Fall 2008, Vol. 3 Issue 1

APAM NEWS

THE DEPARTMENT OF APPLIED PHYSICS & APPLIED MATHEMATICS

THE FU FOUNDATION SCHOOL OF ENGINEERING & APPLIED SCIENCE, COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

9th International Workshop on Non-Neutral Plasmas
Members of the NNP'08 Workshop pose on the steps of Low Library. See page 7 for more information about the workshop.

Dear Alumni and Other Friends of APAM:

Another term. Another exciting newsletter! Lorenzo Polvani was awarded the Great Teacher Award. The Medical Physics masters program gained accreditation through CAMPEP. Many thanks to Cev Noyan, C.-S. Wu, and John and Marlene Arbo for spearheading this process. Chris Marinanetti joined our faculty. Latha Venkataraman won the very prestigious Packard Fellowship. Thomas Pedersen hosted a workshop on non-neutral plasmas.

With this issue we also welcome our new Department Administrator, Dina Amin. Faculty report on their activities of last year (Adam Sobel in Australia) and for next year (David Keyes in Saudi Arabia). We also began a renovation of our department office and other facilities; more on this in our next issue.

Thank you again to our alumni and other friends of the department!

Best,

Irving P. Herman
Chair, APAM

In This Issue

Chad Husko's Fulbright Report

My Fulbright year working at Thales Research and Technology (**www.thalesgroup.com**) in France was one of the most rewarding, both personally and professionally, of my life. I worked with first-rate colleagues, Alfredo de Rossi and Sylvain Combrié and Quynh Tranh, who helped me take great strides in my understanding of optical physics and the French language. Our team produced top-notch research that will lead to several publications. At Thales, I was also able to meet important people in my field whom I might have never had the chance to encounter. There are too many adventures to recount in this space, but here are a few.

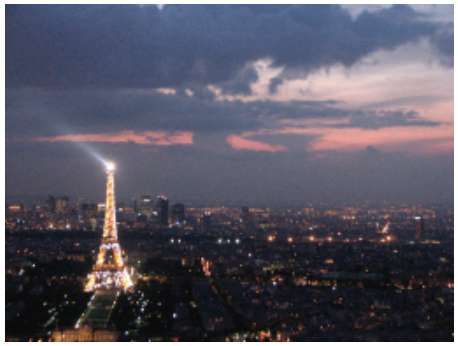
The opening weeks were spent learning about the Thales lab facilities and reading papers of other local lab groups with whom we collaborate. We also reviewed my work done at Columbia and confirmed the research topic that we had discussed throughout the past year. I also worked with Qunyh, a fellow Ph.D. student in my group, to design and do simulations of our initial structures.

Barely 3 weeks into working, the first round of the grèves (train strikes) hit. Despite 2 weeks of strikes, and a potentially daunting commute to Thales in the town of Palaiseau (23 km south of Paris), I was able to get to work by catching a ride with my colleague Alfredo. One of the days, we took advantage of the transit strike to meet up with our collaborators at L'école Normale Superieure de Télécommunications in Paris. We had a productive day and designed an experiment. My experiences at Columbia allowed me to make several suggestions despite my then relatively low-level of French. We also met with colleagues at the Lab de Photonique et de Nanostructures (LPN) and planned the experiments that I would be undertaking.

On the personal side, I joined the Thales running group. One of my friends in the group, Denis, is an avid scuba diver and has visited over 50 countries. His family also owns a Château in Bordeaux. Needless to say, I schemed to get there. I also visited the lab of another friend, Christian, who explained his experiment to me. Finally, I hooked Paolo (Italiano certo!) on a neighborhood Belgian beer store. It's funny that the guy from out of town knows more about the neighborhood than the guy who lives there. Scientist friends were abundant!

November was spent working on our first samples. I learned the subtleties of the group's experimental setup and characterized several devices. I also worked with Kristelle Robin, a fellow Ph.D. student, to make corrections on her first journal paper. In December, Fabrice

Notre Dame Cathedral: My girlfriend Lisa (right - CC'06) came over from NYC in November. Ashley, a friend from I-House-NY (left) came down from London with her colleagues one of the weekends Lisa was there.



