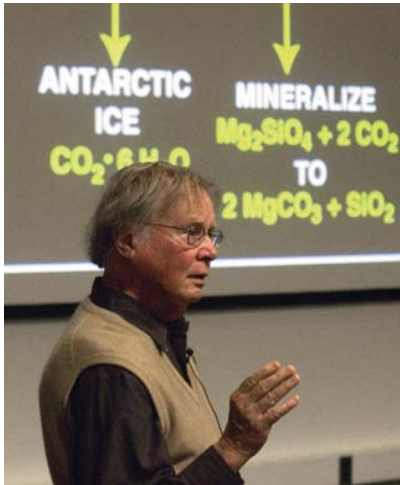


GLOBAL WARMING EXPERT WALLACE BROECKER SPEAKS AT RENSSELAER



Over 215 members of the Rensselaer community attended the recent lecture given by Dr. Wallace Broecker, Newberry Professor at Columbia's Lamont-Doherty Earth Observatory concerning global warming. Credited with coining the term "global warming," Dr. Broecker has authored seven books and hundreds of articles over his distinguished 50-year career. His most recent book, written with Robert Kunzig, is *Fixing Climate: What Past Climate Changes Reveal about the Current Threat--And How to Counter It*. The lecture was sponsored by the Thomas Phelan Lecture Series and the Department of Earth and Environmental Sciences.

"Dr. Broecker taps his half century of groundbreaking research into climate changes of the geologic past in order to forecast future global warming, and more importantly, to narrow the field of potential solutions to propose a realistic remedy for removing excess CO₂ from the atmosphere," said event host Mimi Katz, Assistant Professor in the Department of Earth and Environmental Sciences. "Burning fossil fuels and releasing CO₂ is essentially an anthropogenic acceleration of the natural geological carbon cycle, which should take hundreds of millions of years rather than a few hundred years. Broecker and his colleagues propose a solution that also accelerates the second half of this natural cycle by sequestering that excess CO₂ through natural chemical reaction with rocks, in a few years rather than the natural cycle of millions of years."

"Climate models predict that global warming will increase rainfall in the tropics, while aridity will increase in adjacent drylands. Evidence from the geologic record is consistent with this analysis. Forty percent of the world's grain is grown on irrigated land and over a billion of its poorest live in these areas; therefore, we must minimize these impacts of global warming by reining in the increase in atmospheric CO₂" Broecker said. "It is my opinion that conservation and alternative energy alone will be insufficient. We must develop the means to capture and bury CO₂ which can be economically removed from ambient air."

He and other scientists have developed methods for accomplishing that goal. Broecker's contention is that CO₂ can be "scrubbed" or captured, a technical strategy used for decades on a small scale in space shuttles and submarines. Broecker suggests that an approach on the scale of Earth's atmosphere is technically feasible.

Navigating Beyond Rensselaer



On October 15, School of Science graduate students gathered in the Biotech Center Auditorium to learn more about professional life after graduation and how to prepare for it. The event, Navigating Beyond Rensselaer, included a proposal writing workshop led by Cheryl Geisler, Professor of Language, Literature, and Communication; a keynote speech about life in academia vs. industry by Marlene Belfort, Research Scientist at the Wadsworth Center (NYS Dept. of Health); and a panel discussion where speakers from mixed industrial and academic backgrounds shared their experiences and insight. The panel included RPI alumni David Harris '07, Justin Bult '07, Yangang Andrew Xi '06, and Phaedra Agius '07, as well as GE Global Research scientist Stephen Bush.

Approximately 60 students attended the event, which was coordinated by the School of Science Graduate Student Council. Current members of the Council include Mary Abercrombie (Earth and Environmental Sciences), Cagatay Bilgin (Computer Science), Scott LeFevre (Chemistry), Jeff Martin (Biochemistry and Biophysics), Lindsey McKeen (Biology), Ya Ou (Physics),

Sanchay Subhedar (IT), and Csilla Szabo (Mathematical Sciences). Also contributing significantly to the event were Jiajing Liu (Biology), Neelakantan Kannan (IT), Ming He (Physics), Hussain Dahodwala (Biochemistry-Biophysics), and Banu Baydil (Mathematical Sciences).

