Angel García Named Head of Physics, Applied Physics, and Astronomy Department at Rensselaer

Professor Angel García has been named the new head of the Department of Physics, Applied Physics, and Astronomy at Rensselaer Polytechnic Institute. García is currently Senior Constellation Chaired Professor in the Biocomputation and Bioinformatics Constellation, and a professor of physics at Rensselaer. His new role will be in addition to his work as a leader in the constellation.

“Dr. García is a distinguished scientist and a leader in physical research at Rensselaer as one of our senior constellation professors, and now as head of the department,” said Rensselaer President Shirley Ann Jackson. “His new role will be exceptionally important as we continue to build on the rich history of the department toward new levels of distinction.”

García joined Rensselaer in 2005 from the Los Alamos National Laboratory. He worked at Los Alamos for 16 years and rose to become group leader in the Theoretical Biology and Biophysics Group Theoretical Division at the lab.

“Dr. García is a strong contributor to science at Rensselaer,” said Dean of the School of Science Laurie Leshin. “I am extremely pleased that he has agreed to serve as department head at this critical and exciting time for science throughout the world and right here at Rensselaer.”

García’s research seeks to develop new computing tools to analyze complex biological data, make predictions to guide experimental work, and offer powerful new methods to predict molecular structure and understand the complex behavior of living organisms. His main research objectives are to understand the folding, dynamics, and stability of biomolecules including protein, RNA, and antimicrobial peptides.

García received bachelor’s and master’s degrees from the University of Puerto Rico, and a doctorate in theoretical physics from Cornell University. He is a fellow of the American Physical Society and a member of the Biophysical Society, the Protein Society, the AAAS, and the American Chemical Society. He received the Edward Bouchard prize of the American Physical Society in 2006. García is an associate editor of Proteins, Structure, Function and Bioinformatics, a member of the editorial board of Molecular Simulations, and a
member of the Faculty of 1000 for BioMed Central.

The Department of Physics, Applied Physics, and Astronomy is comprised of about 40 researchers and teachers and more than 250 full-time graduate and undergraduate students. The department includes research and instruction in astrophysics, biophysics, condensed matter physics, optics, nuclear and particle physics, and physics education.

The Cisco academy was designated a "thought leader" and will be presenting its innovative programs and creative ideas to a national leadership conference on December 14th.

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**FACULTY NEWS and NOTES**

**Fenyang Li** was promoted to Associate Professor of Mathematical Sciences and granted tenure.

**Gregor Kovacic** was promoted to Professor of Physics, Applied Physics and Astronomy.

**Laurie Leshin**, Dean of Science, was appointed Professor of Earth and Environmental Sciences and granted tenure.

**Jon Morse**, Associate Vice President for Research, was appointed Professor of Physics, Applied Physics and Astronomy and granted tenure.

**Gary Adams**, Professor of Physics, Applied Physics and Astronomy, retired effective December 31, 2011 after 25 years of service.

**Jim Ferris**, Professor Emeritus of Chemistry and Chemical Biology, and his team from the Astrobiology Center were interviewed for Japanese TV (contact Prakash Joshi <joship2@rpi.edu> for details).

**K. V. Lakshmi**, Assistant Professor of Chemistry and Chemical Biology and Scientific Leader of The Baruch '60 Center for Biochemical Solar Energy Research recently Chaired a conference titled “At the Interface of Natural and Artificial Photosynthesis” at the Baruch '60 Center at RPI. The conference was co-Chaired by Professor John H. Golbeck in the Departments of Chemistry and Molecular Biology and Biochemistry at Pennsylvania State University.

**K. V. Lakshmi** presented a Lecture on “The Mechanism of Solar Water Oxidation: Pulsed Multi-Frequency Multidimensional EPR Studies of Photosystem II” at the Photosynthesis Conference at Baruch ’60 Center at RPI.


**K. V. Lakshmi** attended a reception and banquet with the Europe Chapter of the Rensselaer Alumni Association in Paris as a member of President Jackson’s delegation. Here, she represented the SoS at RPI.

**Deborah McGuinness**, Sr. Constellation Professor of Tetherless World Research Constellation gave a keynote on Semantically enabling eHealth at a Health Informatics meeting co-located with SemTech 2011.

**Deborah McGuinness** co-presented an invited tutorial on Ontologies 101 at the SemTech East 2011
Michael Shur, Patricia W. and C. Sheldon Roberts Professor (ECSE and Physics) was elected as a fellow of SPIE for achievements in electro-optics and photonics including plasma wave devices and THz detectors.

