

Physics on the Hill

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Message from the Chair



The current academic year at Western Kentucky University has been exciting with new majors and faculty arriving and the opening of new Snell Hall attached to the TCCW complex. Here we wish to share with you the accomplishments of our students and faculty as they prepare for the future of science.

Our new faculty include Dr. Dennis Garvey who is an expert in quantum optics and biophysics and has joined us this year from Washington State, Dr. Rachel Campbell who is an expert in trans-Neptunian solar system objects and worked on the Southern Edgeworth-Kuiper belt survey, and Dr. Lachlan Campbell who worked on the largest astronomical spectroscopic survey of galaxies ever conducted. The Campbells are from Australia and have both done post-doctoral work at the Astrophysikalisches Institut in Potsdam.

This year Drs. Barzilov and Novikov at the Applied Physics Institute established a neutron interrogation project supported by the National Institute of Homeland Security, Drs. Bonham and Harper are working on an interdisciplinary NSF funded initiative on laboratory improvement, Dr. Carini has received NASA/KY Space Grant funding for the optical monitoring of blazars and Dr. Dobrokotov has received NASA/KY Space Grant funding for working on Computational Modeling of Nanoscale Artificial Muscle Actuators.

This year we were fortunate to have numerous students travel several times to Oak Ridge National Laboratory to develop projects at the Spallation Neutron Source. The new nanophase and advanced materials laboratory facility spearheaded by Drs. Kintzel and Dobrokotov is taking shape with the addition of a unique large chamber variable pressure scanning electron microscope. The undergraduate research conference at Argonne National Laboratory was well attended by our majors with over a dozen students presenting their research projects ranging from balzar variability to characterizing nanofilms.

Our newsletter is sent periodically to alumni and friends of the Department to update you on changes in your department and the activities, for more information please visit: <http://www.physics.wku.edu>. There you can learn about the most recent activities of our faculty and current students. We are always happy to hear from former students and departmental supporters and to learn where you are, what you are doing now, and how your careers have developed after studying and preparing in our program. The Physics Olympics is coming up soon and we look forward to hearing from anyone in high school interested in participating in this event. We invite you to call, write, or email at any time to let us hear from you at anytime,

Sincerely, Keith Andrew, Professor and Head of Physics and Astronomy

WKU Receives \$2.7 Million Scanning Electron Microscope

WKU News:

<http://wkunews.wordpress.com/2009/11/24/sem/>



(WKU photo by Clinton Lewis)

One of the world's largest scanning electron microscopes was delivered to WKU's Applied Physics Institute on Nov. 24 (upper left).

The large-chamber SEM (LC-SEM, middle left), a \$2.7 million gift from the U.S. Department of Energy, was moved from Oak Ridge National Laboratory to WKU's API facility, located in the Center for Research and Development on Nashville Road.

The one of a kind instrument weighs about 18,000 pounds and has a scanning chamber that accommodate a sample up to 40 inches in diameter, 40 inches tall and up to 650 pounds (large enough for an automobile engine block), which means samples don't have to be cut into small pieces for examination. A conventional SEM's maximum sample size is 2 inches in diameter and 2 inches tall.

The instrument can magnify up to 100,000 times and offers high-resolution imaging for surface analysis, chemical analysis, materials identification, quality control, metal microstructure, subsurface examination and more.

"For the University, the SEM is a unique instrument that places WKU at the forefront of scientific research," said Dr. Edward Kintzel, assistant professor in the Department of Physics and Astronomy and project manager who acquired the instrument for WKU.

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WKU Students attend Women in Physics Conference WoPHY 2009 at the University of Nebraska - Lincoln

WKU students Mayme M. VanMeveren, Sarah K. Huey, Schuyler G. Wolff, and Gatton Academy student Sarah K. Brown gave presentations on their research at the first Women in Physics conference at the University of Nebraska - Lincoln. Exceptional undergraduates attended a three-day conference for undergraduate women in physics (WoPHY) from Friday (10/30) through Sunday



WoPHY 2009 Conference Participants

(11/1). Participants were able to present their research experiences, interact with other students from around the country, and attend presentations by invited scientists from a range of universities. These experiences in part provide a solid foundation on which a successful career in physics is built. Providing opportunities to develop their ability to convey ideas and establish professional peer relationships. The WoPHY conference allowed for plenty of opportunities for student and student-mentor interaction.