School of Science Graduate Student Council Member Scott LeFevre feels that the event was a success. "There is definitely a demand for such events to help students begin to consider and prepare for life after graduation, regardless of career path. One of the unique advantages of this event was being able to connect with experienced professionals from many walks of life and receive such candid answers and advice," said LeFevre. "Our goals were to foster involvement among graduate students in the School of Science, while providing a forum of useful information and insight for our future careers. We feel that this event was successful in those regards and look forward to hosting future events."

Associate Dean of Graduate Education and Research William Siegmann was impressed by the initiative and enthusiasm shown by the council in planning this event. "The Graduate Student Council members figured out what they wanted from Navigating Beyond Rensselaer, based on their own perspectives from graduate school and on comments from other School of Science graduate students. They planned and carried out, on their own and in short order, an ambitious program for the event. The strong attendance and interest shows that School of Science students welcome and appreciate their efforts."

The School of Science Graduate Student Council is a recent initiative, first meeting in January 2008. Acting Dean of Science David Spooner supports the goals of the Council to encourage more active involvement among graduate students in the School of Science. Financial support for Navigating Beyond Rensselaer was provided by the School of Science.

New NSF Research Center to Advance Smart Lighting



A new research center led by E. Fred Schubert, Professor of ECSE and Physics, and Wellfleet Senior Constellation Professor of Future Chips at Rensselaer, aims to supplant the common light bulb with next-generation lighting devices that are smarter, greener, and ripe for innovation. This new Smart Lighting Center is being funded by a five-year, \$18.5 million grant from the National Science Foundation.

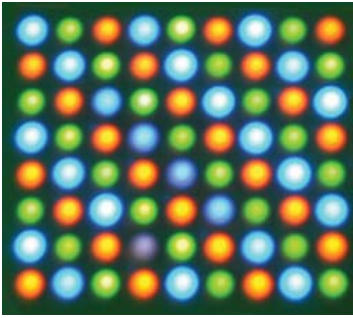
“Sustainability and energy efficiency are two key challenges of our time, yet they also present rich opportunities,” said Rensselaer President Shirley Ann Jackson. “With innovation, ingenuity, and a clear vision, the NSF-funded Smart Lighting Center at Rensselaer will rewrite the rules for manipulating light and help introduce these new green technologies to the world. This project is a shining example of academia, the federal and state governments, and industry working together to advance the state of science and engineering, while creating new opportunities for students, faculty, and businesses.”

Funded by the NSF, industry, New York state, and led by Rensselaer with partners Boston University and the University of New Mexico, the Smart Lighting Center will investigate and develop light-emitting diode (LED) technologies that could one day change the way we illuminate our world. Along with significant energy savings for lighting homes and offices, these technologies will open doors to a diverse spectrum of new applications impacting everything from biotechnology and transportation to computer networking and displays.

The project is expected to receive up to \$50 million in funding over the next 10 years. The bulk of this funding will come from the NSF, with additional support from New York state, Rensselaer, and 18 industrial partners. NSF funding began in September with \$3.25 million for the center’s first year, a figure forecast to increase over the next several years. New York has committed \$700,000 to the center’s first year, and first-year funding from industrial partners is expected to approach nearly \$1 million. Rensselaer is committing more than \$500,000 to help launch the center.

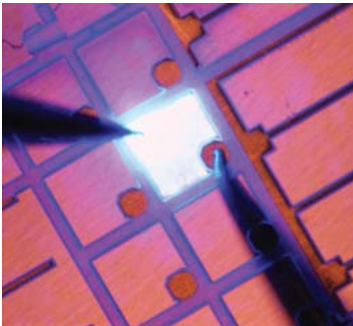
The new research center will concentrate on three primary research thrusts, said Professor Schubert, who leads the center. A multidisciplinary team will focus on developing novel materials, device technology, and systems applications to further the understanding and proliferation of smart lighting technologies.

