

The Department of Physics & Astronomy is dedicated to developing a deeper understanding of the natural world, to educating undergraduate and graduate students, and to conveying the concepts and logic of the discipline to the broader community.



Greetings Alumni and Friends

We are in our third year on semesters since 1967, and we remain an active and vital environment as we help students realize their potential and advance the frontiers of science. Our alumni are testimony to the past success of our program and an inspiration as we look to the future. We are happy to share some updates from our program with this newsletter.

In following up on our commitment to provide a research experience for our undergraduates, this year 19 undergraduates worked with 12 different faculty members from across the department. In addition two undergraduates were able to work elsewhere this summer. Samantha Thrush went on an REU to the University of Minnesota. Helen Cothrel is an Ernest R. Hollings Scholar and spent her summer at NOAA in Colorado. Many students get their first taste of what it is like to perform research with us during their summer internships. One student who took advantage of these opportunities to great effect is Austin Way. He graduated this year and has secured a prestigious NSF Graduate Fellowship. He is now a graduate student at the University of Wisconsin – Madison, where he will study Materials Science.

Graduate students also had many achievements. Andrew DiLullo won the second NQPI dissertation award. Sushil Dhakal won the prize for an outstanding poster in low-energy nuclear science at the Steward Science Academic Programs meeting in Washington, DC. This is the second year in a row one of our students has won that prize. Zhiyuan Fan was one of ten students that graduated with a Ph.D. and while at Ohio University, under Sasha Govorov's direction, Fan co-authored 16 papers and two book chapters, including one paper in Nature which has already collected more than 100 citations.

Several developments have affected the composition of our faculty in the past year. Among our current faculty, Tom Statler completed a sabbatical at the University of Maryland and is now taking a temporary Program Officer position at NASA in Washington, D.C. Saw-Wai Hla remains a Group Leader for Electronic & Magnetic Materials & Devices in the Center for Nanoscale Materials at Argonne National



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Lab, and will return to our department full time during Spring semester. Julie Roche is on sabbatical at Jefferson National Laboratory where she is leading an experiment to measure Deeply Virtual Compton Scattering (DVCS) in order to learn more about the structure of the proton. Her experiment will be the first to run at JLab since the \$300M upgrade to 12 GeV. Doug Clowe has returned to us this Fall from a sabbatical at the University of Pennsylvania where he has been working on plans to use the Large Synoptic Survey Telescope (LSST). This is an 8-meter class telescope currently under construction in Chile, expected to become fully operational in 2020.

We have been successful at recruiting three new faculty. Heather Crawford is an experimental nuclear physicist who joined us in January. Hee-Jong Seo is an astrophysicist who joined us in Fall 2014 from Lawrence Berkeley National Lab. Another new astrophysicist who joined us this Fall is Ryan Chornock. Ryan's most recent position was as a postdoc at the Harvard-Smithsonian Center for Astrophysics. In other faculty news: Justin Frantz was promoted to Associate Professor with tenure; Daniel Phillips was voted an Outstanding Referee by Physical Review and Physical Review Letters. In staff news, Candy Dishong has completed 35 years with us. She did retire a few years ago but we managed to get her to come back to be the assistant department administrator. We thank her for her truly great service to the department. Without Candy, and our other highly dedicated staff, we could not maintain such an active and excellent department.

We greatly value the support we receive from our friends and alumni in helping our department in the pursuit of its mission. We always appreciate visits by our alumni, as a means to educate our students about possible career paths and to help our department remain connected to a larger community. We also express our sincere thanks to those who have contributed financially to our program, as listed elsewhere in this newsletter. In particular I should like to call out the generosity of those who have helped us achieve the endowment of the graduate-student scholarship fund begun by Emeriti Professors Ernst Breitenberger and Louis Wright. This fund is to be used for many different purposes including, but not limited to, supporting graduate-student travel, providing graduate students with equipment (or software) needed to pursue their research, special awards to outstanding students, and assistance in cases of particular need. Now that it is endowed, we should be able to begin to make awards for the next academic year. I hope those of you who have benefitted from work with these dedicated faculty will help us continue to grow this fund and thus benefit future graduate students.



David Ingram
Chair

- 77 graduate students
- 70 undergraduate students
- 32 countries represented in the department
- Programs in astrophysics, biophysics, condensed matter physics, surface science & nanoscience, nuclear and particle physics
- International travel opportunities for both graduate and undergraduate students
- 4.5 MV high-intensity tandem Van de Graaff accelerator
- Member of the MDM Observatory on Kitt Peak, Arizona
- Alumni receive international awards including one Nobel Prize

Faculty News

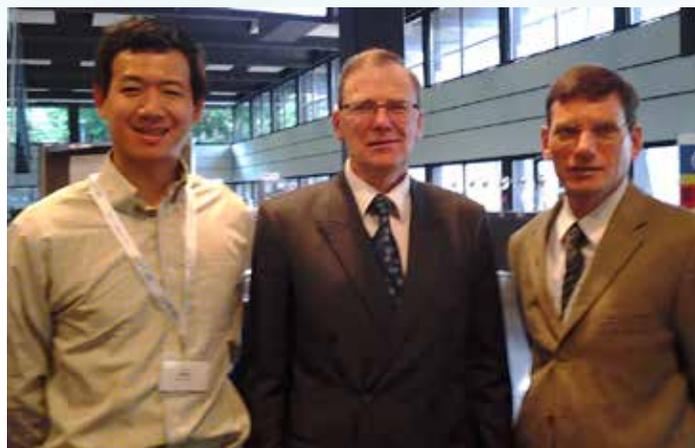


Carl Brune holding *Amphibians of Ohio*



Midland Mud Salamander *Pseudotriton montanus diastictus*, featured in *Amphibians of Ohio* and native to the forests of southern Ohio

Carl Brune authored three chapters in an Ohio Biological Survey publication, *Amphibians of Ohio*. He is the only non-zoologist among the authors. One of Carl's hobbies is to study snakes, lizards and other reptiles or amphibians. He can often be found on weekends taking hikes through the countryside and cataloging the amphibians that he finds. It is unusual for a professor to publish outside of his/her field, and Carl has broken through this barrier showing that curiosity has no limits.



(L to R) Gang Chen helped organized the 1st joint meeting of DGG-ACerS-GOMD in May in Aachen, Germany, with Dr. Reinhard Conrath (Aachen University), and Dr. Steve W. Martin (Iowa State University of Science & Technology.) Chen will chair the second conference in 2015 in Miami, Florida.

Gang Chen can hardly picture a day in which he does not use glass. "Glass is a very active and important research field. It covers almost every aspect of our lives, not only in the traditional aspect of glass for buildings and decorations, but also to the more modern use of glass, ranging from computer memories to bone regeneration," he said.

Chen is the chair of the May 17-21, 2015 joint meeting of the German Society of Glass Technology (DGG) and the Glass & Optical Materials Division of the American Ceramic Society (ACerSGOMD.) This conference will be the second of a two-year experiment to combine the American and German annual conferences in an effort to strengthen ties between U.S. and European glass researchers.

Presentations will explore optical and electronic materials and devices, the fundamentals of the glassy state, how glass is used in healthcare and energy, environmental aspects of glass and nuclear waste immobilization. **David Drabold** will serve as a symposium leader.

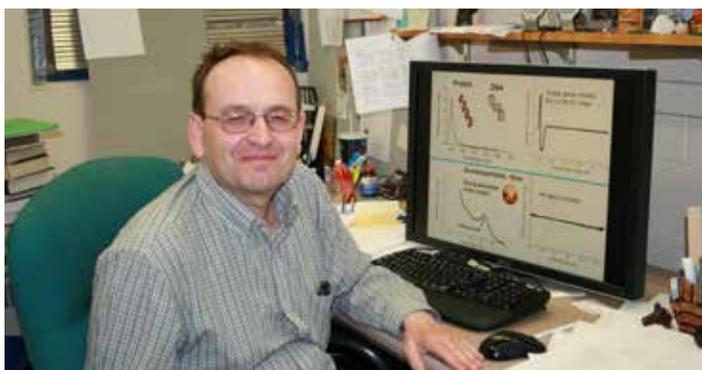


(L to R) Graduate students Andrea Richard, Shamim Akhtar, Sushil Dhakal, Dr. Heather Crawford, and graduate student Cody Parker visit Michigan State and pose in front of the CAESAR (CAESium iodide ARray) gamma-ray detector array, which consists of 192 individual CsI crystal detectors, at the target position of the S800.

Heather Crawford and several graduate students traveled to the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University to participate in an experiment studying the very neutron-rich Carbon isotopes ($^{16,18,20}\text{C}$) by measuring the states populated in proton-knockout reactions from neutron-rich nitrogen.

The experiment used the S800 spectrograph to detect carbon nuclei produced in the knockout reaction, and the CAESAR scintillator array to detect gamma-rays emitted from excited states in the carbon isotopes nuclei.

They were there as a part of a collaboration between researchers at NSCL, University of California at Berkeley, TU-Darmstadt and Ohio University, and took shifts on the experiment, monitoring the data as it was taken, and keeping things running over the 7-day 24/7 experiment.



Alexander Govorov was appointed to the Chang Jiang Chair Professorship of the Scholar Program of the Ministry of Education of China for 2014-17. Govorov received the 2014 Jacques-Beaulieu Excellence Research Chair Award created by the INRS Energy Materials Telecommunications Research Center in Montreal, Canada. He was visiting professor at Nanyang Technological University in Singapore where he

conducted research on light emitting diode (LED) devices. Govorov was part of team from the Max Planck Institute for Intelligent Systems in Stuttgart, Ludwig-Maximilian-Universität in Munich, and Ohio University who have created a nanostructure which can be reversibly switched with the aid of DNA molecules.



