

# Schrödinger's Tiger



The Clemson University Physics and Astronomy Newsletter

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## Clemson Students Make Impressive Showing at AAS Meeting in Washington, D.C.

AAS Meeting in D.C.

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The Clemson astronomy and astrophysics group was well represented in Washington D.C. for the 215th meeting of the American Astronomical Society that took place from January 3rd through the 7th, 2010. This meeting was held at the Washington Marriott Wardman Park. Drs. **Dieter Hartmann** and **Sean Britain** accompanied six of our graduate students, **Ginger Bryngelson**, **Brian Donehew**, **Bethany Johns**, **Joe Liskowsky**, **Matt Troutman** and **Adria Updike** and two undergraduate students, **Brianne Hackett**, and **Jessica Herrington**.



Clemson students in front of the Washington Monument

These students presented their research at this meeting of over 3,400 astronomers and conference participants from all around the country. **Matt Troutman**, a student of **Dr. Britain**, gave a Ph.D. dissertation talk, titled "The Study of CO Disks around Young Stars: Implications for the Formation of Gas Giant Planets". Other students gave either a seven-minute presentation or displayed a conference poster.

In addition to taking in the sights of the nation's capital, the students had the opportunity to meet and reconnect with other Clemson graduates who are now pursuing careers in science and industry. In attendance at the conference were **Dr. Grant Williams**, the Associate Director of the Multiple Mirror Telescope in Arizona; **Kevin Lindsay**, an Image Processing Scientist at the Space Telescope Science Institute; **Yu Chen**, a Patent Clerk at the U.S. Patent Office; **Dr. Simon Shuler**, a Leo Goldberg Fellow at the National Optical Astronomy Observatory; **Dr. Ethan Denault**, Assistant Professor at the University of Tampa; **Dr. Tom Bridgman**, a computer visualization expert at the Goddard Space Flight Center; and, **Dr. Eric Bubar**, a post-doctoral researcher at the Rochester Institute of Technology. It was encouraging to see the exciting research being pursued by our current and former Clemson students.

Clemson's participates yearly in AAS meetings and events. The yearly national meeting has come to be an important part of astronomy students' graduate experience. It allows them to meet other students and academics in the field and to exchange ideas and learn the latest developments in astronomy. The American Astronomical Society (AAS) was established in 1899 and is the primary organization of professional astronomers in North America. It comprises approximately 7,700 members and also includes physicists, mathematicians, geologists, engineers, and others whose research interests touch on the field of astronomy.

### A Message from the Department Chair

I would like to begin with a big thank you to those of you who made donations this past year to the Department's Development Fund. While donations varied in their amount, the total was significant, allowing us to maintain and support programs that would otherwise have been eliminated.

One such program is the establishment of an international Ph.D. program with scientists at the Italian Synchrotron in Basovizza Italy. A previous Chair's Letter mentioned the possibility of eliminating this program because of lack of funds. Thanks to increased support, the first exchange of students will start with the fall semester of 2010. We will begin with one American and one Italian student, with the Italian student completing his coursework with his or her counterpart at Clemson. This program will enhance our international exposure, as students and faculty from Europe learn more about Clemson, and Clemson students are exposed to European science. The same cannot be said of the undergraduate program in Basovizza. We had to cancel this program last summer due to its high operating cost. The plan this year is to seek funds from private sources.

In a future newsletter, we will feature the change in curriculum for graduate studies, in our attempt to both modernize graduate studies and shorten the time of study and research in order to complete the Ph.D. program. You can see the updates to the graduate curriculum on our web page soon. Our sophomore honors program has been split into two classes - one for physics majors and the other for all other majors. Dr. Murray Daw is teaching our physics majors taking a new approach, which includes considerable historical and philosophical content. He is now being swamped with requests from students from many disciplines to take the philosophy section of the program. As of spring 2010, we have 27 freshmen, for a total of 91 Physics & Astronomy undergraduates. Moreover, we currently have total 54 graduate students pursuing academic careers in the field.

With yet another cut in state support to Clemson University, we are reducing costs wherever possible, and will, most likely, discontinue mailing physical copies to alumni, instead sending out electronic versions by e-mail. This newsletter and all previous copies are always available for viewing at <http://physics.clemson.edu>. I would encourage those of you who would like a electronic version to sign up for this option in the enclosed envelope.