Eiffel Tower at night: Studying light in the "City of Lights" was an unforgettable experience. Photo by Matt Worstell.

West Vleteren Abbey: Fellow APAM PhD students Melinda Han and Matt Worstell came for a visit in May. We took a road trip to hunt down one of Belgium's rare beers. We were overjoyed that our pilgrimage was not in vain. Photo by Tom O'Donnell.

Raineri of LPN came to Thales for a day to help start up a new series of experiments that later led to our major results. Another cultural side note, Fabrice's uncle was one of the founders of Café Malongo. This brand is well known throughout France and can be procured in the local supermarché. I expanded on the topic of "Café Culture in Paris" in my cultural presentation at the Fulbright mid-year meeting. Addressing an audience with a variety of backgrounds and interests, I made a strong appeal for the support of fundamental physics research. Albert Fert, the 2007 Nobel Prize winner for his pioneering work in spintronics, was at Thales. Mentioning that without his research we would not have computer memory or iPods hit close to home I think. Later in the spring, I organized an "espresso jam" at my favorite café. For the full story, see a piece (with photos!) that I wrote for the Franco-American Fulbright Commission at:

www.fulbright-france.org/htm/page.php?id=134#CH

The work culture was ideal for getting to know my colleagues. Every day we would go to lunch together and, depending on the day's news, we would discuss French politics, the then upcoming U.S. primary elections, or the so-called "crise sub-prime" (subprime mortgage crisis). Talking about science in French is one thing, but discussing politics or finance is another. In short, my colleagues were extremely patient.

In March, I was selected as a representative of the Franco-American Commission to a special conference on the European Union (EU). Our group of Fulbrighters from around Europe had the opportunity to meet with key players in the EU, as well as NATO. A highlight of the trip was meeting and having a spirited debate with the U.S. Special Envoy to the EU, C. Boyden Gray. The essay that I wrote for the selection process was in fact inspired by Prof. Mauel's talk on his sabbatical year in Washington, D.C., which I was fortunate enough to attend before my departure.

While at Thales, I was able to meet and have discussions with several world-class scientists. Two notable examples were Govind Agrawal of the University of Rochester, and Borge Vinter, of Thales and the University of Nice. When he visited, Prof. Agrawal spent a good amount of time talking with us in our lab. He wrote a key text in fiber optics research, the results of which are also applicable to my research on photonic crystals. As for Prof. Vinter, I had several discussions about quantum well physics with him. It was really great to pick the brain of a guy who is the author of several textbooks on the subject. In addition to these more flashy moments, throughout the spring we continued to work hard on our research, debugging our new experimental setup and testing samples. The last few weeks we were able to crank out some nice results. Now it's time to publish!

This last year I also had a timely re-read of "*Surely you're joking, Mr. Feynman!*" Between the espresso talk to my Fulbright colleagues and energy debates with the Mr. Gray, I couldn't help but imagine the amazing life of the late physicist. The year in France, the cheese, my amazing friends and colleagues at Thales, and the research results we achieved, have been more rewarding and productive than I could ever have expected. Now if only I could win that Nobel Prize!

Special Thanks: From the application process, to negotiating Columbia grant policies, my incredible year would not have been possible without the support of some very treasured friends and mentors in APAM. You know who you are!

Spotlight on Current Students

Seth Davidovits, Applied Mathematics Junior, interned at Argonne National Laboratory, working in computational biology.

Valla Fatemi, Applied Physics Junior, was part of the NSEC REU program on campus this past summer at Columbia, working in the lab of Prof. Latha Venkataraman.

David Goluskin, Applied Mathematics Graduate Student, interned at the National Center for Atmospheric Research in Boulder, CO, working on problems in magnetohydrodynamic turbulence relevant to solar physics.