Twenty faculty researchers from Rensselaer, along with ten researchers from partners Boston University and the University of New Mexico, will staff the new center. Students, postdoctoral researchers, and visiting industry professionals will also be regular contributors to the research conducted at the Smart Lighting Center.



Along with broadening the knowledge base of smart lighting, Professor Schubert expects the center to be a hub for commercializing related technology, where students and academic researchers work side-by-side with companies large and small to test, validate, and bring new products to the marketplace.

“This new center will energize the field of photonics, and it reinforces the vision that smart light sources will soon antique Thomas Edison’s light bulb,” Schubert said. “The Smart Lighting ERC will also be a catalyst for developing and realizing new, yet unexpected applications for photonics.”



At the heart of smart lighting are powerful techniques to control the basic properties of light. With recent breakthroughs in the first true anti-reflective coating, nano-emitter growth, unprecedented control of the refractive index of materials, and the demonstration of the first viable polarized LED-based light sources, researchers are now better able to control almost every aspect of light.



“The capabilities of smart lighting surpasses and transcends the abilities of conventional lighting,” Schubert said. “With smart lighting, we have absolute control over every aspect of the light, from polarization to temporal modulation and spectral composition. We can custom tailor a light source for nearly any imaginable scientific or commercial application.”

By allowing humans to better support their natural circadian rhythm, smart lighting holds promise for reducing individuals’ dependency on sleep-inducing drugs, and even reducing the risk of certain types of cancer.

Along with Rensselaer and core partners Boston University and the University of New Mexico, outreach partners for the Smart Lighting Center are Howard University in Washington; Morgan State University in Baltimore; and Rose-Hulman Institute of Technology in Terre Haute, Indiana. Additionally, Chonbuk National University in Korea; National Chiao Tung University in Taiwan; Taiwan National University; and Vilnius University in Lithuania will support the Center with expertise and international perspectives.

The Center’s 18 industry partners, ranging from major lighting companies to small start-up firms, were enlisted to help guide strategic planning, spur innovation, and provide university students with first-hand experience in entrepreneurship as well as corporate research and development. The Smart Lighting Center will also partner with the Center for Economic Growth in Albany, New York; the Optoelectronics Industry Development Association; and various small business incubators at each of the partner universities.

RPI SCHOOL OF SCIENCE

honors - awards - travel - new faculty

News

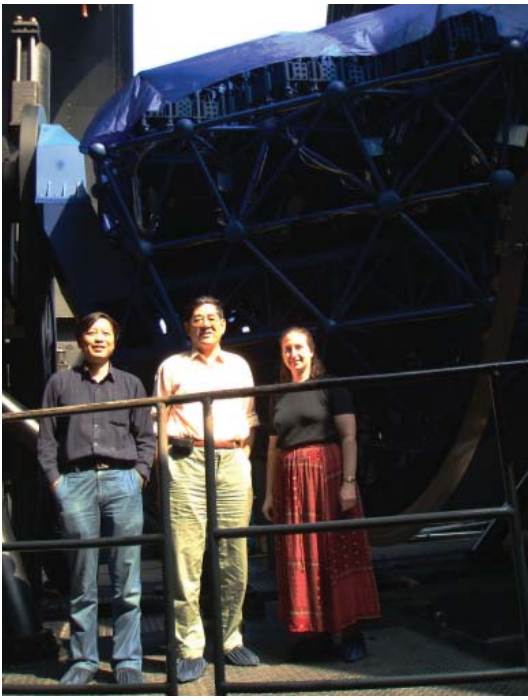
Barbara Cutler, Assistant Professor of Computer Science, is developing modeling and simulation tools that will allow architects to design greener homes and offices. For this project, she is utilizing a brand new research space in EMPAC, Rensselaer's recently-completed Experimental Media and Performing Arts Center.