As always, thank you for your continued support of the Department.

**Peter A. Barnes, Professor and Chair**  
Department of Physics and Astronomy  
Voice: (864)656-3416  
[peterb@clemson.edu](mailto:peterb@clemson.edu)

## Creating a Legacy – Giving to Clemson Physics & Astronomy

You can create a lasting legacy through your donation to the Clemson University Physics and Astronomy Department Foundation. Endowments to Clemson assure the best faculty, the brightest students and the most creative research projects. A substantial endowment can transform a good university into a great one.

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There are several ways to donate. You may use the enclosed envelope or you may send a check to the Clemson University Foundation, P.O. Box 1889, Clemson, SC 29633. Checks should be made payable to Clemson University Foundation with Physics and Astronomy Foundation written in the memo line. Or donations can be made in person at the Foundation Office, located in Tiger Park at 155 Old Greenville Hwy., Suite 105, Clemson, SC 29631.

Alternately, you may visit the Clemson website <http://www.clemson.edu/alumni/giving/ways/index.html> and make a secure electronic donation. Again, please specify that the donation go the Physics & Astronomy Department and indicate to which project you would like to donate. You may contact the Department directly at (864) 656-3416, should you have any questions regarding your donations. Thank you, as always, for your continued support of the Department.



Yu Chen and Brian Donehew in front of the Space Shuttle, *Enterprise*, at the Smithsonian's National Air and Space Museum.



## NEW FACULTY PUBLICATION

Dr. Donald D. Clayton, Emeritus Professor, recently published his autobiography, *Catch a Falling Star: A Life Discovering Our Universe*. This book chronicles his personal and scientific development over many years of accomplishment, and was published through iUniverse, Inc. in 2009. Dr. Clayton was key to the development of the astronomy and astrophysics program at Clemson.

helping to develop its research program on stellar evolution. He became a German citizen around 1980. Dr. Dieter Hartmann of Clemson carried out his Master's research on the properties of matter under extreme conditions in the core of massive stars under Dr. El Eid's supervision.

Following his professorship at Göttingen, he returned to Beirut, where he became instrumental in the creation of its astrophysics program and eventually lead their physics efforts as a Department Chair.

Dr. Donald Clayton assembled the Clemson nuclear and gamma-ray astrophysics team (Clayton, Hartmann, Leising, Meyer and The) by 1991, and Mounib visited Clemson for the first time shortly thereafter. Dr. Hartmann, because of his prior relationship with Dr. El Eid, initially invited him to visit, in order to help develop a research program in stellar evolution – at that time a fledgling initiative. In the intervening years Dr. El Eid has returned regularly, collaborating with Drs. Dieter Hartmann, Lihsin The, and Bradley S. Meyer.

His visits have become a regular event, and we always look forward to his return!

## Our Distinguished Visitor: *Dr. Mounib El Eid*



Dr. Mounib Fuad El Eid

Since 1992, Dr. Mounib El Eid has been a regular visitor to Clemson every year, and over time has become a member of the Physics & Astronomy family.

He first came to Clemson in May of 1992 to attend the first Clemson workshop on Galactic Chemo-Dynamics. While he currently teaches at the American University in Beirut, he taught for a number of years at the University of Göttingen in Germany,



Austin Schwartz and Aaron Allen

## Aaron Allen and Austin Schwartz

Both **Aaron Allen** (Senior in Physics) and **Austin Schwartz** (Junior in Physics) decided to get involved in research early on in their academic careers. As freshmen, they started working in **Dr. Meredith Newby Spano's** laboratory in the Physics and Astronomy Department, exploring the physical properties of RNA molecules. Fall semester, both of these students came back to Clemson more experienced, having done summer research in other universities' REU programs (Research Experience for Undergraduates).

Aaron grew up in Columbia, and he cites his parents as his positive role models. Since arriving at Clemson, he has been awarded a *William Hearst Randolph Diversity Fellowship*. This summer was not his first REU elsewhere; in the summer of 2008 Aaron went to Vanderbilt University to work with **Dr. David Ernst**. There he helped build a computational model to describe experimental neutrino data. This past summer he visited the University of Colorado at Boulder, where he worked with **Dr. Dana Anderson** to develop a portable BEC atom-chip vacuum cell system for the practical application of ultra-cold atom physics. Since he arrived at Clemson, he has done biophysics, atmospheric physics with **Dr. Miguel Larsen**, astrophysics (as an REU) and optical physics (during another REU). What does this already well-rounded physics student hope to do in his graduate study in the future? He plans to work in the field of quantum computing.

