



1 June, 2009

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## New Faces

We are proud to welcome these new faculty members:

**SHAOBIN MIAO**, assistant professor of chemistry, joined us in the Fall of 2008 following post-doctoral work at Georgia Tech. He will teach Organic and Inorganic Chemistry. His research interests are in the area of organometallic chemistry. His PhD degree was earned at the University of South Carolina.

**BARBARA MYSONA**, assistant professor of chemistry, taught introductory chemistry and cell biology. She recently earned her doctoral degree at the Medical College of Georgia.

**MARY NEWTON-ROBBINS**, assistant professor of chemistry, taught introductory chemistry. An ASU alumnus, she earned her PhD degree at UNC-Chapel Hill.

**TAD WHITESIDE**, a research scientist at the Savannah River National Laboratory, taught introductory chemistry. He earned his PhD in chemistry at the University of Georgia.

**JEFF RUCKER**, Chief Meteorologist for NBC Augusta, will be teaching a new course entitled "Intro. to Weather and Climate."

Augusta State University

<http://www.aug.edu/chemphys>

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## Letter From the Chair



The Department of Chemistry and Physics has seen tremendous growth and change over the past year. From hiring new faculty to changes in both the chemistry and physics curricula, it has been a busy and productive year.

One of our strengths has been our recruiting efforts, which has led to a growing student population. At present we have over 160 declared chemistry and physics majors combined. Many of these

students are enrolled in our new pre-engineering program which we have developed in collaboration with Georgia Tech-Savannah. We expect to offer our first engineering courses on campus during the 2009 - 2010 academic year! We have also developed a new Environmental Physical Science course and the existing Astronomy course has been modified significantly.

The department has also seen a surge in undergraduate student research participation. During the Spring of 2009 we had 34 students enrolled in research and 24 involved with presentations at the Phi-Kappa-Phi Student Research and Fine Arts Symposium at ASU. Seventeen students attended the Annual Georgia Academy of Sciences Conference and two of the

students were awarded the "Best Student Talk." This is a fine tribute to our dedicated faculty mentors and hard-working student researchers.

The department will soon benefit from a generous grant from Automated Data Processing, Inc. This money will fund student scholarships and support our Chemistry and Physics Tutoring Center. I am excited to see the positive impact this will have on our students' success!

Finally, I would like to remind you that in the last issue of Chemistry and Physics News I said I was confident that good times were ahead. I'm pretty sure I was right!

- Dr. Andy Hauger

## Faculty Grants



**CHAD STEPHENS** received a renewal of \$25,000 on his research grant from the University of North Carolina for the "Synthesis of Potential Metabolites of Dicationic Drug Molecules." This research is part of a multi-institution collaboration that is funded by the Bill and Melinda Gates Foundation.



**TRINANJAN DATTA** received a 30,000 service unit grant from Tera Grid. This grant gives Dr. Datta access to a 100 teraflop computing resource at the Pittsburgh Supercomputing Center to pursue research in non-equilibrium statistical mechanics. Tera Grid funding is provided by the National Science Foundation.



**HAUKE BUSCH** received a \$1,250.00 grant from Pearson publishing to purchase smart technology switches. This technology uses motion and infrared sensors to cut down power consumption by detecting whether or not a person is in a room. It is estimated that these switches will save the university \$2000 annually and reduce carbon dioxide emissions in excess of 8 tons per year.

## New Courses



**ASTR 1000:** Introduction to the Universe gives students an overview of the large-scale structure of the Universe, galaxies, stars, and planets within and outside our solar system. The class also offers star gazing trips throughout the semester.

### PHSC 1100:

**Environmental Physical Science** will teach students basic physics principles such as momentum, force, motion, energy, electricity, magnetism, heat, and fluid motion, but will focus on applying those principles to global issues, such as sustainability, recycling, population growth, and climate change, as well as possible solutions to these problems.