Physics and Engineering students present at the 20th Annual Argonne Symposium for Undergraduates in Science, Engineering, and Mathematics

On November 13th, Physics and Engineering students from Western Kentucky University traveled to Argonne National Laboratory to present their research at the 20th Annual Argonne Symposium for Undergraduates in Science, Engineering, and Mathematics (left). In total, 16 students made the trip. Student presentations from a wide range of disciplines included:

Sarah K. Huey - Adsorption of alcohols on allotropes of carbon

Ryne J. Weiss - Reconstruction of the (0001) surface of graphite near step edges

Jacob D. Baxley - Investigation of p-sexiphenyl layers vapor deposited onto KCl(001) by Atomic Force Microscopy (AFM)

Nathan B. Campbell - Sample Environment at the Spallation Neutron Source: An Automated Gas Environment System (AGES)

Jahi M. Palmer - Can Gamma Ray Burst be Detected using Infrasound

Kyle W. Cook - Optical and Gamma-ray Cross-correlations in the WKU Blazar Monitoring Project

Tara A. Wink - The use of Wireshark for Research and Development

April M. Pease - The Sersic Morphologies of Thermonuclear Supernovae Host Galaxies in the Nearby Galaxies Supernova Search Data

Landon J. Oakes - Sensing of Toxic and Explosive Materials with Functionalized Nanospring Mats

Schulyer G. Wolff - Determining the Progenitors of Type IA Supernovae from their Environments

Sean M. Hamlet and Michael D. Simpson - Re-engineering of a User-Controlled Robotic ATV Platform

Conference attendee, April Pease, shared her experience with Physics on the Hill: "I was very nervous but I made it through my talk in one piece, even receiving a nicer applause than I expected. I was also pleasantly surprised that so many people asked questions and seemed genuinely interested in my topic." Ryne Weiss of the Gatton Academy of Mathematics and Science in Kentucky shared his view of the conference: "Giving a talk at Argonne National Lab was an invaluable experience. I was able to present my research as well as hear about what other undergraduates are doing all across the US."

WKU Senior, Sarah Huey, shared her experience at the symposium: "I enjoyed presenting my research at Argonne. It made me rethink what I want to do in the future. I also liked viewing all the other types of work done by other students. I hope to keep taking part in these conferences."

Next year a large contingent of WKU undergraduates is expected to attend as ambassadors for Western Kentucky University. Students who want to participate in 2010 are encouraged to contact their research supervisor.

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Five Decades of Sigma Pi Sigma at WKU

Saturday, April 24, 2010

Sigma Pi Sigma is the official honor society of the physics profession and it exists to honor outstanding scholarship in physics, to encourage interest in physics among students at all levels, to promote an attitude of service of its members, and to provide a fellowship of persons who have excelled in physics.

Western Kentucky University's chapter of Sigma Pi Sigma boasts a proud history. It was established on May 25, 1960 and now has 263 total members. We plan to celebrate the fiftieth anniversary of the WKU Sigma Pi Sigma chapter our upcoming annual induction ceremony. Please mark your calendars and join us for this celebration, which will feature recollections from members from each of our past five decades and will culminate with the induction of our newest members into the society.

The celebration will be held on the WKU campus at the Kentucky Museum and Library at 6:00 PM on Saturday, April 24, 2010. We hope that all alumni of the department who are able will join us for this unique event. If you would like to attend please contact Doug Harper at doug.harper@wku.edu for more information.



Physics Department Team Attends SPIN-UP Workshop at North Carolina State University

On September 11-13, 2009, Western Kentucky University Physics Department faculty (shown right) attended the regional SPIN-UP workshop at North Carolina State University. The American Association of Physics Teachers (AAPT) in cooperation with the American Physical Society (APS) and American Institute of Physics (AIP) and with support from the National Science Foundation (NSF) invited teams from physics departments to attend this regional workshop.

The goal of these SPIN-UP Workshops is to enable physics departments at a wide range of institutions to develop a departmental infrastructure that will generate long-term improvements in undergraduate physics programs. Additionally, the goal is to elevate the number and quality of students studying physics, and the enhance student learning.

The workshop invited teams of faculty members including the chair and/or associate chair for undergraduate education to work with experienced groups of physics faculty members. Representatives from departments that have seen significant increases in the number of undergraduate majors were on hand to analyze current departmental situation and provide an outside perspective on how to implement sustainable changes that would enable other departments to accomplish their goals.



In a SPIN-UP team breakout session (left to right) Keith Andrew, Edward Kintzel, Vladimir Dobrokhotov, and Scott Bonham discuss issues facing the physics department.