Austin is a local student who hails from Greenville. His dad is a physician who encouraged Austin's love of science from an early age. This last spring he was awarded an *L.D. Huff Award for Outstanding Sophomore in Physics* by the department faculty, and he continues to work in the Newby Spano lab, pursuing structural studies of the thiamine pyrophosphate riboswitch by fluorescence methods. This summer was not his first research experience outside of Clemson either; in 2008 Austin was an intern for Innegritty, Inc., developing high-performance fibers with the strength of Kevlar at a fraction of the cost. Summer 2009 he did an REU at Ohio State University, and worked with **Dr. Arthur Epstein**. There he worked on the development of a method for production of nanoparticles to be used in medical applications. Austin entrapped glucose oxidase within the nanoparticles, an enzyme that reacts with glucose. The hope is that these nanoparticles can be used as part of a tiny diabetic blood-sugar sensor in the future. Austin plans to attend graduate school in biophysics after graduation. Aaron and Austin will both be submitting publications on their respective REU projects later this year. Kudos to these students for their accomplishments, and for representing our department and university in a positive light!

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We ask that if you would like to receive an online copy in the future, please complete the form in the provided envelope and return it to the Department. We can continue to send a hard copy to those of you who would prefer one. Also please indicate if you would like to make a donation to Clemson Physics & Astronomy at this time. You may include a check with your returned information or make a secure online donation.



## Physics & Astronomy Welcomes a Long-Time Colleague as Newest Department Instructor

The Department's newest lecturer, **Dr. Lih-sin The**, is not new to Clemson. Dr. The came to us as a research associate in 1989. His early work at Clemson focused on gamma-ray astronomy with the OSSE Science Team of the Compton Gamma-Ray Observatory. One of the highlights of this work was the first observation of the gamma-ray line from radioactive decay of cobalt-57 in supernova 1987A, a result presented with **Drs. Donald Clayton** and **Mark D. Leising** of Clemson, and **Drs. James Kurfess** and **Neil Johnson** of the U.S. Naval Research Lab.

In the late 1990's, Dr. The began research on the evolution of massive stars and their processes of element formation. A highlight of this work was his detailed study of formation of heavy elements by neutron capture in the advanced stages of such stars, work performed in collaboration with **Dr. Bradley Meyer** of Clemson and **Dr. Mounib El Eid** of the American University of Beirut (see related article).



Dr. Lih-sin The

Dr. The continues his collaboration on massive star evolution and

has begun a new collaboration on galaxy formation with **Dr. Dieter Hartmann** of Clemson and Clemson alumna, **Dr. Jeannette Myers**, of Francis Marion University. It is evident that Dr. The brings a wealth of research experience to his new position. He is originally from Jakarta, Indonesia and received his Bachelor's degree from the University of Indonesia. He later attended the University of Arizona in Tucson, where he received his Ph.D. in Physics in 1989. When he's not working, he enjoys reading, watching movies, and playing badminton.



Dr. Joshua Pomeroy

## NIST Researcher Appointed as Clemson Adjunct Professor

The Physics and Astronomy faculty recently appointed **Dr. Joshua Pomeroy** of the National Institute of Standards and Technology (NIST) as an adjunct member of the Department of Physics and Astronomy. Dr. Pomeroy is a staff scientist in the Quantum Processes and Metrology Group of the Atomic Physics Division at NIST, where he oversees the running of the Electron Beam Ion Trap (EBIT) facility. Prior to joining NIST in 2003, Dr. Pomeroy received his B.S. and Ph.D. degrees in physics from Boston University (1997) and Cornell University (2002), respectively, and was a post-doctoral research associate at Los Alamos National Laboratory. Most recently, Dr. Pomeroy was a finalist for the 2009 *Call to Service Medal* sponsored by the Partnership for Public Service, and he was profiled in a *Washington Post* article (March 2009). Currently, he collaborates with **Dr. Chad Sosolik's** group on EBIT experiments that utilize highly-charged ions as tools for the selective erosion of thin insulator films in magnetic tunnel junction devices. He is also hosting one Clemson University student (**Russell Lake**) in his laboratory for those measurements.