**GEOG 1112:** NBC Augusta's Chief Meteorologist Jeff Rucker now teaches the department's **Introduction to**

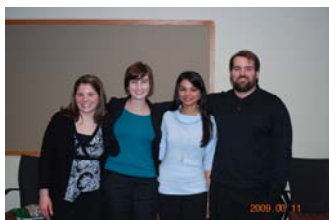
**Weather and Climate** course. The class offers students a chance to learn about the dynamics of the Earth's atmosphere and weather.

## Student Honors and Recognition

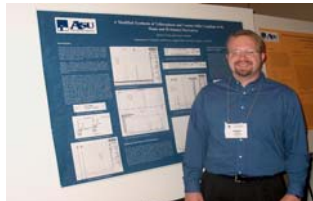


**Phillip Wilkerson** (above) received one of the top poster awards at the Phi Kappa Phi Student Research Conference for his poster entitled "Synthesis of a Dehydrogenated Analogue of a Potent HHV-6 Inhibitor". Also, the group of **Akshita Parikh, Van Beaty, Leila**

**Borders, Scarlett Timmons** and **Aiko Bradford** (not pictured) won best presentation in the Science: History, Teaching, and Research symposium for their presentation entitled "Electrophilic Halogenation of Sulfanilamide in the Organic Teaching Laboratory". Both presentations were sponsored by Dr. Stephens.



**Brian Lumpkin** (left) won a \$2,000 national Phi Kappa Phi Award of Excellence fellowship, as well as the Richard T. Mixon Award in chemistry. **Neal Jenkins** (right) won the John W. Pearce award for outstanding performance in Organic Chemistry.

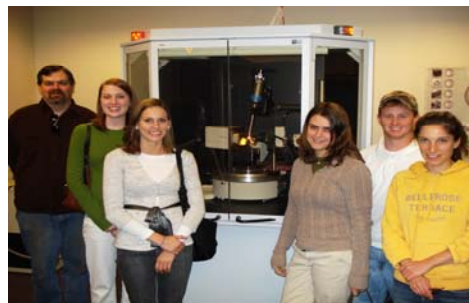


**Daniel Sweat** (left) won the Best Undergraduate Research in Chemistry award. Daniel's research was presented at the SERMACS meeting in Greenville, SC and then published in *Journal of Organometallic Chemistry*.

Two departmental scholarships were also awarded. The Mixon Scholarship went to **Diana Cheng**, and the Dinwiddie Scholarship went to **Lindsay Hilkert**. Congratulations to all of these students!

## Students Visit Emory and GA State University

A group of 5 students visited Emory and Georgia State University this past fall. At Emory, the group toured the Chemistry Department's X-ray laboratory (see photo). At Georgia State University, they met with chemistry faculty to discuss the graduate program and toured many of the labs. In addition to visiting the two schools, the group also visited Atlantic Micro-lab, a commercial laboratory in north Atlanta which does chemical analysis. Students who took the trip include **Megan Clendenning, Mary Kate Fisher, Lindsay Hilkert, Steve Pochini, and Phillip Wilkerson**. The trip was coordinated by Dr. Stephens.



## Student Highlights

**Daniel Sweat** has been accepted to the PhD program in Chemistry at the University of Wisconsin, which has one of the top 10 rated chemistry programs in the country. **Julie Hatfield** has been accepted to a Professional Science Master's Program for Applied Chemistry and Biochemistry at the University of Northern Iowa. **Daniel Gerry** has been accepted to Medical School at Mercer University.

As part of his senior project, Lakeside High School student **Ashton Moradi** spent time in Dr. Stephens' research lab during the spring semester. Ashton's senior project was about the process a drug must undergo before it is approved by the FDA. Ashton says that his experience at ASU has allowed him to see what he may be interested in when choosing a career. Ashton is shown in the photo on the right, along with recent ASU graduate **Gary Schwarz**.

