

Science News

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THE MONTHLY NEWSLETTER OF RENSSELAER POLYTECHNIC INSTITUTE'S SCHOOL OF SCIENCE

The School of Science Advisory Council

The School of Science Advisory Council held its spring meeting on May 1, 2009. Representing the Advisory Council were:

- Mr. F. Dale Corman** '61, President and CEO, Western Copper Corporation;
- Dr. Phillip M. Lurie** '74, M.S. '78, Ph.D. '80, Chief Executive Officer, Logical Approach;
- Dr. C. Greg Paris** '70, Senior Research Investigator II, Novartis Institutes for Biomedical Research;
- Dr. Raymond S. Parker III** '77, Ph.D. '86, Associate Vice-President & Head of Internal Medicine, US Patent Department Operations, Sanofi-Aventis US Inc.;
- Dr. John C. Ruckdeshell, M.D.** '67, CEO and Director, Nevada Cancer Institute;
- Dr. Srinivasan Sivaram** '86 Ph.D., Chief Executive Officer, Twin Creeks Technologies, Inc.;
- Dr. Frederick Tarantino** '77, President & CEO, Universities Space Research Association; and
- Mr. Robert J. Templin** '47, Director PAICE Corporation.

David Spooner, Acting Dean of Science, opened the meeting with an overview of the School of Science and its Performance Plan. He discussed several areas to be addressed by the School in the coming years.

Overview of Science

Research Programs

Develop research programs around the Institute's five signature thrust areas that harness the capabilities of CCNI, EMPAC and CBIS.

Energy and the Environment – develop a strategic plan to accelerate education and research.

Data Science – reinvigorate the Data Science Research Center.

Solar Bio-Energy – develop the Baruch Center for Biochemical Solar Energy and build collaborations with related programs.

Polymer Chemistry – regain a leadership position and reinvigorate the NYS Center for Polymer Synthesis.

Astrobiology – develop the new Center for Astrobiology as the next phase of the Center for the Origins of Life.

Faculty Development

Aggressively recruit world-class faculty in strategic areas to grow research programs and support the teaching mission as funds are available. Diversity is a must in recruitment and retention. Improve the effectiveness of our mentoring system for junior faculty.

Faculty Growth

Fill seven open endowed chair positions. The endowment funds provide full or partial salary on an on-going basis, but do not provide sufficient funds for start-up packages, which run to \$1M or more for chaired positions.

Seek to fill six open junior and two senior faculty positions.

Seek to fill joint positions between Information Technology and the academic schools.

Undergraduate Education

Provide educational programs, research opportunities, and international experiences to attract and retain a high-quality, diverse student body of increasing size.

Reinvigorate the IT Program as the interdisciplinary home for Web Science.

Graduate Education

Recruit a high-quality, diverse student body.

Expand career development opportunities directed at graduate student placements.

Improve the intellectual, physical, and psychological environments in the graduate programs.

Address graduate financial aid challenges, including pursuit of large block and training grants.

Entrepreneurship

Incorporate entrepreneurial modules into appropriate project-oriented courses.

Encourage students to get involved with business plan competitions.

Work with the Science Advisory Council to identify opportunities for students and faculty to participate in entrepreneurial activities.

Work with the Vice Provost for Entrepreneurship.

Investment and Return

	FY' 02	FY' 03	FY' 04	FY' 05	FY' 06	FY' 07	FY' 08	FY' 09*	FY' 10*	FY' 14*
T&TT Faculty	103	103	109	116	116	116	114	111	109	149
New Hires	3	8	10	6	7	8	14	1	11	10
UG Students	1,505	1,489	1,417	1,218	1,185	1,172	1,152	1,269	1,307	1,500
Grad Students	449	408	366	361	321	339	325	334	363	480
Credit Hours	61,433	60,712	63,699	60,647	59,988	61,440	61,329	63,821	64,821	66,000
B. S. Degrees	280	371	405	351	313	329	215	300	310	375
Ph.D. Degrees	24	31	45	34	43	47	47	50	55	80
Research Expend. (\$M)	13.3	14.2	16.3	19.1	18.1	20.1	19.1	23.0	26.0	40.0
Research Awards (\$M)	17.8	12.3	20.7	18.4	18.1	18.3	21.3	24.0	27.0	40.0

* Estimates

This was followed by a presentation and discussion of Entrepreneurship by Rob Chernow, Vice Provost for Entrepreneurship.

The School of Science Graduate Student Council - **Chris Connors** (BCBP), **Jinal Gorasia** (ITEC), **Ben Hallett** (ERTH), **Ming He** (PHYS), **Akintayo Holder** (CSCI), **Scott LeFevre** (CHEM), **Lindsey McKeen** (BIOL), and **Csilla Szabo** (MATH) – discussed several issues of concern to them with members of the Advisory Council. Among the topics considered were increasing social interaction and orientation for new graduate students, fostering career development, and improving graduate student financial resources. The Advisory Council members stressed the importance of internships and CO-OP experiences as preparation for future careers.