## FOCUS ON STUDENT ACHIEVEMENT:

### ***KEMPER TALLEY***

**Kemper Talley** was nominated for the *Goldwater Fellowship* and was selected as the Outstanding Junior in the Sciences for the College of Engineering and Science. He has proven to be an outstanding undergraduate student in the Department. A native of

Easley, South Carolina, he attended the Governor's School for Science and Mathematics (GSSM) in Hartsville, South Carolina and later joined Clemson University's Department of Physics and Astronomy in the fall of 2007, as an undergraduate. Currently he is in his sophomore year, taking many courses and conducting research in the lab of Computational Biophysics and Bioinformatics, directed by **Dr. Emil Alexov**. In addition to physics, he enjoys many hobbies, and is, among other things, a very good guitar player (see photo above). Kemper is also very active in the community through mentoring K-12 students. He is the Vice President for the Society of Physics Students (SPS) and is very excited about the future of SPS as an active and student-driven organization.

Kemper's first exposure to scientific research occurred in the summer of 2006, when he came to the lab of Computational Biophysics and Bioinformatics as an intern from the Governor's School. His research was supported by an award from Howard Hughes Medical Institute to **Dr. Barbara Speziale**. Being an excellent thinker and having strong passion for physics, Kemper decided to conduct research that will help better understand the role of electrostatics on protein-protein interactions. This was an excellent project for him, since the investigation used a physics approach to address a biophysical problem. This is not trivial task, and it involved numerical solutions of Poisson-Boltzmann equation, utilizing the CONDOR computing grid here at Clemson University. The work was published in one of the top journals in the field (*Biophysics Journal* (2007), 93:3340-3352).

The next project that he pursued was on another very important aspect of the energetics of protein-protein interactions—namely how does the concentration of mobile ions in the water phase affect protein-protein binding energy. The work resulted in a scientific paper (*Communications in Computational Physics* (2008), 3:1071-1086), and he is first author of the paper. All computational work was done by him, including writing computer programs and scripts to carry numerical simulations. The critical issue was how to handle such a large amount of data, since the salt dependence of the binding free energy is a complex function, different for each protein-protein complex. Kemper wrote a computer program to transform such a complex dependence into a linear function, which dramatically reduced the difficulty of the problem and allowed a single variable to be assigned to each case.

The last project on which he has worked is an investigation of the sensitivity of the numerical protocols/algorithms with respect to variety of parameters as the value of the internal dielectric constant of proteins, the description of the molecular surface between the protein and water phase, the role of structural refinement and force field parameters. This work was extremely computationally demanding and required manipulation of large data files. It took more than a year to complete all calculations and to analyze results. The work is now published in *PMC Biophysics*, (2008) and, again, Kemper is the first author of the paper. Kemper is already well on his way to an outstanding career in biophysics!



Kemper Talley with a favorite hobby, the guitar.



Dr. John Meriwether in front of the Parthenon in Athens

## Dr. John Meriwether is a Scientific Globetrotter

The work that **Dr. John Meriwether** does, observing thermospheric neutral winds in the atmosphere at 250 km with a Fabry-Perot interferometer, takes him to various places in the world. Some of these are exotic and some are more aligned with scientific meeting places, but still to interesting locales. This past year was somewhat exceptional with a bit more travel than he normally undertakes. In January he served on a NASA review panel, so he had the opportunity to be in Washington immediately after the presidential inauguration. Then, in March (during spring break, he travelled to Lima Perú to consult with the Director of the Jicamarca Radio Observatory. Dr. Meriwether agreed to support the development of a Fabry-Perot observatory on a mountain ridge overlooking the JRO radar antennas. This deployment took place in August, and he was so confident in his undergraduate students' abilities that he allowed them to travel to Perú on their own and do the installation without his presence. **Brooke Baker, Greg Tworke, and Russell Hedden** did a great job, along with the great support of the Peruvian technicians and engineers, to install the Fabry-Perot instrumentation. (See article on next page.) In May Dr. Meriwether spent