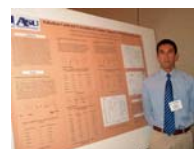


## Chemistry Seminar Speaker

**Dr. Karen Buchmueller**, a biochemist from Furman University, visited the department in February to give a seminar on her research involving binding of organic compounds to DNA. Many students turned out to hear her interesting talk. As a result of her visit, chemistry major **Craig Atkins** will be conducting his honors thesis research on a related topic as part of a collaboration that has been started between Dr. Buchmueller and Dr. Stephens. Good luck to Craig!

## Research to Become Chemistry Elective

Starting this fall, CHEM4990 (Chemistry Research) will become a choice as one of the chemistry electives required for the Professional degree track. As shown by the photos below, many students have already been conducting research in the department; now they can get true credit for it!



## Student Honors and Recognition

**William D. Baez**, a senior physics major received the department's 2009 "**Best Undergraduate Research in Physics**" award for his work with Dr. Trinanjan Datta on the "Hysteresis loop area of the kinetic Ising model with next-nearest neighbor interactions". He presented the results of his research on non-equilibrium statistical mechanics at the annual American Physical Society's (2009) March Meeting. He also received the "Best Talk" awards at both the 2009 Georgia Academy of Sciences annual meeting and at the 2009 ASU's Phi-Kappa-Phi Student Research and Fine Arts Conference.

**Chris Wright**, a senior physics major received the "**American Nuclear Society's Outstanding**

**Physics Major**" award for 2009. Chris Wright was also involved in research with Dr. Nathan Yanasak (Dept of Radiology, Medical College of Georgia) and Dr. Hauger on "Optimized Field Gradient Directions in Diffusion Tensor Imaging."

**John Allison and Chris Parham**, working with Dr. Christian Poppeliers, received the Georgia Academy of Sciences 2009 Annual Meeting "Best Talk" award in the Earth and Atmospheric Sciences section for their presentation on "High Resolution Magnetic Survey Over Laramide and Basin and Range Structure, Big Bend, TX".

Senior physics majors William D. Baez (left) and Chris Wright (right) with their awards.



Seth Clark (above) presenting his poster on "An Experimental Study of the Lengthening Pendulum" at the 2009 Phi Kappa Phi Conference at ASU.



## ASU Student Presents Research at National Conference

This past March, William D. Baez, a senior physics major, along with his advisor, Dr. Trinanjan Datta, traveled to Pittsburgh, PA for the American Physical Society's 2009 March Meeting. The March Meeting is one of the world's largest physics conferences and attracts thousands of condensed matter physicists involved in both theoretical, experimental, and computational materials physics research.

William presented his research on the "Hysteresis loop area of the kinetic Ising model with next-nearest neighbor interactions." He also interacted with other researchers and participated in "Student Lunch with the Expert" where he had the opportunity to discuss non-equilibrium statistical physics.

According to William, "The experience definitely opened my eyes to physics at the professional level. Attending this meeting would be a great opportunity for any student who plans on pursuing physics as a career."

## Physics Club

For Thanksgiving the Physics Club sponsored a food drive to benefit the needy families during the holiday season. They managed to raise 300 pounds of canned goods, which they donated to the Golden Harvest Food Bank in Augusta, GA.

Physics Club members also volunteered their time at the University of South Columbia's Science Education Enrichment Day (S.E.E.D) in Aiken, SC. While there, they taught children about the wonders of nanometer sized objects and how nanoscience benefits medicine and technology. Recently, the club members also lent a helping hand at the National Science Olympiad competition which was hosted at ASU.

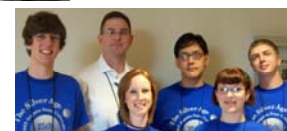
This past year saw a sharp rise in the number of students participating in undergraduate research. The club is always looking to promote its members and their accomplishments by providing an opportunity for members to present their work through "Chalk Talks" to fellow students and faculty. These presentations allow students to experience what it is like to speak in front of a group and field probing questions about their work.