Brian Grierson, Plasma Physics Graduate Student, was invited to present a talk at the APS-Division of Plasma Physics 2008 meeting in Dallas, TX on Nov. 20, 2008, on "Global and Local Characterization of Turbulent and Chaotic Structures in a Dipole-Confined Plasma". His work "The Turbulent Structure of a Plasma Confined by a Magnetic Dipole" will be published in *Nuclear Fusion*.

Derek Hernandez, Applied Physics Junior (3/2), spent last summer working for the Student Conservation Association (SCA).

Wakana Kirihata, Applied Mathematics Junior, interned at IBM Almaden Research Center this past summer, where she worked with Dr. James Kaufman and Dr. Barbara Jones. She was a contributing author on the paper "Assessing the Accuracy of Spatiotemporal Epidemiological Models" by James H. Kaufman, Joanna L. Conant, Daniel A. Ford, Wakana Kirihata, Barbara Jones, and Judith V. Douglas.

Braxton Osting, Applied Mathematics Graduate Student, interned at the Stanford Linear Accelerator Center (SLAC) this past summer. He worked with the Advanced Computational Department to design an optimal accelerator cavity structure using PDE constrained optimization methods.

Erich Owens, Applied Mathematics Senior (3/2), interned at NASA this past summer.

Alumni News

Sarah Angelini, B.S. Applied Physics '05, presented at the Applied Physics Undergraduate Seminar taught by Prof. Pedersen. She recently finished her masters at M.I.T. and is now working in New Jersey.

Chris Hegna, Ph.D. Applied Physics '89, presented a talk this fall at the Plasma Physics Colloquium at Columbia University on "Nonlinear regime of ideal ballooning instabilities". He is currently a professor in Engineering Physics at the University of Wisconsin.

CAMPEP Awards Accreditation to M.S. Program in Medical Physics

Gerald A. Navratil, Interim Dean of The Fu Foundation School of Engineering and Applied Science, has announced that the University's Master of Science Program in Medical Physics has received accreditation from the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP). The program is offered by the Department of Applied Physics and Applied Mathematics in The Fu Foundation School of Engineering and Applied Science.

The faculty and staff of the Medical Physics Program celebrate the CAMPEP accreditation

"Medical physics, which bridges the gap between physics and medicine, has been responsible for innovative and now essential diagnostic technologies, such as CT and PET scans," said Dean Navratil. "We are pleased that our program, taught by such a distinguished faculty, has been recognized by this accrediting body."

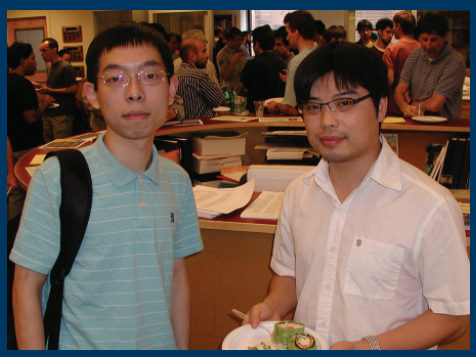
The program is staffed by Columbia University faculty from The Fu Foundation School of Engineering and Applied Science, the College of Physicians and Surgeons and the Mailman School of Public Health. The Medical Physics Graduate Committee is co-chaired by Profs. I. C. Noyan and C.S. Wuu; John C. Arbo is the graduate advisor. The program supports radiation therapy, diagnostic radiology, diagnostic nuclear medicine and health physics and prepares students for professional careers in the field of medical physics by providing appropriate theoretical and practical training. The program also provides preparation toward certification by the American Board of Radiology.

Graduates of the program are currently employed by major hospitals and medical centers in the greater metropolitan area, including Memorial Sloan Kettering Cancer Center, New York-Presbyterian Hospital, Mount Sinai Medical Center, New York University Medical Center and others.

APAM Welcome Party Photos

Faculty, staff, and students gathered on September 9 for the annual APAM Welcome Party.