Following lunch, the Advisory Council members were asked about new opportunities for educational programs within the School of Science. Scientific Computation was the key suggestion put forth, especially in the area of bio-computation. At the bachelor's level the importance of dual degrees in mathematics and biology seemed to be favored over a new curriculum or tailoring an option within either of the curricula.

The meeting concluded with a presentation by **Frank Spear**, Edward P. Hamilton Distinguished Professor of Science Education and Head of the Department of Earth and Environmental Sciences. Frank summarized the activities of the department with emphasis on the new appointments of **Miriam Katz**, Assistant Professor, and her research in the field of paleoceanographer and Peter Fox, Professor and Tetherless World Research Constellation Chair. Fox's research centers on Climate Variability and Solar-Terrestrial Physics.

Graduate Student Council of the School of Science presented the 2nd Annual "Poster Palooza"

Thirty-five posters were displayed in the entryway of the Experimental Media and Performing Arts Center prior to the Science Awards Reception. Approximately 150 faculty, staff and students viewed them. Awards for the best posters were voted on by the audience and first place was awarded to: **Wenting Hou**, graduate student in Physics, for her poster: "Device Performance of Fabricated Yellow Emitting CalnN/GAN LED on C-plane Bulk GaN Substrate". Hu is doing his research with **Christian Wetzel**, Constellation Professor of Physics. Second prize went to **Maria Apostolopoulou**, graduate student in Biology for her poster: "Expression of Multiple Cadherins in a Cancer Coculture System". She is doing her research with **Lee Ligon**, Assistant Professor of Biology.

Scenes from the Poster Session
May 1, 2009





(Photos by Jody Malm)

Art Exhibit by Faculty, Staff and Students in the School of Science

Prior to the School of Science Awards Reception, there was an exhibition of paintings done by members of the School of Science. Works by **Don Drew**, **Susan Duncel** (from Rensselaer Catering), **Scott Dwyer**, **Scott LeFevre**, **Tom Kiehl**, **Toh-Ming Lu**, **Kongki-Min**, and **Paul Stoler** were displayed. **Joan Perras**, Assistant to the Department Head of Physics, Applied Physics, and Astronomy organized the exhibition again this year.

Third Annual School of Science Awards Reception was held on May 1, 2009

Awards in several categories were made by a committee chaired by **William Siegmann**, Professor of Mathematics and Associate Dean of Science for Graduate Education and Research, and **Bonnie Carson**, Assistant to the Dean of Science and representatives from each department in Science. The awards, based on nominations by faculty, staff, and students were presented as follows:

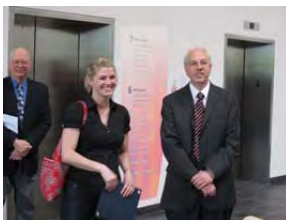
Outstanding Undergraduate Student Award – **Neena Pyzocha**, Biology

Outstanding Graduate Student Award – **Jeffrey Martin**, Biology and Biochemistry/Biophysics and **Lindsey McKeen**, Biology

Outstanding Early Research Award – **Blanca Barquera**, Assistant Professor of Biology

Outstanding Teaching Award – **Peter Persans**, Professor of Physics, Applied Physics, and Astronomy

Outstanding Staff Service Award – **Sharon Simmons**, Administrative Coordinator in the Department of Computer Science



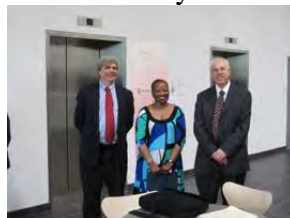
Lindsey McKeen



Jeffrey Martin



Neena Pyzocha



Sharon Simmons



Peter Persans



Blanca Barquera

(Photos by Jody Malm)

Honors and Awards

Faculty Recognition Dinner held on April 30, 2009

Several members of the faculty of the School of Science were presented with awards at the Forty-Sixth Annual Faculty Recognition Dinner.

Xi-Cheng Zhang, Professor of Physics and Director of the Center for Terahertz Research, was presented with the William H. Wiley 1866 Distinguished Faculty Award. Established by Edward P. Hamilton '07 in memory of William H. Wiley (Class of 1886), the award honors those who have won the respect of the faculty through excellence in teaching, productive research, and interest in the totality of the educational process.

Peter Persans, Professor of Physics and Associate Head of the Department of Physics, Applied Physics and Astronomy, was presented with the Trustee' Outstanding Teacher Award. Established in 1994, the award, which carries a \$5,000 honorarium, annually recognizes outstanding accomplishments in classroom instruction. The committee's selection is made on the basis of sustained outstanding teaching as reflected by student evaluations.