## FACULTY RESEARCH PRESENTATIONS

**Dr. Christian Poppeliers** attended the annual Geological Society of America Meeting in Houston, TX and presented his talk "High resolution ground-based magnetic surveys over exposed and buried Tertiary intrusions within Laramide folds and faults, Big Bend Region, TX". He also attended the annual Seismological Society of America Meeting in Monterey, CA and presented a paper "The effects of crustal heterogeneity on ray-based teleseismic imaging."

**Dr. Trinanjan Datta** traveled to University of California Santa Barbara to attend the MEIPIC-6 conference and to present his work on "A theory for the multiferroic compound  $\text{LiCu}_2\text{O}_2$ ." He also attended the annual American Physical Society March Meeting in Pittsburgh, PA to deliver his talk on "Impurity effects in multiferroic compounds."

**Dr. Hauger** traveled to Spelman College, Atlanta, GA to present his research with Seth Clark on "An Experimental Study of the Lengthening Pendulum."



## Company Finances Student Future

Earlier this year Automatic Data Processing, Inc. (ADP) awarded Augusta's three local colleges Augusta State University, Augusta Technical College, and Paine College a \$600,000 grant to foster Science, Technology, Engineering, and Mathematics (STEM) programs.

The portion ASU received will be distributed between the Department of Chemistry & Physics, the Department of Biology, and the Department of Mathematics & Computer Science.



The grant will create dozens of student scholarships in addition to increased staffing and support for student labs and tutoring centers. The company hopes that the scholarship money will assist in increasing the number of graduating students within the critical STEM fields.

## Chemistry & Physics Tutoring Center

For students taking introductory physics or chemistry courses, the department has its very own tutoring center. The center is a great place to study for tests, to do homework, or to just get help for free from knowledgeable student tutors.



For more information on tutor center hours visit <http://www.aug.edu/chemphys>

## Phi Kappa Phi Research Symposium 2009

This year, the ASU Chemistry and Physics department had many students present their research at the 2009 Phi Kappa Phi Honors Society Research Symposium.

### Faculty Advisor: Dr. Christian Poppeliers

- Rebecca Sawyer, "Rolling resistance of tires with a rotary pendulum: Preliminary results."

- John Allison, Christopher Parham, and Rebecca Sawyer, "High-resolution magnetic survey over Laramide and Basin and Range structure, Big Bend National Park, TX."



### Faculty Advisor: Dr. Hauke Busch

- Jeremy Barry and Dewand Jones, "The building and evaluation of a hydrogen fuel station."

- Jeremy Robinson and Brandon Hammond, "Synthesis of an Al-Ga-In-Sn alloy: An alternative method of generating Hydrogen gas for the operation of a fuel cell."

### Faculty Advisor: Dr. Trinanjan Datta

- William D. Baez, "Hysteresis loop area of the next-nearest neighbor kinetic Ising model."

- Timothy Kurtz, "Motion of a magnetotactic bacteria."

### Faculty Advisors: Dr. Trinanjan Datta and Dr. Eric Zuckerman

- Barry Williams, "Digital filter processor: Detecting objects through hue, saturation, and value."

- James Bartasis, "An experimental setup to verify the catenary equation."

### Faculty Advisors: Dr. Nathan Yanasak and Dr. J. Andrew Hauger

- Christopher Wright, "Optimized field gradient directions in diffusion tensor imaging."

### Faculty Advisor: Dr. J. Andrew Hauger

- Seth Clark, "An experimental study of the lengthening pendulum."

### Faculty Advisor: Dr. Chad E. Stephens

- Philip Wilkerson, "Synthesis of a dehydrogenated analogue of a potent HHV-6 inhibitor."

- Mary Kate Fisher, "Synthesis of the thiophene analogue of a potent antiprotozoal agent."



- Akshita Parikh, Van Beaty, Leila Borders, Aiko Bradford, Scarlett Timmons, "Electrophilic halogenation of sulfanilamide in the organic teaching laboratory."

- Gary Schwarz, "Synthesis of N-substituted analogues of a potent HHV-6 inhibitor."