Saw-Wai Hla, NQPI member and leader of the Electronic and Magnetic Materials and Devices group at Argonne National Laboratory, co-chaired the 8th International Workshop on Nanoscale Spectroscopy and Nanotechnology (NSS-8) on July 28-31, 2014, in Chicago. More than 100 researchers from 15 countries attended NSS-8, which featured four plenary speakers, 24 invited talks, over 40 contributed talks and 15 posters focusing on novel nanoscale materials, systems and devices.

“It was a very successful conference, both in terms of scientific discussion and the program and venue, including the outing. People really liked it. It was clearly a very beautiful location, and the attractions after the conference were great. The venue was located right next to the most beautiful part of downtown Chicago.”

Hla was also part of a team (with Volker Rose, Curt Preissner, Daniel Rosenmann) at Argonne National Lab who received a patent in April 2014 for “Simultaneous topographic and elemental chemical and magnetic contrast in scanning tunneling microscopy”

Hla gave an invited talk in April at a special symposium for molecular machines at the 2014 German Physical Society Spring Meeting with over 5,500 attendees present. He also gave an invited lecture about molecular superconductors and molecular machines at the July 2014 International Conference Nanoscience and technology (ICN+T 2014) in Vail, Colorado. This is the largest nanotechnology conference in the world.

Ken Hicks is on detail to the National Science Foundation for a 2-year term as a Program Director of Experimental Nuclear Physics. The 2-year positions are referred to as “rotator” assignments, where a person active in research joins the NSF to help with the review of research proposals. Ken works with the permanent Program



Director, Allena Opper (a previous faculty member of Ohio University), to determine which proposals will be funded in a given year. The job is challenging, as one is often doing an “apples or oranges” type of comparison in the different subfields of nuclear physics, and it is often important to get feedback from the scientific community to help with these funding decisions. Ken started his rotation in Fall of 2014, and plans to stay active in research during this two-year detail.



Research scientists Darren Bleuel and James Hall with Tom Massey

candidates for producing high energy and intensity neutrons. The researchers seek to develop neutron technology to detect defects in ceramics, plastics, and other low-density materials shielded by several inches of dense metal.

Hall mentioned that he has visited Edwards Accelerator Lab on a regular basis for almost 20 years to do experiments. All proof-of-principal neutron imaging experiments have been conducted at Edwards Accelerator Lab during this time



(L to R): Tony Tracy (Belpre HS), Chuck Strubbe (Saint Ursula Academy in Cincinnati), Salvador Castro (doctoral student in Education at OU), Dan Hendershott (Alexander HS), Ashley Brown (Adjunct Instructor at OU-Southern, Dr. Mark Lucas, Kevin McChesney (Pickerington Central HS.)

Mark Lucas conducted a day-long workshop on the LON-CAPA open source course management system in summer of 2014 for area high school science teachers and others. Teachers use LON-CAPA to provide assessment and extra practice for their students as well as help prepare them for the kinds of learning tools they will use in college.

Tom Massey and the staff at the Edwards Accelerator Laboratory welcomed back physicists James Hall and Darren Bleuel of the Lawrence Livermore National Laboratory in California in September, 2014. The scientists visited Ohio University for a week to test and measure several possible



Daniel Phillips was honored as one of the 2014 Outstanding Referees by the American Physical Society. This year 143 Outstanding Referees were selected from across the country. Daniel is the third person in the department to have received this honor.

In 2008, the American Physical Society initiated a highly selective award program to recognize scientists who have been exceptionally helpful in assessing manuscripts for publication in the APS journals. The program annually recognizes approximately 150 of the 60,000 currently active referees. Like Fellowship in the APS and other organizations, this is a lifetime award.



Arthur Smith chaired the fifth international 2014 Spin-Polarized Scanning Tunneling Microscopy (SP-STM5) conference on July 15-19, 2014. SP-STM5 is an international gathering of scholars, sponsored by the Nanoscale & Quantum Phenomena Institute. Topics were related to spin-polarized scanning tunneling microscopy and spectroscopy, and included generalized scanning probe microscopy techniques in nanomagnetism and nanospintronics. Top scientists from the United States, China, France, Germany, Portugal, South Korea, UK, Saudi Arabia, and elsewhere attended.



Tom Statler returned to campus in May to attend graduation ceremonies

Thomas Statler was honored by having an asteroid named after him. This distinction was announced at the triennial “Asteroids, Comets, Meteors” conference in Helsinki, Finland.

You can get the particulars on this rock by going to NASA’s Jet Propulsion Laboratory website and typing 9536 into the search box. This asteroid was the 9,536th asteroid discovered (back in 1981) and so now has the official designation (9536) Statler.

Nancy Sandler and **Sergio Ulloa** traveled to Brazil during the 2013-14 academic year to participate in several conferences:

1. The CIAM-Workshop in Niteroi, Rio de Janeiro, a workshop which was part of the events organized under a NSF-CIAM grant that supports their international research with colleagues from universities in Brazil and Argentina. The workshop was attended by members of the NSF-CIAM Collaboration, invited speakers, postdoctoral researchers and students, for a total of 50 people. Both Sandler and Ulloa gave invited talks.
2. A special workshop on “Musings on correlated electron systems and life” which was in honor of the 70th anniversary of Dr. E. Anda that took place at UFF in Niteroi, Rio de Janeiro. Dr. Anda is a member of the NSF-CIAM Collaboration. Dr. Anda is one of Sandler’s and Ulloa’s long-standing collaborators from several previous NSF awards.
3. The Graphene Brazil 2013 conference in Buzios where experts from all over the world gather for this regular event. Ulloa gave an invited talk and Sandler presented posters representing research from postdoctoral research associates and graduate students in their group.

The name of an asteroid can be suggested by its discoverer, and has to be approved by a commission of the International Astronomical Union. Once it is, the name becomes genuinely “official”. (The IAU is the only body with internationally recognized authority to name objects in space; unfortunately scammers have convinced a lot of people that they can pay money to have a star “officially” named after themselves or a loved one.)

Right now there are about 18,000 asteroids with names, and about 20 times more without. Because asteroid discoverers have eclectic tastes, the asteroidal “Who’s Who” is a bit quirky. (9536) Statler orbits in the company of (1815) Beethoven and (2001) Einstein, but also (15092) Beegees and (214476) Stephencolbert. Not to mention (9007) James Bond and (13681) Monty Python!



2014 CMSS/NQPI Poster session winners with Dr. Eric Stinaff (Dr. Stinaff is on the second row from top) First row (bottom L to R): Sarah Maj, Sam Johnson; Second row: Sudiksha Khadka, Shrouq Aleithan; Third row: Mahmoud Asmar, Ramana Thota; Fourth row: Sean Krupa, Katherine Schleich; Fifth row: Andrada Madru, Dr Eric Stinaff, Rami Amro; Sixth row: Lei Want, Khan Alam, Sneha Pandya.



Eric Stinaff helped organize the 2014 CMSS/NQPI poster session in Clippinger Labs on April 17, 2014. Graduate and undergraduate students from the College of Arts & Sciences Departments of Geology, Chemistry and Biochemistry, Physics & Astronomy, and the Russ College of Engineering and Technology presented 42 posters on the second and third floors of Clippinger Labs. A buffet reception was included. Seven groups were judged for prizes (First Place \$200 and Second Place \$100.)

Departmental News

Flipped out! The Flipped-Classroom Experience

Justin Frantz, Ken Hicks, David Ingram, Julie Roche, and Sergio Ulloa spearheaded the first semester of the flipped classroom approach to classroom instruction. What was it like before being flipped? Here’s some background: The course *General Physics* had been taught in a standard lecture-style format, with a primary audience of engineering students who are required to pass it to complete their bachelor’s degree. The course is fast-paced in order to cover all of the material expected by engineering accreditation requirements. Class size is 60-100 students each, taught in three sections for a total of about 225 students per term.

In the 2013-14 academic year, our department tried a new approach to this class. We used a flipped classroom model, where the students do hands-on and group activities during class with a minimum of lecture. In the old format, lecture was done in class, and problem solving was done primarily outside of class via homework assignments. In the new format, students are expected to read the textbook or view online lectures before coming to class, and problem-solving skills are developed during class. Hence, the name “flipped classroom.”

We are not the first university to try this approach. In the physics education literature, a popular flipped classroom format is called SCALE-UP. It was first implemented at North Carolina State University and is now adopted at many universities across the country. While our classroom is not ideal for the classic implementation of SCALE-UP, which uses round tables that seat nine students in groups of three, we adapted the classroom-style tables of our room to accommodate groups of three students each, as shown in the picture below, where Professor **Julie Roche** works in-class with one group to solve a physics problem.



Julie Roche (standing) assists a group of students in their attempt to solve a physics problem.

In general, we believe this format promotes better learning of the physical concepts. Although this is challenging to measure quantitatively, there is much anecdotal evidence. For example, we found that there was better attendance in the second half of the semester as compared with past experience of a standard lecture format. In addition, those students who came to class were more engaged, since they were active in group-work during class rather than simply listening to the professor's lecture. (There's an old joke that the lecture format is the fastest way to transfer the professor's notes to the student's notes without going through the head of either one!)