two weeks in Brazil, helping his colleagues at the University of Illinois install two Fabry-Perot observatories at Cariri and Cazizeiras, locations in rural, northeastern Brazil. This region is arid, but clear skies tend to prevail. They chose this region because of its proximity to the magnetic equator. In June Dr. Meriwether attended the annual CEDAR meeting in Santa Fe, a workshop on aeronomy and space physics that he has attended every year for the past twenty-five years. Over the summer he worked with undergraduate students to compile the data collected from Alaska, Peru, and Brazil. In August he set off again, this time to Kiev, Ukraine, to give an invited review paper on the application of the Fabry-Perot interferometer to measure thermospheric winds to a meeting of optical space physicists, 36th Annual Meeting on the Study of Atmospheric Physics by Optical Means. This was followed by a visit the following week to the International conference (IAGA) in Sopron, Hungary, where he presented a paper on the work that **Dr. Miguel Larsen** and he have performed together on the analysis of results from the tristatic Fabry-Perot network that is running in central Alaska (Eagle, Fort Yukon, and Poker Flats). In September Dr. Meriwether travelled to Brazil once more, to finish the job of making these observatories become operational. Finally he travelled to Alaska in November, and that concluded a year filled with exciting venues and chances to see colleagues and friends all over the world.



Office staff takes a break to pose for a fun Halloween photo. Pictured from left: Lori Rhoetter, Amanda Crumpton, Risé Sheriff, Debbie Helvie, Dr. Peter Barnes, and Celeste Hackett.





## *Students Install Fabry-Perot Interferometer at Jicamarca Perú*



Jicamarca Radio Observatory in Perú

In mid-August 2009 a Clemson crew, **Brooke Baker** (Clemson undergraduate senior), **Greg Tworke** (McGill graduate student in medical physics), **Russell Hedden** (Cornell University graduate student), and **Brian Turpin** (Physics Department instrument maker), traveled to the Jicamarca Radio Observatory (JRO), which is located 15 miles to the northeast of Lima. Their mission, in collaboration with the JRO Peruvian staff, was to help install an imaging Fabry-Perot interferometer (FPI) at a location above the inversion layer that makes the skies of JRO continuously hazy and cloudy. This effort required a climb of 700 m and a hike of 4 km to reach the MeriHill Observatory site. Everything - bricks, mortar, and instrumental components - had to be toted up the path to the observatory. A power line was installed to provide power for air conditioning and instrumentation. First light was achieved on August 14th, and automatic operations were started on August 15, 2009.



Greg Tworke, Brooke Baker, Russell Hedden and Brian Turpin take in a panoramic view.

The purpose of these measurements is to observe the winds of the upper atmosphere region at 250 km in altitude. The complete study of the ionospheric properties above the geomagnetic equator that passes through Jicamarca requires not only the measurements of the plasma density, ion drifts, and ion and electron temperatures that the Jicamarca radar can provide, but also the measurements of the neutral winds and temperature that the FPI instrument can record. The combination of these results from the two instruments provides a detailed description of the F-region ionospheric properties, providing the foundation for a more complete understanding of the physics of the plasma instabilities. These instabilities develop shortly after sunset and generate big holes in the ionospheric plasma distribution that have a huge impact upon radio wave communications.

The measurement results help support the development of a forecasting capability in regard to when these instabilities develop and how seriously they impact radio communications.



## *Clemson Students Find Diverse Study Opportunities*



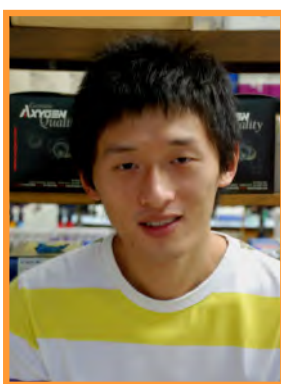
James Turner

James Turner, a senior undergraduate student in the Dr. Pu-Chun Ke's lab, spent this past summer at the Kyoto Institute of Language and Culture. James stayed with a host family, who treated him like one of their own. He had the chance to visit many famed temples and the Kyoto Imperial Palace. The Japanese lifestyle never seemed alien to James, in part, because of his own Asian heritage, and his extensive travels. The school that James attended neighbors the Kyoto Institute of Art and Design. There he met and was impressed with a visiting artist, Khen Shalem. Mr. Shalem, originally trained as a physicist, summarized James's pursuit of both arts and physics, "The choice of studying physics was not intended as a future occupation, but as a profound need to better understand the laws of nature...I gradually came to the awareness that I wanted to further develop my interest in human feelings and artistic creation."