Sarah Lewin & Jo-Ann Provencher



Ningyao Zhang & Shouzheng Liu

Pavol Juhas & Adrian Chitu

Alexandre Jollivet & Clara Orbe

New Faculty Member: Chris Marianetti

Prof. Chris Marianetti

Prof. Chris A. Marianetti joined the faculty in July 2008 from the Lawrence Livermore National Laboratory (LLNL) where he was a post-doctoral researcher. His research focus is the use of many-body quantum theory and computation to predict the behavior of materials. Since the invention of quantum mechanics in the 1920's, it has been a dream of scientists to predict the behavior of materials without input from experiment. In the early days, great progress was made with increasingly clever mathematical theories, and eventually a robust framework for the qualitative understanding of simple materials was in place. However, qualitatively understanding complex elements (i.e. transition metal and actinides) or obtaining quantitative accuracy even in simple systems remained elusive. The advent of the computer with its ever increasing speed fundamentally changed the equation, allowing us to solve the many-particle Schrodinger equation with increasing realism and accuracy. Prof. Marianetti heavily utilizes both density functional theory (DFT) and the dynamical mean-field theory (DMFT), which are two prominent theoretical approaches for solving the many-body Schrodinger equation. Applying these theories to complex materials requires computational power which ranges from a typical desktop to the world's largest supercomputers. The beauty of these computational techniques is that they can be applied throughout the periodic table without discrimination, from bulk materials to nanoparticles to interfaces.

The applications of his research program are broad in scope, ranging from cobalt oxides used in rechargeable Li batteries to plutonium. The underlying theme of the materials application is understanding the physics of materials with applications in energy storage and conversion. Alternative energy is the defining issue of our time, and understanding the underlying materials behavior of these diverse technologies will be critical to advancement. Prof. Marianetti's appointment as a visiting scientist at LLNL allows him access to some of the most powerful supercomputers, a necessity for computing the properties of complex materials such as plutonium. A recent paper, published in *Physical Review Letters*, details the first prediction of the temperature dependence of the magnetic properties of plutonium. Understanding these basic properties of plutonium is relevant to maintaining the safe storage of our nuclear stockpile and nuclear fuels.

He received his B.S. in the field of Welding Engineering at the Ohio State University. During this time, he also spent a year at the General Motors Technical Center working on robotic resistance welding. He continued along this path, earning a M.S. in Welding Engineering at The Ohio State University. His M.S. thesis research dealt with weld-metal hydrogen assisted cracking, a chronic problem in many high-strength steel weldments. He then moved in a different direction, earning a Ph.D. in computational Materials Science and Engineering at M.I.T. His Ph.D. thesis research focussed on applying first-principles methods, such as DFT and DMFT, to energy storage materials. He continued on to a post-doctoral position in condensed matter physics at Rutgers University. There he continued developing/applying DFT and DMFT to strongly correlated electron systems. Following Rutgers, Prof. Marianetti moved on to a second post-doctoral position at LLNL where he utilized LLNL's world-class supercomputers to apply DFT and DMFT to plutonium.

The ability to understand and predict the behavior of materials using first-principles computations will continue to play an increasingly important role in overcoming society's technological challenges. APAM is an ideal department in which to advance this great tradition.

Latha Venkataraman Wins a Packard Fellowship

Prof. Latha Venkataraman

Latha Venkataraman, an assistant professor in Applied Physics, has been awarded one of the 20 prestigious 2008 Packard Fellowships for Science and Engineering. "The School is very proud of this honor that Latha has received," said Interim Dean Gerald A. Navratil. "She is a stellar example of the excellence of the new faculty we are attracting." Prof. Venkataraman joined the SEAS faculty last fall.

The Packard Fellowship, given each year to the nation's most promising young professors, consists of an unrestricted research grant of $875,000 over five years. "I am deeply honored to be chosen for this distinguished award," said Venkataraman. "The Packard Fellowship will help support my research on understanding fundamental properties of single-molecule electronic devices."