Gwo-Ching Wang, Professor and Head of the Department of Physics, Applied Physics and Astronomy, was recognized for twenty-five years of service.

Mukkai Krishnamoorthy, Associate Professor of Computer Science, was recognized for thirty years of service.

Joyce Diwan, Professor of Biology, **Joyce McLaughlin**, Ford Foundation Professor of Mathematical Sciences and Director of the Center for Inverse Problems at RPI and **James Moore**, Professor of Chemistry and Acting Director of the New York State Center for Polymer Synthesis, were each recognized for forty years of service.

Leonard V. Interrante, Professor Emeritus of Chemistry, was recognized on the occasion of his retirement.

Honorary Degree Awarded at St. Lawrence University

Miriam (Mimi) Katz, Assistant Professor in the Department of Earth and Environmental Science is one of four current and former researchers at Lamont-Doherty Earth Observatory who will receive honorary degrees from their alma mater, St. Lawrence University, this spring. The degrees will be awarded at May graduation to paleoclimatologist Peter deMenocal; engineer Dale Chayes; paleoceanographer Miriam Katz; and oceanographer Richard Fairbanks.

St. Lawrence has a small geology program that for at least three decades has turned out a large number of climate science researchers. How did so many wind up at Lamont? "SLU has a great undergrad geology program that turns out excellent budding scientists, who end up at the best institutions," said Katz.

Faculty Named Fellows of the Society of Industrial and Applied Mathematics

Margaret Cheney, Professor of Mathematical Sciences, and **Joyce McLaughlin**, Ford Foundation Professor of Mathematical Sciences have been named Fellows of the Society of Industrial and Applied Mathematics.

Professor Michael Shur Elected MRS Fellow

Semiconductor and integrated circuit pioneer **Michael Shur**, the Patricia W. and C. Sheldon Roberts '48 Chaired Professor in Solid State Electronics at Rensselaer Polytechnic Institute, has been named a fellow of the Materials Research Society (MRS).

American Society for Mass Spectrometry Student Travel Award

For the second year in a row, graduate student **Junfeng Xiao** in the McGown group has received a North Jersey ACS Mass Spectrometry Discussion Group ASMS Student Travel Award to present his a poster or make an oral presentation at the national meeting of the American Society for Mass Spectrometry.

Outstanding Junior Investigator from the Office of High Energy Physics of the Department of Energy

Joel Giedt, Assistant Professor of Physics receives an Outstanding Junior Investigator Award from the High Energy Physics Division of the Department of Energy for his proposal entitled: "Lattice Field Theory Beyond the Standard Model"

Lattice Monte Carlo simulations on Rensselaer's Computational Center for Nanotechnology and Innovation (CCNI) will be used to study theories beyond the Standard Model of particle physics. Simulations of supersymmetric particles and interactions, analogous to the quarks and gluons of the nuclear strong interaction (Quantum Chromodynamics), will reveal the features that are responsible for spontaneous supersymmetry breaking. Supersymmetric particle models are the favored "new physics" phenomena whose discovery is anticipated at CERN's Large Hadron Collider (LHC), and they all require spontaneous breaking of this new symmetry of nature. Giedt's research will also make a conclusive determination of whether "minimal walking technicolor" is a viable explanation for electroweak symmetry breaking (the origin of all mass), whose detailed study is the principal thrust of the LHC experiment.

Secretary Chu Announces Funding for 71 University-Led Nuclear Research and Development Projects

May 6, 2009 - U.S. Energy Secretary Steven Chu today announced the selection of 71 university research project awards as part of the Department of Energy's investments in cutting-edge nuclear energy research and development (R&D). Two projects were awarded to Rensselaer Polytechnic Institute:

"Non Destructive Thermal Analysis and In Situ Investigation of Creep Mechanism of Graphite and Ceramic Composites using Phase-sensitive THz Imaging & Nonlinear Resonant Ultrasonic Spectroscopy", **Xi-Cheng Zhang**, Collaborators: **Pengyu Han**, and David H. Hurley (Idaho National Laboratory)

This project will study the evolution of microstructure-mediated creep properties of nuclear-grade graphite using phase-sensitive terahertz (THz) imaging and nonlinear laser-based resonant ultrasound techniques. These non-destructive evaluation techniques will be used to monitor the mechanical properties of graphite, including the size, distribution, shape and orientation of both pores and grains.

The second award was to Yaron Danon and his collaborators, Witold Nazarewicz (University of Tennessee), Anil Pringa (University of New Mexico) and Patrick Talou (Los Alamos National Laboratory). Their project is “Improvements to Nuclear Data and Its Uncertainties by Theoretical Modeling”.

