



WINTER 2010

PHYSICS & ASTRONOMY

Greetings Alumni and Friends,

The previous two newsletters have described how the physics side of the department has recently grown through the addition of new faculty and courses. These additions have brought new life to physics graduate program along with some truly impressive grant successes. Assistant Professor Adrian Feiguin landed a \$450,000 NSF CAREER award to carry out theoretical and computational studies of strongly correlated systems. In addition, Assistant Professor Wenying Wang recently garnered two grants totaling \$3.2 million to conduct research on novel materials for solar energy conversion.

We are excited to report that this fall we have been interviewing candidates for a new astronomy faculty member, which should lead to new curricular and research opportunities for our students. We have also been fortunate to replace our 1979 gas-powered Tucker snowcat with a new 2011 diesel version, crucial for getting to and from our observatory on top of Mt. Jelm! Moreover, Wyoming AstroCamp has received generous funding from ExxonMobil through the Bernard Harris Foundation, allowing us to expand the camp to ~50 school children and to 10 days and nights. Last summer one of the camp highlights was a visit from Dr. Harris himself, the first African American to walk in space. Finally, the Wyoming NASA SpaceGrant Consortium spearheaded a \$1 million grant to educate WY students and teachers about wind energy.

This newsletter also includes updates from selected alumni. Email us at physics@uwyo.edu if you would like your career path to appear in a future newsletter and/or our alumni webpage (physics.uwyo.edu/Alumni).

All the best,

Danny Dale

Department Head



Spring 2010 Graduates



Our new Tucker Sno-Cat!

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Wyoming Infrared Observatory News

WIRO has had an outstanding year, and it continues to be one of Wyoming's premier science facilities!

Over 160 people visited WIRO under excellent skies on October 15th for the annual open house, observing the Catseye planetary nebula and an open star cluster through the eyepiece.

An upgrade to the telescope control system begun in 2008 was completed in 2009 and the telescope is now performing science observations with minimal down time due to telescope problems. In return for funding from the National Science Foundation WIRO is offering observing time to astronomers. In the last year, WIRO has been used by astronomers, including many graduate students, from Lehigh University (PA), The University of Colorado, Denver University, the University of Southern Maine, Southwest Research Institute in Boulder, North Carolina, the Goddard Space Flight Center, and the University of Birmingham in the UK!

Wyoming graduate and undergraduate students are using WIRO on a regular basis, including recent PhD graduates Dan Kiminki and Carolynn Moore who obtained part of their dissertation data at Mt. Jelm. Dan conducted a multi-year survey to measure the masses and other properties of hot O-type stars that have companion stars in close orbits. Carolynn observed galaxies half-way across the visible universe to understand how they form stars over the last 6 billion years of cosmic history. Undergraduates Megan Bagley (B.S. 2010) and Ian Ewing (B.S. 2010) were regular observers at WIRO, gaining observing experience in control of a major telescope facility. In the coming year, WIRO will continue to see regular use by UW students, faculty, and collaborators while it serves as a centerpiece for UW astronomy. Group tours may be scheduled by calling the Department office.

Graduate Student Research: Corin Chepko

Thermoelectric materials are an area of high interest to researchers around the world due to their ability to recycle heat energy into electrical energy. This means that excess heat, which is usually transferred to the atmosphere from cars, laptops, and even power plants, can be converted into useful electrical energy. While numerous avenues have been explored since the 1960s in making these materials more efficient and easier to produce, recent breakthroughs and rising energy costs have created a new rush to study these materials.

Research at the University of Wyoming Physics Department involves studying and finding ways to improve the industry standard of thermoelectric materials for low temperature applications (room temperature to 300F), bismuth telluride. One of the major ways to improve a thermoelectric material is to reduce heat conductivity while preserving or improving the electrical conductivity. Thermal conductivity and electrical conductivity are generally directly related to each other, but research has shown that materials consisting of nano-size crystals can have lower heat conductivities while still retaining good electrical conductivity. The packed-together nano-crystals create boundaries that heat waves cannot easily cross, but that electrons can still tunnel through.