The underlying focus of her research is to fabricate single-molecule circuits - a molecule attached to two electrodes - with varied functionality, where the circuit structure is defined with atomic precision. "I am working to understand the interplay of physics, chemistry and engineering at the nanometer scale," she said. Her group measures how electronic conduction and single bond breaking forces in these devices relate not only to the molecular structure, but also to the metal contacts and linking bonds. "These experiments provide a deeper understanding of the fundamental physics of electron transport, while laying the groundwork for technological advances at the nanometer scale," she said.

"The School is very proud of this honor that Latha has received," said Interim Dean Gerald A. Navratil. "She is a stellar example of the excellence of the new faculty we are attracting."

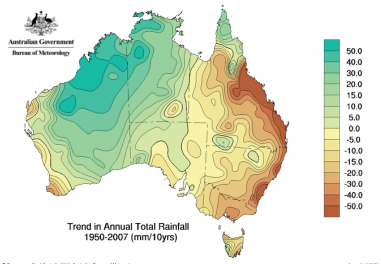
Every year, the Packard Foundation invites presidents of 50 selected universities to nominate two young professors performing innovative research in the natural sciences or engineering. The Packard Fellowship is widely regarded as one of the most prestigious awards given to junior faculty members.

Prof. Venkataraman is the second Packard Fellow in our department; Adam Sobel, associate professor of applied mathematics who holds a joint appointment with the Department of Earth and Environmental Sciences, received the honor in 2000. Seven additional Columbians have received the Packard Fellowship, including 3 other SEAS faculty members - Prof. Jingyue Ju of the Chemical Engineering Department, and T.C. Chang Prof. Shree Nayar and Prof. Kenneth Ross, both of the Computer Science Department.

The Packard Foundation, of Los Altos, CA, was created by David Packard, co-founder of the Hewlett-Packard Company, and Lucille Packard. The Packard fellowship program arose out of David Packard's commitment to strengthening university-based science and engineering programs.

Adam Sobel's Sabbatical Report: "Our Year in Oz"

A couple of years ago, during a visit to some colleagues at a University in another part of the country, I was having dinner with several of them and the subject of sabbaticals came up. One was a very highly regarded professor in his sixties who had started his faculty career in his twenties and had taken many sabbaticals, all of them in different faraway places, most of them accompanied by his family. After he told a few of his stories someone said "you know, these days not many people can take that kind of old-fashioned sabbatical any more; everyone's spouse has a job they can't leave, or their kids have some important commitments, or something, and a lot of people just stay home." I hadn't had a sabbatical yet but was soon due for one. I resolved to do it right.



Map of trend in Australian rainfall, 1950-2007

Samuel Sobel and friend

My wife managed to get a year's leave from her job, and in August 2007 we went with our two boys (then 6 and 9, now 7 and 10) to Melbourne, Australia for a full year's sabbatical. We lived in the southeast near the beach, close to the neighborhood of St. Kilda, which among other things has an amusement park modeled on Coney Island. It was a pleasant half-hour tram ride from there to my "job" downtown, as a visiting scientist at the Bureau of Meteorology.

I was in the Bureau's basic research arm, which has a small but strong group doing tropical weather and climate research, my area. My main occupation was the research projects I'd brought with me. After 7 or so years (I came to Columbia in January 2000) of being mostly an advisor, teacher, editor, and fund-raiser, I was determined to do some real research myself - writing the code, making the plots, the whole thing. But I wanted to learn from my Australian colleagues, so I also spent a lot of time talking to them. I began a few collaborations, one or two of which will lead to co-authored journal articles.

I learned a lot about the local weather and climate, more as an interested spectator than out of any research imperative. Big things, if not necessarily good things, are happening down there. Nearly every part of Australia with significant population has been in a drought for the last decade or so. The drought has had impacts that nearly every citizen feels directly, from higher food prices to restrictions on household water use in the large cities that house most of the population (Melbourne, Sydney, Brisbane, Perth, Adelaide, Canberra). Australia is a dry country under normal conditions, and ten-year droughts like this have happened a few times since the British arrived two centuries ago, but this is at least the worst one since World War II.