Mercy Lard completed her undergraduate studies at Clemson and is now attending graduate school at Lund University in Sweden. While at Clemson, Mercy worked with Dr. Fivos Drymiotis and, extensively, with Dr. Terry Tritt in the area of thermoelectric materials. This past summer she conducted research in the Ke lab, supported by an NSF supplementary award. Using microscopy and spectroscopy techniques, Mercy and her fellow graduate researchers discovered the energy transfer between phenanthrene pollutants and synthetic dendrimers for water purification, and deciphered the mechanisms of fullerene interacting with plant and mammal model cell systems. Mercy's study at Lund University is focused on biological and environmental physics and she plans to pursue an academic career in interdisciplinary sciences. One of the world's top 100 universities, Lund is host to the European Spallation Source, a 1.4 billion euro facility that produces powerful neutron beams for materials research. The campus is located in southernmost Sweden, and was established in 1666. It currently has a student enrollment of approximately 38,000.



Mercy Lard



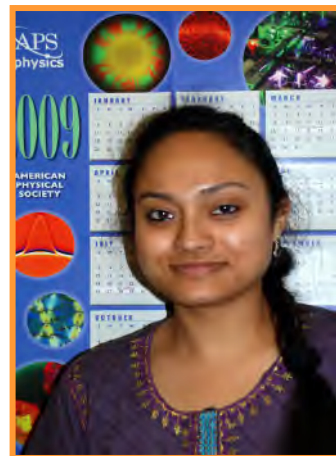
Ran Chen

Ran Chen won a graduate Humboldt Kolleg travel award to attend a conference, "Nano-Bio: The Next Transformative Convergence", held in October at Virginia Tech. Ran presented his research, titled "Differential Uptake of Carbon Nanoparticles by Plant and Mammalian Cells", at the conference. He initially won a graduate recruiting fellowship from Clemson for his excellent entrance scores (GRE 1400, TOEFL 627), and joined the Ke lab in August 2008.



## Other Students in the News.....

**Priyanka Bhattacharya** is one of four winners of graduate fellowships from the Center for Optical Materials Science and Engineering Technologies (COMSET) at Clemson University. This award provides a \$5,000 stipend supplement and \$2,500 for supporting Priyanka's research presentation, titled "Binding of Nanoplastics onto a Cellulose Film", at the IEEE International NanoElectronics Conference to be held in January, 2010 in Hong Kong. Since joining the Ke lab in August 2008, Priyanka has maintained a 4.0 GPA at Clemson and has coauthored a paper in the *Journal of Physical Chemistry C*. She works with **Dr. Pu Chun Ke** in the Single Molecule Biophysics and Polymer Physics Laboratory.



Priyanka Bhattacharya

Graduate student, **Russell Lake**, was also selected as a 2009 COMSET Fellow. This award will provide stipend supplements and money for supplies and travel related to his research. Russell works with **Dr. Chad E. Sosolik** in the Surface and Interface Nanoscience Group.

**Dr. Matthew P. Ray**, who received his Ph.D. from our department in August 2009, was awarded a National Research Council (NRC) Research Associateship to pursue postdoctoral research at the U.S. Naval Research Laboratory in Washington, DC. He will be working with **Dr. Bradford Pate** on a study of electrons in image charge states on diamond. Members of Dr. Sosolik's group also attended two

conferences during the spring and summer terms. The first was the Twelfth International Workshop on Desorption Induced by Electronic Transitions (DIET - XII), held in Pine Mountain, Georgia and hosted by Georgia Tech University. The second was the 21st International Symposium on Ion-Atom Collisions (XXI ISAC) held in Norfolk, Virginia and hosted by Old Dominion University.