The value of doing group activities during class is common sense. For example, to learn to play the piano, it is not sufficient to watch a good pianist; one must practice as well. Similarly, to become good at sports, it is not sufficient just to watch good athletes; one must get out onto the field and play. It works the same in the classroom: watching the professor solve physics problems on the blackboard does not make students good at solving problems. The in-class group activities provide the student with coached problem solving, where they can raise their hand and get immediate help if they fail to work out the solution on their own. Many students were very positive about this approach in a classroom survey taken during the class. The first semester of the flipped classroom approach was spearheaded by a group of faculty and graduate students, including Professors Frantz, Hicks, Ingram, Roche and Ulloa.

College of Arts and Sciences Themes Initiative

The College of Arts & Sciences is developing a number of "curricular themes". These are clusters of courses and communities of students and faculty focused on interdisciplinary areas of interest. They represent a strategy that can be used by students to rationalize completion of

the 'breadth of knowledge' requirements for an A&S degree. This is achieved through a set of multi-disciplinary courses and extracurricular activities organized around a particular



topic. Themes should thus include content from the humanities, natural sciences, and social sciences.

Daniel Phillips is the coordinator for the "Knowing the Future"

theme. This theme collects a broad range of classes that teach and discuss the tools that are used to make predictions in disciplines from Physics to Population Biology to History. The theme also discusses how our ability to know the future is affected by our understanding of the present and the past. Epistemology is thus a key emphasis within the theme, and the hope is that students who sign up for the theme come to appreciate its crucial—if usually unacknowledged—role in our lives. Questions like "How do you tell fact from opinion?" and "Do numbers never lie" are discussed in the first-year class that all students in the theme enroll for, a class called "Knowing What We Know". That course examines the topics of knowledge, uncertainty, and prediction, and particularly how they arise and intersect in contemporary policy issues, societal debates, and state-of-the-art research. Through this, and other classes, the goal is that students in the "Knowing the Future" develop the skills to be able to make good predictions, understand which things can—and can't!—be reliably predicted, and gain a deeper appreciation of the way in which we arrive at "knowledge".

Eric Stinaff is a member of the Steering Committee for the "Fire to iPhone" theme. Human beings have always engaged in developing new technologies to improve their



work, quality of life and relationships with others. Our culture speaks of "technology" as though it describes the most cutting-edge digital inventions.

And it does. But technology itself is nothing new. Humans have been developing new technologies throughout our history. This theme, through a variety of disciplines, traces progressions of key technologies across human history and critically investigates how those technologies have shaped society in the past and how new technologies might shape our future. From written language to the book to the telephone

to GIS, students in this theme will explore questions such as:

- How and why do we create technologies?
- Why and in what contexts do we choose certain technologies?
- How have technologies (e.g. Twitter, texting) changed the ways we read, write, and communicate?
- How is technology blurring the boundaries between human and machine being? Is our immersion in technology transforming us into cyborgs?
- How does our culture construct technology, and how does that shape what we do with it?

There are other interesting possibilities for our department to be involved in other themes, e.g. “War and Peace” and “Sustainability”. We look forward to the opportunities that this initiative will provide for more Ohio undergrads to learn about science in general, and Physics & Astronomy in particular.

New Faculty



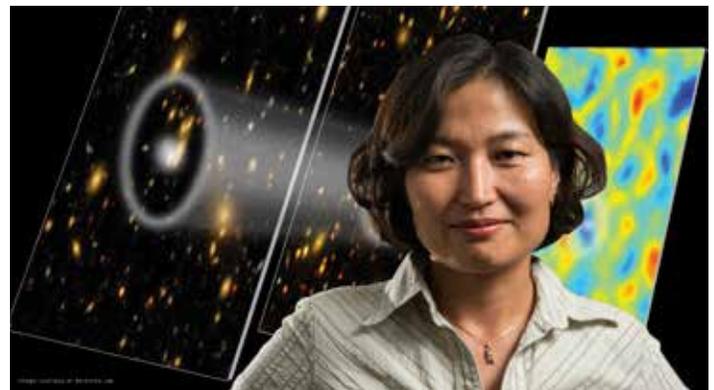
Ryan Chornock is an astrophysicist who joined us in Fall 2014. Ryan’s most recent position was as a postdoc at the Harvard-Smithsonian Center for Astrophysics. He writes: “I spent most of my childhood in the northern Virginia suburbs of Washington, D.C., where a few chance encounters with educational games and some popular science books on my grandparents’ shelves sparked my interest in astrophysics at an early age. I began my professional education by heading off to college at Caltech to receive my B.S. in Physics. While there, my initial summer undergraduate research projects involved testing X-ray detector technologies and understanding the large-scale clustering properties of distant galaxies.

My positive memories of these experiences help me to understand the importance of providing exposure to cutting-edge research for undergraduates as a complement to formal

coursework. After finishing college, I moved on to UC Berkeley for my M.A. and Ph.D. in Astrophysics. I entered grad school with interests in both high-energy astrophysics and cosmology, and I found that the study of supernovae straddled the boundary between these two subfields quite nicely. My dissertation research examined the polarization properties of light from distant supernovae to gain insight into the three-dimensional properties of the explosions, which helps us to understand how stars explode.

I turned in my thesis in 2009 and moved on to the Harvard-Smithsonian Center for Astrophysics, where I spent the last five years as a postdoc before arriving at Ohio University in August. I have worked on many different topics in astrophysics, mostly united by an interest in phenomena that are transient or time-variable. The enormous length and time scales involved in our universe (it is more than 100 million times older than you are!) can make the ancient idea of static heavens seem superficially plausible, but careful study reveals just how much of the universe is actually dynamic. Technological advances are making time-domain science one of the hottest subfields of astrophysics for at least the next two decades.

In pursuit of my research, I have been fortunate to use many of the world’s largest telescopes around the globe. In October, I will be looking forward to traveling to Arizona and using MDM Observatory for the first time. I am also currently part of research collaborations using telescopes in Hawaii and Chile although, unfortunately, those projects do not require personal travel to the telescopes at the moment. When not in my office confronting the vastness of my ignorance, I like to spend time in forests and mountains.”



Hee-Jong Seo is an astrophysicist who joined OU in January 2015. She writes: “I was born in Busan, South Korea. Due to external circumstances, I pursued my education in a college of pharmacy in the Busan National University instead of studying astrophysics which had been my dream. After a few years of working in local pharmacies and a hospital to

save enough money to come to the United States and study astrophysics, I was accepted in the undergraduate program of the University of Arizona in the spring of 1999. There I studied disk properties of young stellar objects alongside my mentor and adviser, Dr. George Rieke.

I graduated in 2001 with a B.S. in astronomy and physics and was accepted to the graduate program of the University of Arizona. I worked on the large scale structure of the Universe under the guidance of Dr. Daniel Eisenstein and graduated with a PhD in 2007. I then moved to Fermilab and worked as a postdoc for the next three years. In 2010, I became a fellow at the Berkeley Center for Cosmological Physics at the University of California. Three years later I received an offer to join the faculty at Ohio University. In 2013, I moved to Columbus, Ohio, to spend one year as a CCAPP Postdoctoral Fellow at Ohio State University, and moved to Athens in the Fall, 2014.

My research interests are in high precision cosmology with large scale structure. I study the distributions of galaxies and matter on very large scales to infer how our Universe has expanded, what our Universe is composed of, and therefore to collect observational clues to identify dark energy and dark matter, which together makes up 95% of Universe while still being quite mysterious.

My work involves various methods of analyzing the large scale structure of galaxies and matter, including analytical, numerical, observational studies of Baryon Acoustic Oscillations (BAO), a distinct feature imprinted in large galaxy surveys and or radio surveys, as a dark energy probe. I am also interested in relating observed galaxies to the underlying dark matter halo distributions, finding the upper limit on neutrino mass using the large scale structure, weak gravitational lensing signal of the dark matter distribution. Outside of work, I am a mother of two young children and that keeps me quite busy. My non-astrophysics investigations are on-going; to look for cool playgrounds and places for family outings.”

Recent Graduates

**Rakitha Sanjeewa Beminiwattha PhD –
adviser Dr. Julie Roche**

Dissertation: ‘A Measurement of the Weak Charge of the Proton through Parity Violating Electron Scattering using the Qweak Apparatus: A 21% Result’



I have involved in development and maintenance of Data analysis software and Data Acquisition (DAQ) system for an experiment called Qweak. Then I actively participated in the Qweak experiment data taking period. I also collaborated with Hall A experiments including HAPPEX, PREX and DVCS. Finally I worked main data analysis project to obtain the main result, the weak charge of the proton by only using commissioning data set of the experiment. My dissertation was based on this initial release of results.

I’d like to do research and development related to basic science for the next few years, to gain more experience in various aspects on nuclear experimental physics and then try to find a job in academia or in industry R&D. Currently I’m involved in three future projects proposed to run in the Jefferson lab. First experiment is the parity violating asymmetry measurement of lead (Pb) to determine the neutron radius (PREX) which will run in about 2017. Second experiment is the proposed Solenoidal Large Intensity Device experiment (SoLID) which have broad range of physics measurement capabilities. Third is the MOLLER experiment which is a test of the Standard Model of Particle physics. Last two projects are very long term project which will hopefully help me to find a job in academia.