Bolek Szymanski, Claire and Roland Schmitt Distinguished Professor of Computer Science gave a plenary talk at the Unexpected Conference on Sociophysics, Paris, France, November 14, 2011.

Bolek Szymanski gave the opening keynote presentation at the IEEE Computer Intelligence and Software Engineering Conference at Wuhan, China on December 10, 2011.

Carlos Varela, Associate Professor of Computer Science, has been selected as Program Chair for the 5th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2012) to be held in Chicago, November 5-8, 2012.

Mohamed Zaki, Professor of Computer Science, chaired the IEEE International Conference on Bioinformatics and Biomedicine, held Nov 12-15, 2011 in Atlanta.

Xi-Cheng Zhang, Professor and Acting Head of Physics, Applied Physics and Astronomy and Director of the Center for Terahertz Research, retired from Rensselaer effective December 31, 2011 after 20 years of service and has been named director of the University of Rochester's Institute of Optics.

RESEARCH NEWS and NOTES

“Nanowiggles:” Scientists Discover Graphene Nanomaterials with Tunable Functionality in Electronics

Vincent Meunier, the Gail and Jeffrey L. Kodosky '70 Constellation Professor of Physics, Information Technology, and Entrepreneurship, used the capabilities of one of the world’s most powerful university-based supercomputers, the Rensselaer Center for Nanotechnology Innovations (CCNI), to uncover the properties of a promising form of graphene, known as graphene nanowiggles. What they found was that graphitic nanoribbons can be segmented into several different surface structures called nanowiggles. Each of these structures produces highly different magnetic and conductive properties. The findings provide a blueprint that scientists can use to literally pick and choose a graphene nanostructure that is tuned and customized for a different task or device. The work provides an important base of knowledge on these highly useful nanomaterials.

The findings were published in the journal Physical Review Letters in a paper titled “Emergence of Atypical Properties in Assembled Graphene Nanoribbons.”

More information can be found at: http://news.rpi.edu/update.do?artcenterkey=2968

Crystal is Announces Merger with Asahi Kasei

Green Island, NY – January 11, 2012 –Crystal IS Inc. today announced its merger with Asahi Kasei. As a wholly owned subsidiary of Asahi Kasei, the merger will enable Crystal IS to accelerate commercialization of its UVC LEDs leveraging Asahi Kasei’s strength’s in product engineering and manufacturing excellence. The effective date of the merger was December 28, 2011. Financial details of the acquisition were not disclosed.
“We are delighted to welcome Crystal IS into the Asahi Kasei family,” commented Mr. Masafumi Nakao, General Manager of Asahi Kasei’s Advanced Devices and Sensor Systems Development Center and responsible for this agreement. “Asahi Kasei Group is committed to bringing to the global marketplace a family of products that contribute to life and living for people around the world. The advances in solid state UVC technology accomplished by Crystal IS will allow for clean and safe disinfection to be introduced into water, air and surface applications in multiple markets”.

The company will organize around its respective strengths, with R&D fundamentals and entrepreneurial business development managed from Crystal IS, and product engineering and manufacturing excellence being led by Asahi Kasei.

“This is a major milestone for our company,” commented Dr. Steven Berger, CEO and President of Crystal IS. “Our record LED performance in development has brought interest from global customers and we are eager to create a high-quality product to meet their needs. We recognize Asahi Kasei Group’s strength as a successful developer and manufacturer of compound semiconductor devices and are confident that their support will ensure a timely and quality launch of our UVC LED business in the global marketplace.”

Crystal IS has been working in a development mode for over ten years, with a history of early support from the Rensselaer Polytechnic Institute in Troy, NY, as well as continued support over the years from both regional and the US government. Venture funding in 2004 and 2006 from Arch Venture Partners, Lux Capital, Credit Suisse and Harris & Harris Group, helped the company scale its development and recent collaborative and strategic support from Asahi Kasei Group and San’an Optoelectronics Company Ltd propelled the company to its current operation.

“I am pleased that this ground-breaking technology platform is moving forward into the next phase of growth,” said Leo Schowalter, Adjunct Professor of Physics and co-founder and CTO at Crystal IS. “I couldn’t be more proud of the scientists here in Green Island, New York for their commitment to success. We are pleased to be part of a growing high-tech area focused on advanced materials, life science, cleantech and energy. We are confident that we will continue our tradition of innovation and excellence, while also accelerating global business growth with our new owner”.

Crystal IS will continue to be based in New York State.

About Crystal IS

Crystal IS, Inc. is the market leader in the development of ultraviolet light emitting diodes (UVC LEDs) on aluminum nitride substrates for the cost-effective production of long lasting, energy efficient devices. Visit www.crystal-is.com for more information.

