State Board of Education, the Governor, the Idaho Legislature and others recognize that."

A Minute With Dr. Dan Ames

By Kortny Rolston, CAES Communications

Dr. Dan Ames, a CAES affiliate professor from Idaho State University, was recently named ISU's 2009-10 Distinguished Researcher.

Ames' research focuses on watershed data analysis, software development and environmental modeling of water systems under conditions such as climate change.

Ames developed open source MapWindow geographic information system (GIS) software, which is widely used by scientists across the world. Dr. Ames has authored many manuscripts, and presented his work at national and international conferences. He was recently invited to give the keynote address at a GIS conference in Bahrain.

How long have you worked at CAES?

Since it opened for business in Fall 2008.

Which research projects are you involved with at CAES?

I've been involved in a project with Montana State University developing a web-based map atlas of mafic rock deposits that can be used for carbon sequestration. We've also had students

working with INL researchers on biofuels database development and modeling locations for biofuels refineries and we have a new CAES/INL/BSU project on identifying optimal "paths of least resistance" for the placement of power lines in southern Idaho.

What do you like best about working at/with CAES?

I very much appreciate and enjoy the collaborative environment. It feels like a miniature "Médecins Sans Frontières" because there are literally few or no walls that separate me from my colleagues in other departments and at other institutions. I also appreciate the professional – almost corporate – feel of the building as it is one more preparation for many of my students who will go on to work for large technology companies.

Has CAES led to any new research projects or collaborations for you?

Absolutely. When I was hired as a full-time Idaho Falls faculty member six years ago, it was with the expectation that I would collaborate specifically with INL researchers. While not impossible to



do from the basement of a University Place building, this activity has been significantly enabled by moving to and participating with CAES.

What do you do in your free time?

Most of my free time is spent with my family. We love to travel and, as of late, spend a lot of time at ballroom competitions (three children and my wife participate in various ballroom dance teams). My hobbies include reading, writing, and collecting Internet domain names (I presently own 33 – the oddest one is probably hydrotopia.com).

What is your favorite movie?

My favorite movie is usually the most recent one I've seen. If I have to name one, however, it would be Nacho Libre!

Favorite book?

Maybe I'm easy... my favorite book is usually whatever I'm currently reading. However, I can safely say that John le Carré is my favorite author.

If you were a superhero, what would your superpower be?

I'd like to have the power of being in multiple places at the same time. There are just too many cool and interesting things to do at any given time in my work life and personal life...

Boise State and INL awarded education grant

Boise State University, Idaho National Laboratory and several partner school districts have received a \$210,000 grant to help support two expense-paid summer science, technology, engineering and math workshops for Idaho K-12 teachers and to research their effectiveness.

About 300 fourth- to ninth-grade teachers are expected to take part in the "i-STEM Teacher Academies," which will be held July 19-22 at North Idaho College in Coeur D'Alene and the College of Southern Idaho in Twin Falls.

The academies are part of the Idaho STEM initiative (i-STEM), a broad and growing partnership of educators, government and businesses working to improve science, technology, engineering and math education in the state. Members include INL, the state universities, the state Department of Education, Energy Solutions, Micron and Idaho Power. More information is available at www.sde.idaho.gov/site/istem.

To submit story ideas, calendar items or other information for upcoming CAES newsletters, please send an e-mail to Kortny.Rolston@inl.gov.