Is global warming responsible to some extent for this particular drought? If not, the drought will eventually end, as they all have in the past. If so, maybe not. The short answer is we don't really know, but probably some of the drought is natural and some of it is anthropogenic. The rainfall decrease may be partly or even completely natural, but because it is hotter than in the past (at least partly due to global warming), more of the water in the soil evaporates than in the past, which leads to less water in streams and reservoirs per unit rainfall.

Regardless of what the real answer may be, the drought has led to an intense awareness of climate and water issues throughout Australia. It was my impression that the Australian press covers these issues more than ours does here in the US, and that people talk about them more. It is the conventional wisdom, supported by polls, that climate change played a major role in the Australian federal election which took place November 2007. The right-of-center Liberal/National coalition led by John Howard was thrown out, in favor of the left-of-center Labor Party led by Kevin Rudd. Rudd had used Howard's vaguely skeptical, essentially passive, rather Bush-like stance on climate to paint his opponent as clueless and out of touch, "yesterday's man". Shortly after being sworn in, Rudd fulfilled his campaign promise to sign the Kyoto protocol. Whether this drought is caused by global warming or not, it has helped Australians visualize what a permanently changed climate might look like for them, making the issue much less abstract.

We did a lot of traveling. For an American, Australia is not very foreign or exotic culturally, except for the traces of Aboriginal culture that remain (and maybe Aussie rules football). But it is another world geographically, with landscapes, plants and animals different from anything in the USA. We saw as much of it as we could. Our kids were just the right ages to appreciate the kangaroos, koalas, wombats, possums, crocodiles, weird birds, snakes… my older boy, Eli, became fascinated and obsessed with them to the point that his friends at school called him "Wombat kid". He and my wife learned how to surf and she learned how to scuba dive. My younger boy, Sam, learned how to read while we were there, and how to speak Australian like a native (almost).

I didn't really acquire any skills other than how to say the word "mate" with a straight face (that took about 9 months) and how to order my coffee ("long black"). I didn't write a book either. That's ok. t was a real sabbatical: a rest, an escape from the regular routines, time to think, a new environment to jar one's thoughts out of their ruts, a very different time zone. I highly recommend it.

Faculty Updates

Prof. Daniel Beshers (*Emeritus*) was named one of the winners of the Zener Medal Award. He received the medal at the International Conference on Internal Friction and Mechanical Spectroscopy ICIFMS-15 in July 2008.

The American Meteorological Society Council has awarded Prof. Adam Sobel an Editors' Award for his excellence as a reviewer "for uniformly excellent reviews improving the quality of papers published by the *Journal of the Atmospheric Sciences*."

The CU Engineering Alumni Association honored Prof. Horst Stormer at an Awards Dinner on November 11, 2008, in Low Library. He received the Pupin Medal for Service to the Nation in engineering, science or technology. Stormer, who joined Columbia in '98 after 20 years at AT&T's Bell Labs, is scientific director of Columbia's NSF Nanoscale Science and Engineering Center where he conducts research into the electrical conductivity of single molecules. In 1998, he shared the Nobel Prize in physics for his part in the "discovery of a new form of quantum fluid with fractionally charged excitations."

Prof. Cheng-Shie Wuu, the Co-director of Medical Physics Graduate Program, was elected President of the Radiological and Medical Physics Society of New York, Inc. (RAMPS). His term will begin in January 2009.

Prof. Lorenzo Polvani

" . . . a passionate teacher who cares about his students, has a straightforward and well planned teaching style, and is very understandable and approachable."

SOCG Honors Polvani As Great Teacher

Prof. Lorenzo M. Polvani of the Department of Applied Physics and Applied Mathematics and Christia Mercer, Gustave M. Berne Professor in the Department of Philosophy, received the Great Teachers Award from the Society of Columbia Graduates (SOCG) at its annual dinner on October 23 in Low Library Rotunda. The 2008 winners were announced by Alexandra Baranetsky '75, DDS'80, president of the Society. Henry Graff, Professor Emeritus in the History Department, gave the keynote address, "A New President Again," on the then upcoming presidential election.