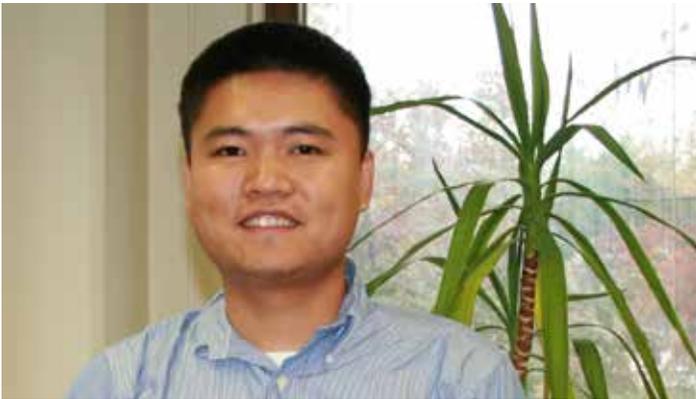
I have a very good experience as a grad student at OU even though it was very short (I stayed only for about 2 years at OU before moving to JLab). During that two years I learned a lot by interacting with the wonderful faculty at Physics department. They helped me to build a solid foundation in my research career. My advisers were really helpful on guiding me at early stages and I learned to do work independently when I moved to the lab. I also have to mention the admin staff at OU physics was very good and helpful. Especially when I moved to the lab a lot of admin work has to be done over emails and telephone calls. They were helpful in every other ways.



**Desiree Cotto-Figueroa PhD –
adviser Dr. Tom Statler**

Dissertation: ‘Radiation Recoil Effects on the Dynamical Evolution of Asteroids’

My primary research was to study radiation recoil effects on the dynamical evolution of asteroids. I’m currently a postdoctoral research associate in astrophysics at Arizona State University in Tempe. In the coming years I want to obtain more experience as a postdoctoral researcher in order to accomplish my goal of becoming a professor and research adviser. My graduate student experience was a great experience!



Zhiyan Fan, PhD – adviser Dr. Alexander Govorov
Dissertation: ‘Optical Activity of Chiral Nanomaterials: Effects of Short Range and Long Range Electromagnetic Interactions’

While a graduate student, most of my projects were related to plasmonic circular dichroism of chiral nanostructures. Currently I’m working at University of Texas at Austin as a postdoctoral researcher. I will continue working in the field of photonics and plasmonics, and focusing on design, analysis and optimization of novel electrooptic devices.

At Ohio University, we have a team of very experienced professors at teaching and research. One may be a little slow

at the beginning of his/her PhD program, but don’t worry, our faculty members are able to push you to the highest speed. In my first year, I was just solving a Poisson equation and wondering how plasmonics would work out of it. After six years, Dr. Govorov had taught me lots of stuff and guided me through about 20 projects in collaboration with research teams around the globe. I’m very grateful that I can study and work on my favorite subject while Dr. Govorov can always provide me with good advice and share with me the most updated information and experience of frontier projects in the field.

Whatever job one may get into, team work and efficient communication are most important factors for becoming a success. So every group meeting or seminar is a good opportunity for us students to practice such skills, as well as to be exposed to the latest research that may not be available in the classroom.

It is often easier to solve a problem than to really understand the physics behind it. However, it’s the understanding of physics that allows scientists and engineers to create many new devices that are faster in operation, more compact in size and more efficient in energy consumption. The education at Ohio University has changed me from the ‘worker’ who routinely solved exercise problems to someone who will apply physics to real world applications. But this is just the beginning, I will continue exploring the beauty of physics.



Normal Israel, MS – adviser Dr. Julie Roche
Dissertation: ‘Commissioning of the Trigger module for the E12-06-114 Experiment at Jefferson Laboratory’

My primary research was the commissioning of third generation Deep Virtual Compton Scattering Experiment. I hope to continue doing physics in the next few years.



Greg Petersen PhD – adviser Dr. Nancy Sandler
Dissertation: ‘Anderson Localization in Low-Dimensional Systems with Long-Range Correlated Disorder’

I studied the role of structural and chemical disorder on the electronic states of one- and two-dimensional nano-structures.

I’ve changed fields since graduating and have since moved on to the study of machine learning, spectroscopy, and aerosol science. In my new role I have gained experience in electrical and mechanical engineering while leading the algorithms group to address such challenges as detection of bacterial auto-fluorescence and processing spectroscopic signals created by light-induced breakdown (LIBS).

In the future I would like to stay along a technical track and either head an R&D department or possibly return to academia.

My advice to current graduate students is to travel as much as you can. It’s harder to find the time and opportunity to do so in the future. It can change your life.



David Ruiz-Tijerina PhD – adviser Dr. Sergio Ulloa
Dissertation: ‘Kondo physics and many-body effects in quantum dots and molecular junctions’

As a graduate student at Ohio University I did fundamental research on the electronic properties of nanostructures known as

quantum dots, as well as of molecular magnets. In particular, I studied how the transport of charge through these systems changes as we apply voltages and magnetic fields to it, and in the case of molecules as we stretch them in certain ways. These systems present a great variety of interesting phenomena because within them electrons interact very strongly with each other; these highly-correlated electronic effects have enormous potential for future applications in spintronics and quantum computing.

After a few more years as a postdoctoral researcher, my plan is to pursue an academic position at a major university or research center in order to continue my studies of highly-

correlated electronic phenomena in condensed matter systems. Two things that I would also love to do are teaching and getting involved in the popularization of science.

My years in the Department of Physics and Astronomy were some of the most challenging, most gratifying and happiest of my life so far. The close relationships that I had with my professors and my fellow students could only be possible in such a friendly, cohesive community, and surely the transcendental friendships I built could only have happened in a town as diverse (and awesome!) as Athens, Ohio. It was a life-changing experience. I’d do it again, if I could!

Undergraduate News



Austin Way, an Honors Tutorial College student majoring in Engineering Physics, received a prestigious graduate research fellowship from the National Science Foundation.

The award includes three years of full support for graduate study during a five-year period, for the amount of \$132,000. In addition, he

has received a fourth year of full support from the University of Wisconsin-Madison, where he will pursue a Ph.D. in Material Sciences and Engineering.

“I’ll have a chance to study the growth of graphene and explore methods of applying graphene to different real-world problems under the direction of Dr. Michael Arnold, a leading researcher in the field,” Way says. “There’s a real possibility that I may become both a scientist and an inventor with the opportunity to write publications and patents.”



Samantha Thrush spent her summer doing research on injecting simulated continuous gravitational waves into real gravitational wave data at the Laser Interferometer Gravitational Wave Observatory (LIGO) at the University of Minnesota-Twin Cities in Minneapolis. Funding came from a National Science Foundation Research Experience for Undergraduates (REU) Award.

Gravitational waves are ripples in space-time caused by the motion of massive objects. They are a prediction of Einstein's Theory of General Relativity, but have never been directly observed. The Laser Interferometer Gravitational Wave Observatory (LIGO) is a set three of world-class gravitational wave observatories located in two locations: Livingston Parish, LA, and Hanford, WA. As it stands currently, all data from LIGO consists of either environmental or instrumental noise. The motivation for this project was to simulate what the output data would look like if LIGO could observe a gravitational wave signal from a pulsar, which creates a continuous source of gravitational waves.



Last summer, after traveling west across the continental United States to attend and perform in the Zeltsman Marimba Festival in Arcata, California, **Natalie Klco** wrote about the beauty she found in marimba music and festival performers who displayed clarity and oneness between their instruments, their bodies, and their minds.

In summer 2014 she headed east across the Atlantic to Italy and France, where a world of similar beauty revealed itself to her in the field of nuclear physics. She participated in physics experiments with scientists whose relationships with the world are delving deeper with each new discovery.

Natalie began her summer in Genoa, Italy where she worked on the Forward Tagger project, supervised by researchers at the National Institute of Nuclear Physics Section of Genoa. The Forward Tagger project involves designing hardware to detect electron scattering at a US experiment to be held at Jefferson Lab. Once the Forward Tagger is installed, it will be possible to investigate the kinds of particles that can be formed from quarks when high-energy electrons are scattered from protons and neutrons.

After spending a month in Italy, Natalie traveled to CEA/Saclay, to participate in a second month-long project, under the supervision of researchers at CEA. She assisted in the testing and documentation of a new style of detector that will track particles produced in particle physics experiment at Jefferson Lab.



Last summer, **Helen Cothrel** worked at the David Skaggs Research Center in Boulder, CO, to study the Earth's ozone layer. She received funding through an Ernest F. Hollings Scholarship, a two-year appointment with the National Oceanic and Atmospheric Administration's Office of Education. The title of her NOAA project was "Summertime Ozone Measurements in the Colorado Front Range." She looked at summertime ozone exceedances in Colorado (i.e. ozone episodes above the 75 ppb standard), and possible correlations between high ozone levels and specific ozone precursors.

Identifying ozone exceedances that correlate with a certain precursor would allow us to identify what circumstances led to an exceedance, such as forest fires or gas and oil well activity.

Society of Physics Students Research Conference

On Feb 22, 2014, six undergraduate presenters at the Society of Physics Students Research Conference at Ohio University provided an overview of their individual research projects undertaken during and since the previous summer, which ranged in scale from subatomic to galactic sizes, and applications from micro-scale devices to new semi-conductors. **Austin Way**, HTC Engineering Physics '14 received an award for "best presentation" from a panel of faculty judges. **Yashashree Jadhav**, HTC Astrophysics '14 received 'Honorable Mention.' The judges were impressed with all the presentations which made choosing the top two a challenge, they said. SPS Faculty Advisor **Gang Chen** facilitated the morning's program.



Students load their presentations on the computer prior to the start of the conference.



Drs. Justin Frantz (l) and David Tees(r) congratulate Austin Way for winning best presentation.