- Brandon L. Hammond, "Novel tricyclic heterocycles via intramolecular N-arylation of 2-aminopyrroles and -thiophenes."

- Ronnie Neil Jenkins, "Synthesis and fluorination of various 1,3,5-triarylpiperazines."



## ASU Student Research Presentations at Georgia Academy of Sciences

This year's Georgia Academy of Sciences annual meeting was dominated by students from ASU's Chemistry and Physics Department. Eight student presentations were given at Spelman College meeting in Atlanta, GA. Two presenters won the "Best Student Talk" along with a \$100 cash prize.

- **Jeremy Robinson and Brandon Hammond** presented their work on "Synthesis of an Al-Ga-In-Sn alloy: An alternative method of generating Hydrogen gas for the operation of a fuel cell."

**Seth Clark**, who was unable to attend the meeting, had his work on "An Experimental Study of the Lengthening Pendulum" present by his advisor Dr. J. Andrew Hauger.



ASU Chemistry & Physics undergraduate student research presenters at Spelman College in Atlanta.

**John Allison and Christopher Parham** gave a talk on the "Preliminary Results From High-resolution magnetic survey over Laramide and Basin and Range structure, Big Bend National Park, TX."

For their presentation, the two were awarded "Best Student Talk" in the Earth & Atmospheric Sciences section along with the \$100 prize. This was John Allison's second time winning this award.

**Rebecca Sawyer**, who also presented at the 2009 Georgia Academy of Sciences meeting, spoke to the crowd about her "Preliminary Results of a Rotary Pendulum Designed to Measure Rolling Resistance of Pneumatic Tires."

Biology major **Tim Kurtz** presented results from his work with the "Motion of a Magneto-tactic Bacteria."

**William D. Baez** also took home a \$100 "Best Student Talk" prize in the Physics, Mathematics, Computer Science and Technology section for his talk on the "Hysteresis Loop Area of the Kinetic Ising Model with Next-Nearest Neighbor Interactions."

## 2007 Alumni update



Recently, two ASU Physics graduates, Daniel Rodriguez (above left) and Matt Howard (above right) contacted the department to let them know how their education has benefited them.

"As an employee of SRS Process Control Engineering, I design and develop software systems for facility nuclear material processes. Studying physics at Augusta State University was a great experience. The enthusiastic and devoted faculty provided me with the edu-

cation and skills I needed to be successful at Savannah River Site. On top of that, it was fun and I wish I could do it all over again" says Dan.

Matt Howard joined Savannah River Site (SRS) after working for the Atlanta Gas Light Company for two years.

## Geophysics Field Trip



This August, Dr. Christian Poppeliers and several students (see picture on the left) will return to Big Bend National Park in Texas.

Once out there he and his team will collect geomagnetic data that will be used in their geophysics research. This trip is a continuation of a similar field trip last summer to study the geophysical structure and formation of the Rocky Mountains.

## Department Meet & Greet



The Department kicked off each semester this year with a gathering of students and faculty in the JSAC Coffeehouse. This social activity has become popular with students and faculty and is an important time for us to introduce new faculty and to learn more about our new students.