The Society of Columbia Graduates, formed over 99 years ago, established the Great Teachers Award in 1949 to honor exceptional teachers of undergraduate students in Columbia College and The Fu Foundation School of Engineering and Applied Science. Each year, one award is given to a faculty member from each of the faculties that serves the College and Engineering.

Polvani joined Columbia SEAS in 1990 from M.I.T., where he received a Ph.D. degree in physical oceanography and had been an instructor in applied mathematics. He received tenure in 1996 and was named a professor of applied mathematics in 2000, when he also received a joint appointment as professor of earth and environmental sciences. He was an inaugural winner of the Distinguished Faculty Teaching Award, established in 1997 by the Columbia Engineering School Alumni Association to recognize exceptional teaching at the undergraduate level.

Polvani's research interests lie in atmospheric and climate dynamics, geophysical fluid dynamics, numerical methods for weather and climate modeling, and planetary atmospheres. His most recent published research focuses on the expected closing of the ozone hole in the second half of the century and its impact. See the article below for more information.

In student evaluations, Prof. Polvani has been praised as a passionate teacher who cares about his students, has a straightforward and well planned teaching style, and is very understandable and approachable. One student wrote, "Charisma, charisma, charisma. Very passionate professor with excellent classroom delivery. Clearly he has passion for the subject and cares about his students."

Ozone Hole's Closing Will Affect Climate

A new study led by Dr. Seok-woo Son and Prof. Lorenzo Polvani is suggesting that the winds in the Southern Hemisphere will be greatly impacted by the expected recovery of the ozone hole in the second half of this century. In a study that appears in the June 13 issue of *Science*, Seok-Woo Son, lead-author and a postdoctoral research scientist at SEAS, and Prof. Polvani suggest that stratospheric ozone ought to be more carefully considered by the next Intergovernmental Panel on Climate Change (IPCC) round of climate model predictions.

"We were surprised to find that the closing of the ozone hole, which is expected to occur in the next 50 years or so, shows significant effects on the global climate," said Lorenzo Polvani. "This is because stratospheric ozone has not been considered a major player in the climate system. We believe the closing of the ozone hole is likely to have profound impacts on the surface winds and, also likely, to have an impact on other aspects of the Earth's climate, including surface temperatures, locations of storm tracks, extent of dry zones, amount of sea ice, and ocean circulation."

In the past few decades, the tropospheric winds in the Southern Hemisphere have been accelerating closer to the planet's pole as a result of increasing greenhouse gases and decreasing ozone, says Polvani. This wind change has had a broad range of effects on the Earth's climate and the IPCC models predict that this effect will continue, albeit at a slower pace. In contrast, Polvani says, predictions made by the chemistry-climate models of the Scientific Assessment of Ozone Depletion, published by the World Meteorological Organization in 2006, indicate that, as a consequence of ozone recovery - a factor largely ignored by IPCC models - the tropospheric winds in the Southern Hemisphere may actually decelerate in the high latitudes and move toward the equator, potentially reversing the direction of climate change in that hemisphere.

The Earth's ozone layer, which lies just above the troposphere, catches harmful ultraviolet rays from the sun and was, until the Montreal Protocol, being eroded by pollution caused by the widespread use of aerosols powered by chlorofluorocarbons (CFCs). Recent observations indicate that the ozone layer is no longer in danger and is expected to recover. As a consequence, the new study finds, the Southern Hemisphere climate change may also reverse.

"Our results suggest that stratospheric ozone is important for the Southern Hemisphere climate change, and ought to be more carefully considered in the next set of IPCC model integrations," says lead-author Seok-Woo Son.