'Learn by Doing' Undergraduate Research Opportunities

Twenty-one majors participated in internships during the summer of 2014 which were administered through the Department of Physics & Astronomy's undergraduate summer research program. The interns were supervised by 12 department faculty members in research labs on projects ranging in scale from measuring atomic nuclei, to observing cancer cell properties, to galaxy cluster simulations.

Some summer research included travel to locations in Colorado, Minnesota, Virginia, as well as Italy and France. Undergraduate research offers life-changing opportunities to dig deeper into the mysteries of the universe and to enjoy the journey to discover how things work.

"Our faculty have the strong record of federal funding needed to support our PhD program, so we've been able to offer up to 20 paid summer research projects per year for interested undergraduate students," explained **Dr. David Tees**, Associate Professor of Physics at Ohio University, and the undergraduate adviser. "More than 75 percent of our graduating undergrads have done research internships with faculty during their time at Ohio University," he continued.

The research projects give students hands-on experience with research equipment and analysis techniques and a chance to interact with a faculty mentor and his or her graduate students. This experience inspires students to excel in their courses and helps them to identify career options in industry or academia, including topic areas that they might want to work on for a PhD, or that they don't want to work on for a PhD.

"From a student's perspective, it's an opportunity to work closely with a faculty member, which is useful when looking for letters of recommendation for graduate school and employment. From the point of view of our faculty members, it's a chance for an enthusiastic extra pair of hands for analyzing and collecting data, or for developing the expertise needed to bring a new technology or technique to the lab," Tees said.

A complete list of interns and their projects are featured in the College of Arts and Sciences Forum newsletter.



Undergraduate Erin Grimes worked with David Ingram

Peter Andrews "The Relationship Between Annealing Temperature and Size of Nuclei in Phase Change Memory Materials"

Max Camp "Data Analysis in the Search for the Pentaquark"

Alex Carroll "Re-evaluating the Thermonuclear Reaction Rate for the $^{18}\text{F}(\text{p},\alpha)^{15}\text{O}$ Reaction"

Helen Cothrel "Analyzing Summertime Ozone Measurements in the Colorado Front Range"

Justin Courtright "Making with Microcontrollers"

Ryan Goetz "Improving cluster mass measurement techniques with cosmological simulations"

Miguel Gomez "The pion cloud and motion of sub-atomic particles"

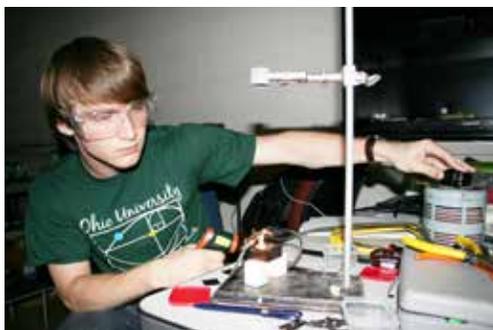
Erin Grimes "Building an optics model to examine works of art and nature"

Taylor Grueser “A Calorimetric Study of the Metal Induced Crystallization of Amorphous Silicon”

Jacob Hartman “Video Microscopic Analysis for Determination of Cancer Cell Mechanical Properties”

Kylie Holmes “Detecting More Pion”

Natalie Klco “Two Studies in Europe: Testing LED Calibration of the Forward Tagger for CLAS12, Genoa, Italy” and Helping to Test and Document a New Style of Detector at CEA/Saclay, France”



Hunter Lawson “Sputter Epitaxy of LaMnO₃ on SrTiO₃”

Miles Lindquist “Simulating a Realistic GRETINA”

David Overton “Determining the Feasibility of Measurements of the $^{19}\text{F}(p,n)^{19}\text{Ne}^*$ Reaction”

Robert Radloff “Detecting Photons Another Way”

Thomas ‘Tad’ Riley “Getting to Know the Atomic Force Microscope and Its Uses”

Sara Sand “Building Stirling Engines”

Samantha Thrush “Welcome to LIGO, a World-Class Observatory”

Chris Wolfe “Developing a Photolithography Procedure to Produce Micron Scale Metallic Devices”



Yonry Zhu “Assembling a Pulsed Laser Deposition System to Allow for Tandem MBE/PLD Sample Synthesis”

2014 Department Awards and Recognition

Faculty

- APS Outstanding Referee of Physical Review and Physics Review Letters
– **Daniel Phillips**

Staff

- Physics & Astronomy Outstanding Staff Award
– **Jean Andrews**

Ohio University Administrative Service

- **Candy Dishong** – 35 years
- **Tom Massey** – 25 years
- **Todd Koren** – 15 years
- **Alexander Voinov** – 10 years

Undergraduate Students

- Outstanding Undergraduate Teaching Assistant – **Yashashree Jadhav**
- NSF Graduate Fellowship, University of Wisconsin Madison – **Austin Way**
- Scholarship to the La Serena Data Science School, La Serena Chile
– **Yashashree Jadhav**
- Hollings Scholarship with NOAA at the David Skaggs Research Center, Boulder, CO – **Helen Cothrel**
- REU at the LIGO, University of Minnesota
– **Samantha Thrush**
- Two detector studies at research facilities in Genoa, Italy and CEA/Saclay, France
– **Natalie Klco**

Graduate Students

- College of Arts and Sciences Outstanding Teaching Assistant – **Oscar Avalos**
- NQPI Outstanding Dissertation Award
– **Andrew DiLullo** (adviser **Dr. Saw-Wai Hla**)
- Scale-Up Teaching Assistant Award – **Tyler Danley**, **Sean McGraw**, and **Andrea Richard**
- Y.C. Chang Graduate Fellowship
– **Mahmoud Asmar**
- 2014 Stewardship Science Academic Programs Outstanding Poster – **Sushil Dhakal**

Graduate Student Accolades

Outstanding Staff Member Award 2013-14



Sushil Dhakal won 'Outstanding Poster' for 'Measurement of Neutrons from DD Reaction and Neutron Transmission from Iron Sphere'. He was one of two winners who were chosen from among twenty-five entrants in the category Low-Energy Nuclear Science at the 2014 Stewardship Science Academic Programs (SSAP) Annual Review Symposium in Washington DC.



Mahmoud Asmar published an article this week in Physical Review Letters. His advisor and co-author, Dr. Sergio Ulloa says Mahmoud has theoretically advanced the field significantly.

This research focuses on the role of a relativistic effect on the electronic properties of graphene -- and in how this effect could be measured and observed in the lab.



Special Projects Assistant **Jean Andrews** received the Outstanding Staff Member Award for 2013-14. Jean's service was integral in the migration of departmental web content into the College of Arts & Sciences format, using this as an opportunity to highlight student learning. She has enhanced communication within our physics and astronomy community, from freshmen majors to emeriti and alumni, in numerous ways, and this has strengthened our departmental awareness of each other's interests and activities.

"Jean has applied the same verve and energy to the use of other media as writing stories for online publications, managing our department's Facebook page, producing movies for our YouTube channel, and facilitating this year's Science-on-Screen movie events. These efforts serve to highlight the department's activities and successes with constituencies here and abroad," said David Ingram, Professor and Chair.

Community Outreach



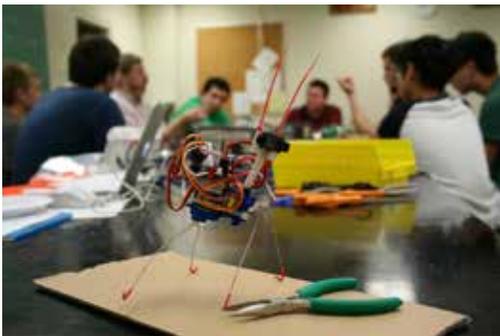
Physics for Kids - Boom, Splat!

Mark Lucas shares cool physics with cool kids at the Athens Public Library. Repeat programs were held at The Plains Public Library and at the Wells (Albany) Public Library during the summer months.



3D Printing Workshop

Mark Lucas and physics doctoral student Sean Krupa hosted a 3-D printing workshop. The pair explained the process of 3-D printing to 'Athensmakers', a local community group interested in cutting-edge technology and the hands-on creative process. The printer is used in the Nanoscale & Quantum Phenomena Institute (NQPI), a research group within the Ohio University Department of Physics and Astronomy.



Insect Bot Workshop with Dr. Mark Lucas

Mark Lucas hosted an Insect Bot workshop where participants learned more about cute do-it-yourself robots that use two motors, an infrared sensor, and a tiny Arduino (micro-controller) to 'bring it to life.'



Robotics Day at the Ohio Valley Museum of Discovery

Mark Lucas teamed up with his son, Ryan Lucas, a sophomore in the Russ College of Engineering and Technology's Department of Mechanical Engineering, to organize a 'Robotics Day' in August. The father-son team was assisted by graduate student volunteers from our Department, volunteers from the Russ College, and medical student volunteers from Ohio University's Heritage College of Osteopathic Medicine.

Alumni Spotlights

Rakitha Sanjeewa Beminiwattha (PhD 2013) receives Jefferson Science Associates Thesis Prize.



Keith Hawkins, (BS HTC Astronomy 2013) was elected as Chair of the King's College Graduate Society at Cambridge University. A recent mini-movie about Keith can be found on our Youtube channel.



Serge Nakhmanson, PhD Alum Serge Nakhmanson (PhD 2001) of the University of Connecticut, a colloquium speaker presented "Computational Design of Multifunctional Complex-oxide Materials Across Length Scales" in March 2014. In an article by Special Projects Assistant Jean Andrews, Nakhmanson describes himself as a Digital Alchemist Transforming Matter.