Cutler presented her project, "Interactive Architectural Daylighting Design" to an audience at EMPAC's grand opening weekend, Sunday, October 5. She explained that designing with daylight shows great promise for reducing energy demands of buildings, and increasing occupant comfort and well-being. Complex fenestration systems, such as prismatic and laser cut panels, are emerging as attractive options in architectural design thanks to their ability to redirect intense illumination from the sun. However, the non-intuitive interactions with the built environment make it necessary to develop tools that adequately represent these systems' behavior to the architect. Cutler's full-scale interactive design environment, which will debut at EMPAC, will simulate and evaluate the illumination and functionality of an evolving architectural design. The user can explore the high-dimensional configuration space of the design to create and edit the geometry, select appropriate materials, and vary the external conditions such as the sun position, weather, neighboring buildings, and traffic noise. The simulation results of the current design are projected on movable partition screens and furniture to create a full-scale immersive design environment. The architect could then make real-time design adjustments such as moving walls, resizing or moving windows, or modifying virtual blinds to test how their alterations would affect the space's natural lighting.



Built to the highest sound, image, and motion standards, the technological capabilities within EMPAC make the building an unprecedented platform for scientific research. The volume of unencumbered space and immersive sensory environments located within each of the four EMPAC venues allow researchers to use EMPAC as a giant simulation and modeling tool, offering new ways to access and understand hugely complex sets of data.



Heidi Newberg, Associate Professor of Physics, Applied Physics and Astronomy, gave an invited colloquium on September 18, "Galactic structure from LAMOST" at the Kavli Institute for Astronomy and Astrophysics at Peking University in Beijing, China. Newberg was appointed to the LAMOST Galactic survey working group. LAMOST is a national key project of China to build a 4 meter telescope with 4000 optical fibers, which will make it capable of acquiring spectra of stars at the highest rate in the world. All of the optical, electrical, and mechanical systems are currently in place and being tested. The photograph on the left shows Professor Newberg (right) with LAMOST project scientist Yaoquan Chu (center), and LAMOST Chief Technician Guoping Li (left) standing in front of the support system for the LAMOST primary mirror.



Michael Shur, Patricia W. and C. Sheldon Roberts '48 Chaired Professor in Solid State Electronics; Professor of Electrical, Computer, and Systems Engineering; Professor of Physics, Applied Physics, and Astronomy; and Director, Center for Broadband Data Transport Science and Technology received the 2008 Technical Achievement Award from the IEEE (Institute of Electrical and Electronics Engineers) Sensors Council. He also gave an invited keynote talk and chaired a session at the 2008 International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) at the California Institute of Technology from September 15 to 20. In addition, Professor Shur gave a seminar at the Laboratory for Physical Sciences (National Security Agency and University of Maryland) on September 24.



Ingrid Wilke, Associate Professor of Physics, Applied Physics, and Astronomy, gave an invited review talk on the topic of Terahertz Technology at the Workshop on Detection of CBRNE Events. The Workshop took place on September 9 in Karlsruhe, Germany and was organized by the VdI, the Association of German Engineers on behalf of the BMBF, the German Federal Ministry of Education and Research. The workshop marked the start of a new Security Research Programme organized by the BMBF.



Computer Science Day: Data Mining and Machine Learning

The Department of Computer Science held their annual Computer Science Day on September 22 in the Biotech Auditorium. Speakers included Christos Faloutsos, Professor of Computer Science at Carnegie Mellon University; Usama M. Fayyad, Chief Data Officer and Executive Vice President at Yahoo Inc.; Michael Kearns, Professor of Computer and Information Science at University of Pennsylvania; and Tomaso A. Poggio, Professor of Computer Science and Artificial Intelligence Laboratory at Massachusetts Institute of Technology. To view the abstracts from the event and learn more about the presenters, visit <http://www.cs.rpi.edu/news/rpicsday/>

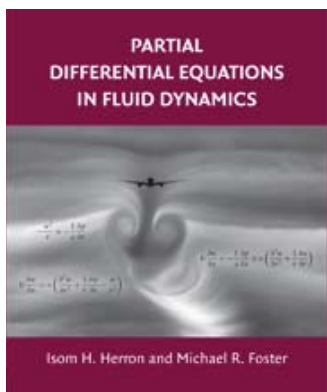
Physics, Applied Physics, and Astronomy

Welcome Picnic: On Wednesday, September 10, the Department of Physics, Applied Physics and Astronomy held their annual welcome picnic. The picnic is held every fall to welcome faculty, staff, and students back for the start of a new academic year.