## Faculty Research Spotlight

### Organic/Medicinal Chemistry Research: Chad Stephens



Research done by students in my lab generally involves two different areas of organic chemistry. One is medicinal chemistry, and one is organic synthesis. We currently have two different medicinal chemistry projects. One involves the development of sulfone-based compounds as potential drugs for the treatment of HHV-6 (human herpes virus 6), a virus that causes the childhood disease roseola, and may also be a mitigating factor in diseases such as multiple sclerosis, cancer, epilepsy, and hepatitis. Our research, which is currently funded by the HHV-6 Foundation, is based on a compound from our lab that was earlier identified by our biological collaborators in Leuven, Belgium as having good activity against the virus (*Antiviral Research* **2006**, 72, 60). Students working on this project are trying to synthesize analogues of this lead compound in attempts to develop an even better drug. The other medicinal chemistry project involves the synthesis of dicationic compounds as potential drugs for the treatment of certain protozoal diseases, including African sleeping sickness, Malaria, Leishmania, and Chagas' disease (*J. Parasitology* **2008**, 94, 743). This work is in collaboration with scientists at GA State University, University of North Carolina, and other places, and is funded by the Bill and Melinda Gates Foundation through UNC. One of our organic synthesis projects involves the direct fluorination of heterocyclic compounds using N-F reagents. Here, we are currently studying the fluorination of pyrazoles and thiazoles, and have found that multiple fluorination can take place under certain conditions, even leading to non-aromatic products. Although this research is purely synthetic in nature, it has application to drug synthesis, as the addition of fluorine to a drug compound can often greatly improve its biological activity (see Lipitor, Prozac, Flonase, etc.). Another synthesis project involves the development of new transition metal-catalyzed N-arylation reactions, with a primary focus on heterocyclic amines. Finally, we are also working to develop new synthesis experiments that can be used in the organic teaching laboratory. If any of you, as students, are interested in participating in such research, I will be happy to discuss the possibilities with you. This includes freshmen and sophomores!

### Theoretical Condensed Matter Physics Research: Trinanjan Datta



My area of research is concerned with providing a theoretical explanation of the fundamental physics of frustrated magnetic materials. Frustrated magnets are chemical compounds in which the geometrical properties of the crystal lattice or the presence of competing atomic interactions prevent the system from being energetically satisfied. At present I am pursuing a collaborative effort with Prof. K. Majumdar (Grand Valley State University) to explain the magnetic behavior of such a class of materials. My other research interest includes multiferroic systems. These novel materials are technologically important and have applications in computer data storage devices. Their unique property is to allow for the control of magnetization with an electric field and electric polarization with a magnetic field. My research on multiferroics, conducted at ASU, has led to the publication of "A theory for the multiferroic compound  $\text{LiCu}_2\text{O}_2$ " in *Physical Review B* **79**, 014107 (2009). I am also pursuing a collaborative work on impurity effects in multiferroic materials with the research group (experimental) of Prof. P. Guptasarma at the University of Wisconsin-Milwaukee. In addition to this, my research with undergraduate students at Augusta State University is focused in two directions. With William Baez (physics major), I have been computationally exploring the non-equilibrium statistical mechanics properties of magnets using an up-down binary model (Ising model). With my other research student, Philip Javernick (math major), I have been focusing on the physics of synchronization in a chaotic system.

### Geophysics Research: Christian Poppeliers



My work centers on extracting information about the earth from scattered seismic waves (C. Poppeliers, *Mathematical Geosciences*, **2009**). In a project (in collaboration with T. Datta), we quantified the resolution of images of the Earth's mantle formed from distant earthquakes. Specifically, we quantified how the (rather messy) Earth's crust can degrade the quality of images. The results of this research has been accepted for publication by the *Geophysical Journal International*. In my other major research direction, I've been attempting to incorporate a class of mathematical functions called wavelets to enhance the amount of information that we can extract from seismic signals. Specifically, I've incorporated a new processing technique, called "multi-wavelet seismic processing" to obtain frequency-dependant 'snap shots' of various seismic wave attributes. The advantage of these new mathematical tools is that it allows us to obtain seismic wave properties as a function of frequency and time in a mathematically rigorous way. Additionally I am involved in undergraduate research. My research student Rebecca Sawyer has just started a project where we use seismic data collected from volcanic eruptions to model the "plumbing" of the volcano. My other research student Chris Parham work involves mapping geologic structures in Big Bend National Park in Texas. Also, Chris is interested mapping some geologic structures the CSRA. Also, Rebecca, Chris, and John Allison will be accompanying me to Big Bend National Park this summer to collect additional geomagnetic data. This project is a continuation of work we started last summer. Our goal is to determine the age and style of deformation of this portion of the Rocky Mountains.