About Asahi Kasei Group

Asahi Kasei Group is one of Japan’s largest diversified industrial enterprise groups. Its electronics business includes Asahi Kasei Microdevices Corp., whose distinctive compound semiconductor products enjoy world-leading market shares.

Jim Myers, Director of The Computational Center for Nanotechnology Innovations, is a co-PI on an NSF DataNet project: Sustainable Research – Actionable Data (SEAD) that will apply semantic content management techniques for the long-term curation and preservation of scientific data. The overall award is anticipated to be $8M over 5 years. The other partners are U. Michigan, U. Illinois and Indiana U.

Jeff Trinkle, Professor of Computer Science, has been awarded $350K by DARPA for a 1 year project on Parallel Physical Simulation. The specific goal is characterization of traction for robots running on granular
terrain (packed earth covered with loose stones). This is part of the M3 program (Maximum Mobility and Manipulation).

Mark Goldberg, Professor of Computer Science, is PI on an IARPA contract with Malik Magdon-Ismail, Associate Professor of Computer Science, Sanmay Das, Assistant Professor of Computer Science, and Al Wallace, Professor of Industrial and Systems Engineering, for $242,185.

Chris Carothers, Professor of Computer Science, received $63K from Argonne National Labs /DOE to have two of PhD students work on massively parallel storage projects in this spring semester.

Jim Hendler will be receiving a four-year $1.2M DARPA grant for Social Media and Semantic Web research.


K. V. Lakshmi, at the Baruch ’60 Center for Biochemical Solar Energy Research in the School of Science, presented an invited lecture at the “PCET 2011: From Biology to Catalysis” International Conference that was held in Loire Valley, France in Fall, 2011. Dr. Lakshmi’s presentation was titled "The Mechanism of Solar Water Oxidation in Nature." The lecture was focused on recent breakthroughs in the Lakshmi laboratory on the structure of key photochemical intermediates of the solar water oxidation reaction in the photosynthetic protein complex, Photosystem II. The PCET 2011 Conference was devoted to Proton-Coupled Electron Transfer reactions and processes, from biology and biochemistry to catalysis, including mechanistic, theoretical and spectroscopic approaches and applications focused on energy conversion and storage. The conference was widely attended by researchers from around the world and the invited speakers included leaders in the fields of catalysis and small molecule activation, biology, biochemistry, DNA and spectroscopy, theory and mechanisms.

Experts from around the globe came together at Rensselaer Nov. 4-5 at the Baruch ’60 Center for Biochemical Solar Energy Research to discuss the development of technologies that run on the cleanest and safest energy production process on Earth: photosynthesis. The conference, titled “At the Interface of Natural and Artificial Photosynthesis,” was co-chaired by K.V. Lakshmi, assistant professor of chemistry and chemical biology and the scientific lead at the Baruch ’60 Center, and John Golbeck of Pennsylvania State University.

“The overwhelming need for carbon-neutral energy and the enormous potential of solar energy use is the driving force behind the recent conference at the Baruch ’60 Center,” Lakshmi said. “At the conference, we witnessed amazing research breakthroughs and important debates in the field of light-driven chemical catalysis. We are indeed pleased to have created an interdisciplinary forum that is the underlying basis of research on natural and artificial photosynthesis.”

The two-day conference brought together scientists from academia, government, and industry. Invited lectures covered photosynthetic processes from the solar-driven splitting of water to the production of hydrogen and CO₂ reduction as well as the development of bio-inspired new technologies.

The process of photosynthesis is among the most efficient processes in the world. Capturing and replicating its
power in new solar technology could result in a revolution in solar technology. It was the vast potential of solar energy research that inspired Thomas Baruch ’60, a member of the Rensselaer Board of Trustees, to help establish the Baruch Center at Rensselaer in 2008.

“My wife, Johanna, and I share the belief that meeting the global demand for energy will be a daunting task achievable via a technology revolution based on using plentiful solar energy with far-reaching efficiency,” Baruch said. “Real breakthroughs will come from talented researchers applying multidisciplinary approaches and innovative research tools. We are very lucky to witness these new ideas here at the Baruch ’60 Center and at Rensselaer today, where we are joined by exceptional talent in the field of natural and artificial photosynthesis.”

“The Baruch ’60 Center is critical to the future success of the School of Science at Rensselaer. It is both a research and educational resource, producing breakthrough discoveries at the interface of fundamental and applied science, and educating the next generation of energy pioneers,” according to Laurie Leshin, dean of the School of Science.