Science Advisory Council Meeting

On October 2, members of the Science Advisory Council met on campus to listen to a variety of presentations, tour the Computational Center for Nanotechnology Innovation (CCNI), and discuss the future direction of Rensselaer's School of Science. David Spooner, Acting Dean of Science, gave introductory remarks and coordinated the meeting, along with Donald VanLuvanee, the Council Chair. Department heads and other members of the School of Science also attended the meeting. Presenters included Assistant Professor of Chemistry and Chemical Biology Peter Dinolfo; Assistant Professor of Mathematical Sciences Fengyan Li; Constellation Professor in the Tetherless World Constellation and Professor of Computer Science Deborah McGuinness; Accelerated B.S./Ph.D. Students Jeff Martin and Wayne Powers; Assistant Professor of Earth and Environmental Sciences Mimi Katz; and Kodosky Constellation Professor in Physics, Applied Physics, and Astronomy Shengbai Zhang. Later in the day, Joel Giedt, Assistant Professor of Physics, Applied Physics, and Astronomy led the council on a tour of CCNI at the Rensselaer Technology Park. The council enjoyed dinner at Tosca restaurant in Troy, and several members stayed through the weekend for the EMPAC Opening Celebration.



Isom Herron, Professor of Mathematical Sciences, and Adjunct Professor of Mathematical Sciences **Michael Foster** have published a book: *Partial Differential Equations in Fluid Dynamics*, Cambridge University Press. This book was in preparation for several years and is especially geared toward Rensselaer graduate students in Mathematics, Science, and Engineering. For more information, visit ----><http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521888240>

Curt Breneman, Professor of Chemistry and Chemical Biology, and Director of the Rensselaer Exploratory Center for Cheminformatics Research, was recently elected Chair-Elect of the American Chemical Society Division of Computers in Chemistry (ACS COMP). An active contributor to the American Chemical Society, Breneman has served as Treasurer of COMP for the past nine years. Dr. Breneman is also organizing a symposium for the 2009 Spring ACS Meeting (March 22-26) in Salt Lake City, UT in the brand new field of "Nanomaterials Informatics and Modeling." This symposium received a huge response from the computational chemistry and materials communities, and will feature over 25 invited talks over several days. For more info, visit <http://tiny.cc/ACS2009>



The Rensselaer Chemical Society has received a Certificate of Achievement from the American Chemical Society Undergraduate Program for their 2007 to 2008 activities. The Rensselaer Chemical Society Faculty Advisor is James Moore, Professor of Chemistry and Chemical Biology, and the President is David Lober, an undergraduate senior in the Department of Chemistry.



Jonathan Dordick, the Howard P. Isermann '42 Professor of Chemical and Biological Engineering at Rensselaer, has been named the new director of the Center for Biotechnology and Interdisciplinary Studies (CBIS). Dordick, who has been with Rensselaer for a decade, plans to use his expertise in both academic research and entrepreneurship to continue to grow the reputation and research funding for the \$80 million research center. He takes over for **Robert Linhardt**, Professor of Chemistry and Chemical Biology, and the Ann and John H. Broadbent Jr. '59 Senior Constellation Professor of Biocatalysis and Metabolic Engineering at Rensselaer, who has served as acting director since 2007.

* This newsletter is prepared monthly and distributed to faculty, staff, and students in the School of Science to keep everyone informed of accomplishments and events within the school. Please submit news items, including photos, for the next newsletter to Rebekah Mullaney, Communications Specialist for the School of Science at mullar2@rpi.edu.