2010 Western Kentucky Physics Olympics – Saturday, February 20th

Green Physics

Western Kentucky Physics Olympics is a half-day competition consisting of a pentathlon of challenging problem-solving activities that reward teamwork, creativity, and communication. The WKU Department of Physics & Astronomy invites each high school to send one or more teams of four to compete in the 2010 Western Kentucky Physics Olympics. This year's event will be held **Saturday, February 20** from 8:30 a.m. until about 2:00 p.m. in the Thompson Center, Central Wing on WKU's Bowling Green campus.

The competition will commence with two activities that involve competitors arriving at the event ready to compete with devices they have designed, constructed, and tested. The competition entitled ***Edible Musical Instrument*** requires each team to design, construct, and play a musical instrument capable of producing the tones for a full octave scale. For ***Wind Generator*** each team will design and construct a wind turbine capable of generating the greatest current through the spinning of a portable compact disk player's motor. This year's "Calculation/ Communication Challenge", "On-the-Spot Activity" and "Order-of-Magnitude Quiz" will remain cloaked in secrecy.

Registration

Teams can register online at <http://physics.wku.edu/olympics/registration.html>. Registration deadline is Thursday, February 11.

Prizes

Each of the four contestants on the team with the best score in the overall competition will receive a **\$500 scholarship** to attend Western Kentucky University. The scholarship is to be used during the freshman year and is awarded above and beyond any other scholarships the student might otherwise earn.

Medals for the team members and a plaque for the school will be awarded to the top 3 teams in the overall competition. Certificates will be awarded to the top three teams in each event.

Upcoming Physics Meetings

Conference	Date	Location
40th Annual WKU Student Research Conference	February 27, 2010	Carroll Knicely Conference Center
American Physical Society	March 15 - 19	Portland, OR
Materials Research Society	April 5 - 9	San Francisco, CA
American Conference on Neutron Scattering	June 26 - 30	Ottawa, ON Canada



Annual Department Christmas Party

On December 16, 2009 the department celebrated the end of another successful semester by having our annual Christmas lunch. This is always one of our most popular events, and is a great way for students and faculty to gather, and share some great food!!! We hope everyone has a Merry Christmas, and a Happy New Year!!! We will see you all next semester, and look forward to seeing you at all of our events.



New Faces on the Hill

Our department has seen great changes both in and out of the laboratory. Please join us in welcoming the following people who joined our department this past Fall 2009:



Dr. Rachel Campbell, the Observatory Education Scientist, joined the department 6 months ago and is really starting to settle in to her new job and new place. Originally from Australia, Dr Campbell has worked all over the world most recently spending 18 months in Berlin working on a project to determine the speed and composition of 1 million Milky Way stars. Since coming to work at WKU she has been involved getting both the RCT and the Bell observatory back to full operational status as well as throwing herself into all aspects of public outreach including the development of a program to help scouts achieve their astronomy belt loop and badge and instituting the Feast-of-Facts, a bi-monthly meeting of the entire Faculty and it's students where current research, new discoveries and other issues are discussed with delicious food and comfortable chairs.



Dr. Dennis Garvey did his doctoral work at Washington State University in the areas of fiber optics and nonlinear optics. He taught at Washington State University after graduation and then at Gonzaga University in Spokane. His latest area of research has involved analyzing the results from the Human Genome Project to identify markers on the human Y chromosome that are useful for distinguishing paternal lines. This type of Y marker has found application in law enforcement and in the field of genealogy to aid in tracing paternal lines back to a point of origin in Europe.



Society of Physics Students

The WKU Chapter of the Society of Physics Students (SPS) continues to provide opportunities for physics students to gather socially and to promote interest in physics.

New officers of the SPS this year:

April Pease (President)

Kyle Cook (Vice-President)

Jacob Baxley (Secretary)

Mayme van Meveren (Treasurer)

These students are working to increase the visibility of the club and to encourage new students in the department to become involved in physics research and be successful in the classroom. This fall the club helped sponsor our annual trip to the Argonne National Laboratory where we took a record 17 students to the Undergraduate Research Symposium. Of course the fall picnic was also a big event again this year at Lampkin Park as usual. Activities for the spring semester will include assisting faculty with the WKU Physics Olympics and the Kentucky Science Olympiad as well as helping to prepare for the upcoming Fiftieth Anniversary Sigma Pi Sigma Banquet.