### *Share Your Story with Us*

Gotten married? Added a new member to the family? Landed your dream job? If so, we'd love to share your good news in future issues. Visit [physics.clemson.edu](http://physics.clemson.edu) for contact information, or use the form below. Mail your completed form to: **Department of Physics & Astronomy, Clemson University, 118 Kinard Laboratory, P.O. Box 340978, Clemson, South Carolina 29634-0978.**

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## Clemson Professors Rao & Ke Forge Baltic Collaborations in Nanomechanics Research



Dr. Apararo Rao in Russia

One of the frontier research topics in advanced materials is the fundamental understanding of how electrical and mechanical phenomena couple at the micron and the nanoscale. We don't have to think very hard to appreciate why this topic is very important, since several functionalities in biological systems are based on how electrical and mechanical phenomena couple at these small-length scales. Examples range from nerve-controlled muscle contraction, cardiac activity, and hearing on the micron scale, to energy storage in mitochondria and electromotor proteins on the nanoscale.

A focused workshop, TNN 2009, "Trends in Nanomechanics and Nanoengineering" was organized in Krasnoyarsk, Russia during the week of August 2009, to highlight the latest scientific advances within the broad field of nanomechanics in academia and industry. The world's leading scientists in the field of nanostructure growth, investigation of their properties and development of nanodevices, were invited to be on a single platform for discussion, exchanging ideas and developing collaborations. One of the plenary speakers at TNN 2009 was **Dr. Apparao Rao**, of Clemson, who described a technology that was developed in collaboration with **Dr. Malcolm Skove**, a Clemson Alumni Distinguished Professor of Physics. Collaborative research has been initiated between Clemson and two universities in Russia (**Dr. Avramov** at Siberian

Federal University, and **Dr. A. Fraerman** at Institute for Physics of Microstructures of the Russian Academy of Sciences).

Since 2007, **Pu-Chun Ke's** lab has been collaborating with **Dr. Ilpo Vattulainen's** BIO Group at Tampere University of Technology and **Dr. Emppu Salonen's** Soft Matter Group at Helsinki University of Technology, both in Finland. These collaborations, centered on understanding the interaction between biological systems and engineered nanoparticles, integrate the experimental studies by the Ke lab with the simulations by the Finnish groups.

In March 2009, the principal investigators of the three groups successfully organized a three-week workshop at Nordic Institute for Theoretical Physics in Stockholm. **Dr. Apparao Rao** in Physics and Astronomy and two graduate students from the Ke lab also presented their research at the workshop. Currently the Ke lab is teaming up with the Vattulainen lab, **Dr. Andrey Gurtovenko** at the Russian Academy of Sciences in Saint Petersburg, and **Dr. Jaakko Akola** at the University of Jyväskylä, Finland, to examine the phase transition and electric potential of cell membranes in response to nanoparticle uptake. This work utilizes Juropa, one of the most powerful supercomputers in Europe, to perform both classical and quantum chemical atomistic simulations. In addition to these research efforts, two students from the Ke lab received training and performed molecular dynamics simulations at Helsinki University of Technology in the summer of 2008.

To bridge the knowledge gap, Dr. Ke will be giving a one-week lecture series at the same institute on experimental biophysics in June 2010, to be attended by a group of theorists. In March 2010 Dr. Ke will be visiting the National Institute of Chemical Physics and Biophysics of Estonia. Helsinki, Tallinn, and Saint Petersburg, three major cities by the Baltic Sea and separated by a small radius of 200 miles, are now only one click away from Clemson.



# Department News



*Congratulations to Dr. Sean Brittain and his wife, Beth, on the birth of their daughter, Charlotte Elizabeth Brittain, born September 15, 2009. In addition to Charlotte, the Brittains have one son, Samuel, and daughter, Olivia.*



*Wedding bells have rung for Office Manager, Risé Moroney and her fiancé, Mike Sheriff. Rise and Mike were married on November 23, 2009. The Department wishes all the best to Risé and Mike on this happy occasion.*



*Congratulations to Dr. Chad Sosolik and his wife, Janet Lee, on the birth of their daughter, Madeline. Both mother and baby are doing well. Madeline was born on January 24, 2010, coincidentally, Janet's birthday. The Lee-Sosolik family has one other child, Jackson, age 3.*

If you have any suggestions for the newsletter, or any other constructive input on its format, please email your thoughts to: [rvogt@clemson.edu](mailto:rvogt@clemson.edu). To subscribe or unsubscribe to *Schrödinger's Tiger*, please go to our mail list at: <http://www.ces.clemson.edu/mailman/listinfo/panda-newsletter>.

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