**STUDENT NEWS and NOTES**

**Ruchira Chatterjee**, a graduate student in Dr. K. V. Lakshmi’s laboratory at the Baruch ’60 Center for Biochemical Solar Energy Research in the School of Science presented an Invited Lecture at the Eastern Analytical Symposium in Somerset, New Jersey. Ruchira’s presentation was in the “Frontiers of EPR Spectroscopy Session” and it was titled "Pulsed EPR Studies of Photosystem II Elucidating the Mechanism of Solar Water Oxidation." The lecture was focused on the application of cutting-edge multi-dimensional multi-frequency pulsed electron paramagnetic resonance (EPR) spectroscopy methods to study the photochemical intermediates of the solar water oxidation reaction in the photosynthetic protein complex, Photosystem II. The invited speakers in the Frontiers of EPR Spectroscopy Session included Professor Gary Brudvig (Yale University), Professor Gary Gerfen (Albert Einstein College of Medicine), Professor John Marohn (Cornell University), Professor Jack Freed (Cornell University) and Dr. Clyde Cady (Rutgers University). Graduate student, Christopher Coates, and research associate, Sergey Milikisyants, also from the Lakshmi laboratory presented posters on pulsed EPR spectroscopy studies of natural and artificial photosynthetic systems at the Symposium.

**STAFF NEWS and NOTES**

**Evelyn L. Dougherty** died December 27, 2011. Prior to her retirement she was executive secretary in the Department of Physics.
ALUMNI NEWS and NOTES

ACS AWARD IN ANALYTICAL CHEMISTRY
Sponsored by Battelle Memorial Institute

Nicholas Winograd,'67, the Evan Pugh Professor of Chemistry at Pennsylvania State University, is receiving this year’s award in recognition of his 40-plus years of research in surface science and secondary ion mass spectrometry (SIMS). “Nick Winograd is the quintessential surface analytical chemist,” says Richard P. Van Duyne, a longtime friend and a chemistry professor at Northwestern University. They met as freshmen at Rensselaer Polytechnic Institute, where they both did undergraduate research with David Aikens and graduated in 1967. “Winograd is especially noted for his ability to merge advanced theoretical principles with novel experimental approaches to create powerful analytical methods,” Van Duyne says. Winograd traces his love of instrumentation back to the oscilloscope kit his mother gave him in ninth grade. His tinkering led to a variety of construction projects and a ham radio license. “My research now is the same as it was then, in many ways,” he says. “The toys are just bigger.” Winograd raced through graduate school at Case Western Reserve University in less than three years, working on electrochemistry with Theodore Kuwana and earning a Ph.D. in 1970. From there, he moved to Purdue University as an assistant professor. Purdue was already a powerhouse in instrumentation development, and the university had acquired an electron spectroscopy for chemical analysis (ESCA) prototype from Hewlett-Packard. “My work in electrochemistry utilized solid electrodes, and the results were generally not reproducible, presumably due to some undefined chemistry,” Winograd says. “I got the bright idea of trying to elucidate that chemistry with ESCA, but the surface chemistry so enamored me that I never looked back.” But ESCA was not as selective as Winograd would have liked. After hearing about Alfred Benninghoven’s surface mass spectrometry experiments, Winograd collaborated with R. Graham Cooks, also at Purdue, to write a proposal to add the appropriate instrumentation to ESCA. “It was successful, and I have enjoyed working with SIMS immensely ever since,” Winograd says. Winograd “recognized that essential fundamental information required to perform credible surface analysis using SIMS was totally lacking,” Van Duyne says. “Rather than continuing along an empirical path, he combined forces with Barbara J. Garrison to create a detailed molecular dynamics computer simulation model that could be employed to provide an atomic view of molecular desorption.” Winograd credits Garrison, a computational chemist to whom he has been married since 1978, as one of his major influences. “She is a deep thinker who kept me from making very many mistakes and gave me plenty of ideas.” In 1979, they moved to Penn State, where they have been since. In recent years, Winograd has turned to biological applications of SIMS. “I’m really focused on trying to get a 3-D mass spec image of a single biological cell, with enough interesting chemical information to yield some new biology,” he says. “In the beginning, it was a pipe dream really—not enough sensitivity and lots of other problems. Today, with new instrumentation and new ion beams, we are closer than ever to getting something meaningful.” Winograd will present the award address before the ACS Division of Analytical Chemistry during the fall national meeting in Philadelphia. — CELIA ARNAUD

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 Emeritus of Science, at waitsc@rpi.edu