Jairo Sinova, Alum (BS HTC Physics 1994) is the newly appointed Alexander von Humboldt Professor and founder of the Spin Phenomena Interdisciplinary Center at the Johannes Gutenberg University in Mainz, Germany. In an article by Special Projects Assistant Jean Andrews, Sinova likens science teamwork to dancing a tango.



The College of Arts & Sciences and all departments located in Clippinger Labs sponsored a lunch reception for graduates and their families and friends.

More 2014 May MS and PhD Graduation Reception photos may be viewed on our Facebook album.



Alumni News

1950-1989

Richard C. Fernow, BS 1969, received his PhD in 1973 from Syracuse University. He worked at Brookhaven National Lab for many years and has since retired. He now lives in The Plains, Ohio.

Paul Koehler, PhD 1984, after leaving Oak Ridge National Laboratory has a new position as Lab Operations Branch Chief with the Air Force Technical Applications Center (AFTAC) at Patrick Air Force Base in Florida. AFTAC is responsible for nuclear treaty monitoring. Paul did his doctoral research in experimental nuclear physics with Ray Lane.

Roger Richards, MA 1968, went on to a PhD in Acoustics at Penn State University. He is now retired from the Naval Undersea Warfare Center in Newport, RI. He chairs the Technical Committee on Engineering Acoustics of the Acoustical Society of America.

Shailendra Shukla, PhD 1981, is a Medical Physicist at the University of Florida and its affiliated Veteran's Hospital. He lives with her family in Gainesville, Florida. He did his doctoral thesis with Seung Yun.

Dave Straw, BS 1964, mentored by the late Roger Finlay, went on to a PhD at Florida State. He is retiring in 2015 from the non-profit Aerospace Corporation in the Washington DC area.

Jerry Wilson, PhD 1970, has written the 8th Edition of "Physics Laboratory Experiments" and the 14th Edition of "An Introduction to Physical Science". He lives with his wife in Greenwood, South Carolina. He did his doctoral research in Acoustics with Seung Yun.

Barry Wyerman, BS 1971, went on to get a PhD from Penn State University. He manages a research and development group at Janesville Acoustics. He lives with his family in Novi, Michigan.

1990-1999

Derek W. Beck, BS HTC Physics 1999, is presently serving as an US Air Force Reserve officer (currently holding the rank of major) at the Joint Space Operations Center (JSpOC) at Vandenberg AFB, CA, and is responsible for a team that tracks 24/7 foreign space launch operations. Derek works now full-time as a reserve officer, but the Reserves gives him flexibility to moonlight as a writer, and Derek has written a popular history nonfiction manuscript about the start of the American Revolution in Boston in 1775. This book, under the working

title of America 1775, is being published by Sourcebooks, and is expected to be on bookshelves in late 2015. Derek's ultimate goal for his "1775" project is a television miniseries, which he describes as "Band of Brothers set in Revolutionary Boston".

Eric L Monte, PhD 1996, is at Seagate - Recording Heads Group, in Bloomington, MN. He is working on HAMR - Heat Assisted Magnetic Recording and manages a HAMR RSS test group. The group uses spindowns to characterize performance of HAMR recording heads and, in particular, benchmarks the performance of our HAMR heads. His wife, **Anita Kumar**, PhD 1994, is managing a Software Engineering group at Transition Networks in Minnetonka MN. They have two children, Uma (15) and Matt (11), and a dog Pepper (5). Eric did his doctoral research in surface science with Marty Kordesch while Anita did her doctoral research in nuclear theory with David Onley.

Earl Saito, PhD 1993, is the Vice President for Emerging Technologies for GE Hitachi, Global Nuclear Fuel (GNF) company. Earl did his doctoral research in experimental nuclear physics with Ray Lane.

2000-2009

Hamad Al-Britthen, PhD 2004. Hamad and his family live in Saudi Arabia where he is a Professor in the Physics and Astronomy Department at King Saud University, and also associated with the King Abdullah Institute for Nanotechnology at the same University as well as the National Center for Nano Technology at King Abdulaziz City for Science and Technology, all in Riyadh. Hamad did his doctoral research with Art Smith.

Kendal Clark, MS 2005, stayed at Ohio University and earned a PhD in Electrical Engineering in 2010 under the direction of Savas Kaya and working in collaboration with Saw Hla. Kendal then took a successful postdoctoral position at Oak Ridge and is now an Assistant Professor of Physics in Central Methodist University in Fayette, Missouri.

Costel Constantin, PhD 2005, and **Anca Constantine**, PhD 2004, are both Assistant Professors (Physics and Astrophysics) at James Madison University in Harrisonburg, VA where they live with their daughter Mia. Costel investigates oxide and nitride materials and did his doctoral research with Art Smith. Anca did her doctoral research with Joe Shields.

Aparna Deshpande, PhD 2006, is now an Assistant Professor in India (IISER, Pune). She has set-up an impressive low temperature UHV STM lab there. Aparna did her doctoral research in surface science with Saw Hla.

Muhammad Baseer Haider, PhD 2005. Muhammad lives with his wife and their 2 children in Dhahran, Saudi Arabia where he is an Assistant Professor of Physics at King Fahd University of Petroleum and Minerals (KFUPM). Prior to his appointment at KFUPM in 2009, he worked as a postdoctoral fellow under a joint appointment of the University of Alberta and the National Institute for Nanotechnology. Muhammad did his doctoral research with Art Smith.



Dr. Aurangzeb Khan, PhD 2007 and **Dr. Saima Khan**, PhD 2008, returned to Athens to visit family and our department including their thesis advisor, Marty Kordesch. Dr. A Khan is an associate professor and Dr. S Khan is an assistant professor, both in the Physics Department at the University of Tabuk, Kingdom of Saudi Arabia. Their Athens relatives include our recent doctoral student, Dr. Sajida Khan PhD'14.

Mark E. Little, PhD 2001, holds the position of Semiconductor Manufacturing Engineer with Honeywell Aerospace in Plymouth, MN. Mark did his doctoral research with Marty Kordesch.

Catalin Matei, PhD 2005, and his wife **Violeta Iancu**, PhD, 2006, now both have permanent positions at the Extreme Light Infrastructure (ELI) which is located in Romania and covers a broad range of multi-disciplinary science with intense lasers. Catalin reports that on the nuclear physics side, ELI is planning to build a “super HIGs” gamma-ray facility. Violeta is in the Applied Physics Department while Catalin is in the Nuclear Physics Department. Violeta did her doctoral research in surface science with Saw Hla while Catalin’s doctoral research in experimental nuclear physics was directed by Carl Brune.

Deepshikha Shukla, PhD 2006, reports that she is now in her third year at the University of North Carolina at Greensboro, NC as a Visiting Assistant Professor. Her responsibilities mainly involve teaching undergraduate Physics courses and some service and research. She has been quite active in outreach activities involving middle school girls (with two grants from the American Association of University Women - AAUW; one of them as PI). Most notable achievement - decreasing the DWF (D’s, W’s, F’s) in introductory algebra-based Physics from >30% to <20%. Her husband, Shaleen Shukla, PhD 2008, is also working in a similar position at UNC-Greensboro. They have a 3.5 year old son, Neelay! Deepshikha did her doctoral research in nuclear theory with Daniel Phillips while Shaleen did his doctoral research in nuclear physics with Steve Grimes.

Rong Yang, PhD 2006, lives in Beijing with her husband Wei and son Lingyu (now in his first year of high school) and is a research scientist at the National Center for Nanoscience & Technology, studying semiconductor nanomaterials and their biomedical applications. Rong did her doctoral research with Art Smith.

2010-present

Karina Avila-Coronado, PhD 2014, is a postdoctoral researcher with Prof. Annette Zippelius’ group at Georg-August Universitaet, Goettingen, Germany. Karina did her doctoral research in condensed matter theory with Horacio Castillo.

Daniel Bergman, BS Applied Physics 2001, After graduating from Ohio University, Daniel went to the University of Toledo and acquired a Masters of Science Professional of Photovoltaics degree in 2013. He currently lives in Toledo with his fiancée and works at First Solar in their Quality and Reliability department testing the long-term reliability of their thin film solar module.

Tianjiao Chen, BS Physics & BE Mechanical Engineering 2011, Tianjiao went on to obtain her MS in Mechanical Engineering, graduating from MIT in 2013. She has a patent for a rotary-bed reactor design that applies the chemical looping combustion technology. She currently lives in Wilton, CT and is a design engineer working for ASML, a major provider of lithography systems for the semiconductor industry.



Andrew Dilullo, PhD 2013, is now a postdoc in Argonne National Lab. Andrew did his doctoral research in surface science with Saw Hla. He won the NQPI Best Dissertation Award.

Dilupama Divaratne, PhD 2014, reports that she has moved to Englewood, OH where she is a Visiting Assistant Professor in Physics at Miami University in Oxford, OH. During the Fall Semester, she taught two sections of a lab and lecture combined Scale Up classes. She meets with the students two times a week for 2.15 hours. In the Spring Semester she will again be teaching classes using Scale Up. Dilupama reports that she loves Scale Up teaching and has an outstanding room to work in at Miami. Some photos were made of her teaching that appeared in the local media and the President of Miami University is coming to view the class. Dilupama completed her doctoral dissertation in experimental nuclear physics under the direction of Carl Brune.