In addition to the two SEAS researchers, eight other scientists - from Johns Hopkins; the National Institute for Environmental Studies in Tsukuba, Japan; the National Center for Atmospheric Research in Boulder, CO; the NASA Goddard Space Flight Center in Greenbelt, MD; the Institute for Atmospheric and Climate Sciences at ETH in Zurich, Switzerland; the Physical Meteorological Observatory in Davos, Switzerland; the University of Toronto; and the Meteorological Research Institute in Tsukuba, Japan, participated in the study.

www.apam.columbia.edu/announcements/polvani_08/index.html

David Keyes to Spend a Year at KAUST

Prof. David Keyes

Prof. David Keyes will spend a year as inaugural Chair of the Division of Mathematical and Computer Sciences and Engineering, one of four academic divisions at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia.

Beginning in the summer of 2009, Keyes will oversee KAUST's research and educational activities in applied and computational mathematics and computer science, while forging collaborations with the other science and engineering divisions in large-scale computational simulation.

"We are extremely pleased that David will use his sabbatical year to create a stronger relationship between our School and KAUST, which already partners with academic institutions such as Berkeley, Caltech, Cambridge, Chalmers, Cornell, Imperial, La Sapienza, MIT, Oxford, Stanford, Tokyo, Toronto, and Utrecht," said Gerald A. Navratil, SEAS Interim Dean. "We see this as a good opportunity for the School to continue to build our international academic connections."

"I am excited to be part of the establishment of the first independent university in Saudi Arabia," said Prof. Keyes. "Out of the climax of the petroleum economy, powered by the information economy, KAUST will help forge future technologies of renewable energy and agriculture. My participation in SEAS's Global Development Team expanded my vision of what difference an individual faculty member can make.

We've talked a great deal at SEAS about how to engage the world for mutual benefit and we've studied some failures as well as the few successes that are out there. KAUST appears poised for success in short order. When it came to my own sabbatical, I began to feel that it was up to me not just to think globally, but to act locally - on site!"

"What could be more fulfilling?" Keyes asks. "If we don't partner with them, other nations can and will, but higher education and computational science are things that the U.S. unquestionably still does best."

Keyes brings to this position experience leading multi-institutional projects in large-scale simulation for the U.S. Department of Energy (DOE) and the National Science Foundation and directing academic collaborations institutes at DOE laboratories and NASA. He has authored or contributed to eight federal agency reports since 2002 on the role of large-scale simulation in complementing experiment and theory in scientific discovery and engineering design, and he sits on advisory committees of the NSF, DOE, and PCAST for cyberinfrastructure and simulation.

9th International Workshop on Non-Neutral Plasmas

SEAS and the Department of Applied Physics and Applied Mathematics hosted the 9th International Workshop on Non-neutral Plasmas from June 16-20 this past summer. A total of 51 physicists from all over the world (U.S., Germany, Russia, Japan and several other countries) attended the workshop, which was held in Davis Auditorium. The field of non-neutral plasma physics, which is represented at Columbia by Prof. Thomas Pedersen's CNT group, was founded 2 decades ago. It was therefore appropriate that the workshop concluded with a historical overview by Chuck Roberson entitled "Non-neutral plasma physics at 20". Many interesting results were presented, including studies of dusty plasmas in zero gravity environments, progress on the effort to create, trap, and study antihydrogen, and new confinement records in the toroidal non-neutral devices, including record long confinement in the CNT non-neutral stellarator, and even longer confinement times achieved in the Lawrence Non-neutral Torus, exceeding one second. The workshop included a guided boat tour around Manhattan, and a guided tour of the Plasma Physics Laboratory.

Prof. Thomas Pedersen and other conference participants enjoy a ride on a Circle Line Cruise

Benoit Durand de Gevigney & Quinn Marksteiner

APAM Staff News: We welcome Dina Amin as our new Departmental Administrator. Dina was the Assistant Director of the Center for Iranian Studies and we are very pleased that she has joined the APAM staff. We warmly thank Justine Herrera for filling in during the interim.

DEPARTMENT OF APPLIED PHYSICS & APPLIED MATHEMATICS FUND

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