Barry M. Goldwater Goldwater Scholarship

Eric Michael Dzienkowski a dual major in Physics and Mathematics won one of the very prestigious Goldwater Scholarships. Eric’s career goal is to obtain a Ph.D. in Theoretical Particle Physics and then to conduct research in fundamental particle physics and teach at the university level.

Congress established the Barry M. Goldwater Scholarship and Excellence in Education Program in 1986 to honor Senator Barry M. Goldwater, who served his country for 56 years as a soldier and statesman, including 30 years of service in the U.S. Senate.

The purpose of the Foundation is to provide a continuing source of highly qualified scientists, mathematicians, and engineers by awarding scholarships to college students who intend to pursue careers in these fields.

News and Notes

VORTEX DYNAMICS, STATISTICAL MECHANICS, AND PLANETARY ATMOSPHERES (World Scientific Monographs) TextBook by **Chjan C. Lim, Xueru Ding and Joseph Nebus**, April 2009.

Introduces the reader with a background in either fluid mechanics or statistical mechanics to the modeling of planetary atmospheres by barotropic and shallow-water models. These potent models are introduced in both analytical and numerical treatments highlighting the ways both approaches inform and enlighten the other. This book builds on Vorticity, Statistical Mechanics, and Monte Carlo Simulations by Lim and Nebus in providing a rare introduction to this intersection of research fields. While the book reaches the cutting edge of atmospheric models, the exposition requires little more than an undergraduate familiarity with the relevant fields of study, and so this book is well suited to individuals hoping to swiftly learn an exciting new field of study. With inspiration drawn from the atmospheres of Venus and of Jupiter, the physical relevance of the work is never far from consideration, and the bounty of results shows a new and fruitful perspective with which to study planetary atmospheres.

First Graduate of the Accelerated B.S./Ph.D. Program

Amanda Waite Lund was the first person to receive a Ph.D. from the School of Science’s Accelerated B.S./Ph.D. Program. In addition she received an MBA from the Lally School of Management and Technology. Their research and teaching efforts focus on the commercialization of new and often disruptive technologies and she was able to apply her learning to issues of biomedical product development and commercialization.

Amanda’s research was done with **George Plopper**, Associate Professor of Biology, and **Jan Stegeman**, currently Associate Professor of Biomedical Engineering at the University of Michigan. Her dissertation was entitled “The 3D Microenvironment as a Regulatory Cue during Mesenchymal Stem Cell Osteogenic Differentiation.”

She has accepted a postdoctoral position with Dr. Melody Swartz in the Laboratory of Mechanobiology and Morphogenesis, Institute of Bioengineering at Ecole Polytechnique Federale de Lausanne, Switzerland. She will be moving out there following graduation in July to look at tissue interactions using both in vivo mouse models and complex 3D in vitro culture systems.

Independent Study by Graduating Senior in Earth and Environmental Sciences



Earth and Environmental Sciences graduating senior **Mike Prosalik** completed an independent study on climate change in the Catskills, working with Doug Burns from the US Geological Survey (located at the RPI Tech Park). Mike analyzed temperature, precipitation, growing season length, and stream flow records. His findings show that significant regional changes in climate are occurring across the Catskills. Temperatures have increased by an average of 1.1°C over the last 56 years. The average growing season lengthening by an average of 0.9 days each year over the last 46 years, for a total increase of ~ 40 days. During the same time, the average annual snowpack declined 85.3mm and precipitation events in the 50-99mm range increased slightly. Mike's work provides important analysis of climate trends, and contributes to our knowledge of the impact of climate change in New York State.

New York Center for Astrobiology

On April 27, members of the New York Center for Astrobiology presented a seminar that was webcast live to the entire NASA Astrobiology Institute (NAI). The NAI consists of 14 teams at universities and research centers nationally, and it emphasizes the use of modern technology to promote interdisciplinary and inter-institutional collaborations between its members. The purpose of the seminar was to present an overview of the on-going and proposed research in the New York Center for Astrobiology, following our recent selection as a new member of the NAI team. The seminar was led by Center Director **Douglas CB Whittet**, Professor of Physics and Director of the New York Center for Astrobiology, and included contributions from co-investigators at Rensselaer including **James Ferris**, Professor Emeritus of Chemistry, **Wayne Roberge**, Professor of Physics and **E. Bruce Watson**, Institute Professor of Science; the University at Albany (**John Delano, Distinguished Teaching Professor**) and Syracuse University (**Suzanne Baldwin**, Professor of Earth Sciences). The seminar is available for download at: <http://nai.arc.nasa.gov/library/uploads/AB090427.mov>

This newsletter is prepared monthly during the academic year and distributed to School of Science faculty, staff, students and alumni to highlight accomplishments and events within the school. Please submit news items for the next newsletter to Samuel Wait, Associate Dean of Science, at waijsc@rpi.edu.