Tejinder Kaur, PhD 2013, is the Principal Consultant at Genpact Headstrong Capital Markets in Richardson, TX. She and her husband, Piyush Verma (J Warren McClure School of Information and Telecommunication Systems alum) welcomed a new baby, Jasmine Verma, on December 23rd. Tejinder did her doctoral research in condensed matter theory under the direction of Nancy Sandler.

Wenzhi Lin, PhD 2011, Wenzhi and his family live in Los Alamos, New Mexico. Wenzhi is presently a postdoctoral research associate at Los Alamos National Laboratory. His research interest is focused on using scanning tunneling microscopy and spectroscopy to explore photophysics of semiconductor nanocrystals with an emphasis on applications in solar energy conversion and light-emitting devices. Wenzhi did his doctoral research with Art Smith.

Gcina Mavimbela, PhD 2012, is a Lecturer of Physics at the University of Swaziland in Kwaluseni, Swaziland. Gcina did his doctoral research in condensed matter theory with Horacio Castillo.

Kellen Murphy, PhD 2014, reports that he is the owner of Cardinal Computing Consultants, Inc., a rapidly growing information technology company headquartered in Athens, OH. Cardinal Computing Consultants specializes in small business information technology and residential technical support/training services and serves all of central and

southeastern Ohio. Kelly is married to Holly and they have identical twin two-year old daughters, Hope and Lily. Kellen did his doctoral research with Doug Clowe.

Gayani Perera, PhD 2011, is now a postdoc at Brookhaven National Laboratory. Gayani did her doctoral research in surface science with Saw Hla.

Greg Petersen, PhD 2013, is an Algorithm Engineer at TSI in Minneapolis, MN. On a personal note, Greg got married this past July to another Ohio University graduate, Mahin Shahlari, who earned a PhD in Chemical and Biomolecular Engineering. Greg did his doctoral research in condensed matter theory under the direction of Nancy Sandler.

Daniel Sayre, PhD 2011, was recently hired as a staff scientist at Lawrence Livermore National Laboratory (LLNL). Dan has been a postdoc at LLNL for the past three years, where he has been, and continues to be, part of the group responsible for neutron and gamma-ray measurements from inertial confinement fusion experiments at the National Ignition Facility. Dan did his doctoral research in experimental nuclear physics under the direction of Carl Brune.

Kyle Uckert, BS 2010, reports that he is still working on my PhD at New Mexico State University on the optimization of IR spectroscopy and mass spectrometry techniques for the identification of subsurface biosignatures. He spent quite a bit of time underground this last year doing field work in caves in New Mexico. He also had the opportunity to travel to Cueva de Villa Luz (a toxic cave full of sulfuric acid and hydrogen sulfide in Mexico) with National Geographic to demonstrate the operational capabilities of a portable NIR spectrometer they've developed. (Kyle says he is mentioned as "other scientists").

Joel Vaughn, PhD 2010, during this past year started Wolfram-Labs which offers R&D for hire services, and manufactures automation components/systems. He reports that it has been a wonderful adventure! Before leaving Sandvik Hyperion Joel was awarded Inventor of Year (2013). Joel's doctoral research was directed by Marty Kordesch.

Kangkang Wang, PhD 2011, Kangkang currently lives in the San Francisco bay area and works at Seagate Technology. At Seagate, he is working towards extending the magnetic recording technology into the future, by focusing on the magnetic characterization of media and studying recording physics. Kangkang did his doctoral research with Art Smith.

Recent PhD Graduates

January 2014

Ella (Congshang) Wan – with Dr. Martin Kordesch
'Study of Scandate Cathode Surface Materials'

March 2014

Yuting Li – with Dr. David Drabold
'Simulations and Electronic Structure of Disordered Silicon and Carbon Materials'

August 2014

Anthony Paul Ramirez – with Dr. Alexander Voinov
'Study of nuclear level density from deuteron induced reactions on iron and copper isotopes'

August 2014

Bing Xia – with adviser Dr. Justin Frantz
'PZERO-Charged Hadron Jet Correlations in d+Au Collisions at $\sqrt{s_{NN}}=200\text{GeV}$ '

Undergraduate Degrees

Matthew Burket (BS cum laude, Astrophysics).

Tyler Coy (BS, Physics).

Robert Harrington (BS, Applied Physics).

Justin Hunneshagen (BS, Astrophysics).

Yashashree Jadhav (BS, magna cum laude, HTC Astrophysics). She is going to a PhD program in astrophysics at the University of Rochester.

Desmon Rogers (BS, Applied Physics). He plans on applying for a Masters in Biological Sciences.

Austin Way (BS, summa cum laude, HTC, Engineering Physics). With his NSF Graduate Fellowship in hand, he is going to a PhD program in Materials Science at the University of Wisconsin.

SuSuTin Win (BS, Physics). She returned to Myanmar and is applying for graduate programs in the UK.

Danielle Witt (BS, Physics and BS, Applied Math). She is going to a Masters in Applied Math at Wright

In Memoriam



John O'Donnell, Systems Engineer, Edwards Accelerator Laboratory

We mourn the loss of Systems Engineer John O'Donnell and are grateful for the time he was with us.

O'Donnell, age 56, passed away on February 9, 2014. He is survived by his mother, Ann McGinn Huddart. O'Donnell was a native of Pittsburgh, Pennsylvania, and came to Athens as an Honors Tutorial College student in Physics. He was hired at Ohio University's Computer Services Center for two years before joining our department. His primary assignment was to provide software support to those doing research at the Edwards Accelerator Lab, but John far exceeded his job description.

O'Donnell became skilled at machine operation, gas cell assembly and testing, and served for a time as Radiation Safety Officer for the lab. Many graduate students came to rely on O'Donnell's help to the extent that their faculty advisers, in meeting former students at professional meetings, would be asked to convey greetings to him when they returned to Athens.

O'Donnell also had a very substantial impact on the region, particularly in the Village of Amesville, where he resided. He was a volunteer and member of the Ames-Bern Fire Department for over a decade and also had worked part time as an Emergency Medical Technician for a few years. He served on the Amesville Village Council for over ten years and part of that time as Vice-Mayor. He assumed a major role and responsibility for an upgrade of the Amesville Sewage Treatment Plant. O'Donnell impressed the contractor with his understanding of the details of the upgrade.

Distinguished professor emeritus Steven Grimes recalled a time some years ago when O'Donnell accompanied a group of physicists from our department on a trip to complete some nuclear physics measurements at Los Alamos National Lab. "During his week there," Grimes said, "John found time to slip away from the lab and consult with the person in charge of the Los Alamos Sewage Treatment Plant. Of the many scientists who have visited Los Alamos for research purposes, John was surely one of a very small number who demonstrated a commitment to his community (without pay) as evidenced by his side trip to the Los Alamos Sewage Treatment Plant."

A person with many skills, O'Donnell had an impressive focus on detail and someone who genuinely enjoyed helping others. His life enriched those of the people he came in contact with and he is missed in many ways.



Tomoyasu Tanaka, Physics Professor and Founder of Chubu Exchange

Dr. Tomoyasu Tanaka, age 94, Emeritus Professor of Physics at Ohio University, passed away in May in his native Japan. He was a highly respected theoretical physicist, loving parent to five children, husband, and son.

"Professor Tanaka was a wonderful colleague. He was interesting to talk to and a very good teacher at the undergraduate and graduate level," said Dr. Louis Wright, Emeritus Professor of Physics and Department Chair during the 1990s. "Soon after joining the faculty at Ohio University, Tomo and his old friend and colleague Professor Katsumori of the Chubu Institute of Technology in Nagoya City initiated an exchange program with Ohio University and Chubu."

"I had the pleasure of being the second Chubu Visiting Professor in the Spring of 1975," Wright continued. "This

was a typical idea of Tomo. He was always interested in trying out new options to improve higher education and open up possibilities for students and faculty. The exchange program with the now Chubu University and Ohio University continues to be strong to this day. Every spring we're reminded of this exchange when we see the 175 cherry trees in bloom that Chubu University gave to Ohio University to celebrate its 175th birthday in 1979, and the additional 25 trees received as a gift last spring to commemorate Ohio University's 200th year."

Thesis Adviser to Future Nobel Laureate

Tanaka was a member of the Physics & Astronomy faculty from 1971 to 1989. He taught Statistical Mechanics and Solid State Theory, among other courses. He was well-known for his excellent teaching at both undergraduate and graduate levels and for his supervision of students in the many-body theoretical group, the solid-state experimental group, and the acoustics experimental group. One of his six graduate students, Venkatraman "Venki" Ramakrishnan, received his Ph.D. in 1976 in condensed matter theory, and later was one of three scientists awarded the 2009 Nobel Prize in Chemistry for his work on the structure of the ribosome.

Tanaka obtained his master's degree in 1943 at Kyushu Imperial University, and in 1953 his doctorate in science at the same university. In 1948 he was appointed assistant professor in the Faculty of Science, Department of Physics, Kyushu University, Fukuoka, Japan. In 1954 he obtained a Fulbright Act Grant and a Smith-Mundt Act Grant to travel to and stay in the United States at the Enrico Fermi Institute for Nuclear Studies, University of Chicago as a Research Associate under Professor J.E. Mayer. In 1955, his stay in the United States was extended for one year, and he became a Research Associate in Fluid Dynamics and Applied Mathematics at the University of Maryland. He returned to Japan in 1956, and was promoted to full professor at his home university. In 1960, The Catholic University of America, Washington, DC, appointed him Professor of Physics, whereupon he left Japan semi-permanently to continue his research in the United States.

He was a member of the Physical Society of Japan (since 1945) and of the American Physical Society (since 1954.) He acted as one of the Board of Editors of the Physical Society of Japan for seven years; he was twice a member of the National Committee on Programming in the Research in Theoretical Physics at the Research Institute for Fundamental Physics at Kyoto University.

Tanaka remained active in retirement by returning to Athens during the Fall of 1997 to write *Methods of Statistical Physics*, a graduate-level thermophysics textbook, published by Cambridge University Press in 2002. The book includes chapters on traditional ensemble theory, review of representation theory, second quantization, perturbation theory, cluster variation method, spin-wave theory, BCS, and s-d interaction.

A Witness to the Atomic Bombing of Hiroshima

Tanaka grew up in Japan and was drafted to serve his country during the World War II. His recollections of that time were stark and horrific. Tanaka's daughter, Norico, recalled, "My father was serving as a naval officer and instructor at the Japanese Imperial Naval Academy on an island near Hiroshima on the day of the bombing. He never spoke in detail about this experience to any of us. At 8:15 that morning, he was brushing his teeth and getting ready for class when the flash came. The instructors were requested to analyze the bomb, and knowing it could not be TNT because no plane could carry a TNT bomb of that size, they concluded it was the "new-model bomb" that had been rumored to be under development," she said.

"From his memoirs," Norico continued, "He wrote: On that fateful day of August 6, 1945, I was witness to the bomb's flash, followed by the shock wave, then the mushroom cloud—from an island just 15 km across the bay from Hiroshima. I cannot find the words to express what I saw, only that I pray deeply that never again will such a tragedy happen again on this earth."

"After another bomb was dropped on Nagasaki, the war quickly came to an end. My father sent all the young soldiers home, closed down the school and passed through the city of Hiroshima on his way back to Tokyo. My mother says he later said he saw bodies everywhere, and injured people with severe burns with skin hanging from their bodies. He walked along the railroad tracks until he got to a station where the trains were still running, and returned to Tokyo," she said.

An Advocate for International Understanding

Tanaka moved back to Nagoya City, Japan after having lived in the United States for almost thirty years, to take up a professorship in the Department of Industrial Physics at Chubu. From 1984, Tanaka served for thirteen years as the director at the Center for International Programs. He was

subsequently appointed the senior university advisor until 2002. In the meantime, he continued to teach for part of the year at Ohio University, splitting his time between Nagoya and Athens. He was subsequently appointed Emeritus Professor at the two universities.

As the inaugural director for the Center for International Affairs, he wrote in the Chubu newsletter in 1985: "...To be 'international,' we must forget the national boundaries that divide us, and live together as citizens of a global world. We must rid ourselves of stereotypes, feelings of superiority and/or inferiority, respect others, and live together as companions in a contemporary world. To do that, we must strive to expand our horizons."

Also in his memoirs, he wrote about the places he had lived, "As one advances in age, it's nice to be back in one's home country. I spent 28 years with my family in the U.S. and acquired a permanent visa, but never citizenship. America is my second home, and will forever be dear to my heart."

Student Research and Creative Activity Expo 2014

First Place Winners



Cody Parker (4th from left)
(PhysAstro Sec 1)



Brian Muccioli
(PhysAstro Sec 2)



Yashashree Jadhav
(PhysAstro Sec 2)



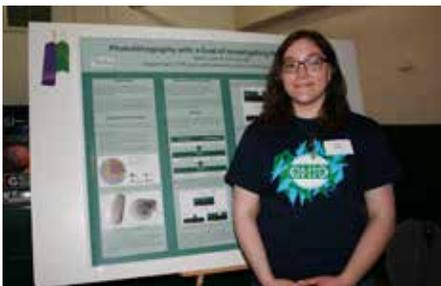
Andrada Mandru
(PhysAstro Sect 3)



Austin Way
(PhysAstro Sec 4)



Ameneh Mohammadalipour
(PhysAstro Sec 4)



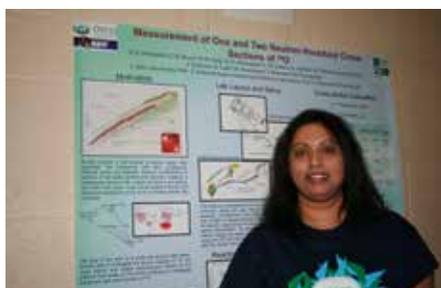
Helen Cothrel
(PhysAstro Sec 5)



Chandrasiri Ihalewala
(PhysAstro Sec 5)

More photos may be viewed on the Department's Facebook 2014 Expo album.

Second Place Winners



Dilu Divaratne
(PhysAstro Sec 1)



Joseph "Perry" Corbett
(PhysAstro Sec 3)

Upcoming Events

Dr. Gang Chen is the chair of the Glass & Optical Materials Division and Deutsche Glastechnische Gesellschaft Join Annual Meeting 2015 from May 17-21 in Miami, Florida.

Drs. Charlotte Elster and **Daniel Phillips** are co-chairs with Dr. Craig Roberts from Argonne National Laboratory, of the 21st International Conference on Few-Body Problems in Physics (FB21) from May 18-22, 2015 in Chicago, Illinois.

Join us for our biennial Open House Fall Semester 2015. The date is TBA.

New Sciences Building Being Considered

The Clippinger building upgrade has recently taken a big leap forward. Ohio University approved a six-year capital improvement plan that includes Clippinger Lab. The proposed \$90M renovation will likely include additional building space. Design firm interviews were conducted and the winning firm will be announced soon. The programming phase could begin sometime in 2015. Clippinger Laboratories was built in the 1960's and is currently home to the Departments of Geography, Geology, Chemistry and Biochemistry, and Physics and Astronomy.

Improvements will include temperature stability, vibration reduction, and adequate electric power to meet modern research needs. In some cases, research such as condensed matter experiments that are very sensitive to vibrations, have needed to move out of Clippinger to produce reliable data. The new capital improvement project will keep us competitive with top institutions in research and undergraduate STEM instruction.

Though the university's six-year capital improvement plan attributes \$90 million to the total project, the exact source of the funds and details for financing the project are still in discussion. When possible, we will solicit Federal funds for specific needs, and private sources for further assistance. To learn more, contact Eric Stinaff, lead contact in the Department of Physics and Astronomy.

Gifts to Ohio University

Physics and Astronomy Scholarships

We are very fortunate to have many outstanding majors who hold academic scholarships that partially support them. We are grateful for your previous support of these scholarship funds and we would encourage you to be as generous as you can in providing continuing support.

Holders of the Edwards Scholarships for 2014-15 include:

- Natalie Klco
- Andrew Dewald
- Samantha Rush
- Taylor Grueser.

Holders of the Shipman Scholarships for 2014-15 include:

- Sara Sand
- Yonry Zhu

Holders of the Stocker Scholarships for 2014-15 include:

- Thomas Riley
- Maxwell Camp

Donors to the Department

During the past academic years the department received contributions from many alumni, friends, and members of the faculty and staff. We are very thankful to all of our donors. Donors from calendar year 2014 are listed below. (We apologize if we have overlooked any contributions made during this period.)

Arnold Aronson
Clyde and Karen Baker
Carl Brune
Don Carter
Horacio Castillo
Michael Cervenak
Gang Chen
Wayne Chiasson
Henry and Shannon Clark
Bruce Danner
Richard and Ruth Fernow
Thomas Fox
Justin Frantz
Robert and Carol Gibbons
Alexander Govorov
Siegfried and Barbara Hausladen
Donald Henry

Lindsay and Carla Hess
Saw-Wai Hla
Yixiu Kang
Paul King
Ken Hicks and Terry Murphy
Marie Huwe
David Ingram
Peter Jung
Martin Kordesch
Colin McCrone
Microsoft Corporation
Robert Mueller
Alexander Neiman
Brent Park
Herbert Petitjean
Daniel Phillips
Julie Roche

Roger and Betty Rollins
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Nancy Sandler
Daniel and Donna Sayre
Joseph Shields
Arthur Smith
Carolyn and Charles Smith, Jr.
Suzanne Stotlar
David Tees
James and Barbara Tison
Eric Stinaff
Margaret and Burt Stumpf
Hames Tison
Sergio Ulloa
Louis and Karin Wright

Building a Strong Tradition of Networking

Thanks to all of you that have stayed in touch with faculty and friends of the Department of Physics and Astronomy. Your feedback and contributions keep our networking tradition strong. Throughout the year we invite you to send us news of personal and professional highlights as well as photos to share. To keep in touch with us submit your news at physics@ohio.edu or newsletter editor Dr. Kenneth Hicks at hicks@ohio.edu.

New Graduate Program Endowment Fund Continues to Grow



In 2013 Professors Ernst Breitenberger and Louis E Wright each contributed \$7,500 toward the initiation of an endowment fund to support the Graduate Program in the Department of Physics and Astronomy. Many friends and alumni contributed to help reach the goal of \$25,000 which is the amount required to create an Endowment Fund.

To reach the goal more quickly, Professor Wright proposed a matching challenge grant up to \$3,000 in the Spring of 2014. The challenge was matched within a couple of months so the Breitenberger/Wright Graduate Endowment Fund now exists. The annual earnings from the endowment will be allocated for support of Physics & Astronomy graduate students by the Department Chair, according to recommendations from the Department's Graduate Committee.

Funds will be used for purposes such as supporting graduate-student travel, providing graduate students with equipment (or software) needed to pursue their research, and providing special awards to outstanding students. We encourage friends and alumni, particularly graduate alumni, to continue to give generously so we can honor the contributions of Drs. Breitenberger and Wright.