This research can help improve the efficiency of thermoelectric materials as well as making them cheaper to produce. These materials may soon utilize your automobile's excess heat to run any electrical device, such as your air conditioner to cool you down.

Honor Roll of Recent Donors

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If you would like to donate to the Physics & Astronomy department, please visit <https://uwsecureweb.uwyo.edu/giveonline>.





A&S Extraordinary Merit in Advising Awardees



Awards & Recognitions

<i>Mike Alexander</i>	NASA Graduate Student Fellowship
<i>Megan Bagley</i>	Outstanding Senior
<i>Megan Bagley</i>	A&S Top 20 Graduate
<i>Jianbo Liu</i>	Cinnamon Scholarship
<i>Dan Lyons</i>	Outstanding Teaching Assistant
<i>Andrew Magstead</i>	Cinnamon Scholarship
<i>Emily May</i>	A&S BoV Outstanding Service
<i>Roy Oursler</i>	Cinnamon Scholarship
<i>Mark Reiser</i>	Ellbogen Outstanding GA Teaching

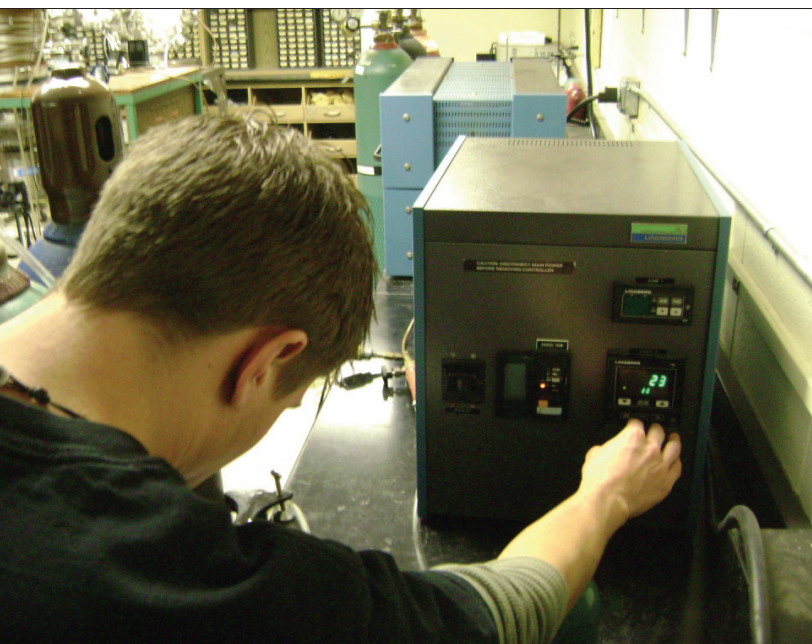
<i>Mike Brotherton</i>	Faculty Senate Speaker Series
<i>Rudi Michalak</i>	A&S Extraordinary Merit in Advising
<i>Jinke Tang</i>	A&S Extraordinary Merit in Research
<i>Adrian Feiguin</i>	NSF CAREER

<i>Lynn Wheat</i>	A&S Student Council Staff Award
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MODERN PHYSICS LAB

The Advanced Modern Physics Lab went into its second teaching cycle. The course performs strong as a double major recruitment tool, and it plays a central role in enhancing student satisfaction and retention for our majors. Typical comments are: "It has been worth the wait to finally do all this exciting stuff."

In the past year, we have been able to add a Rutherford Scattering and a Franck-Hertz experiment. Students appreciate the nuclear and quantum physics experiments very much because they have no other opportunity in our curriculum that help to visualize the difficult concepts. If funds are available, we plan to expand more on the nuclear side of the curriculum, in particular with X-Ray and table-top NMR/EPR labs, each of which start at about \$10,000.



Alumni News

Ramesh Kakar (1970 Ph.D.) I am “Weather Focus Area Leader” in the Earth Science Division and Program Scientist for the TRMM, Aqua, SORCE and GPM satellites.

James Allen (1974 Ph.D.) I am President of J.L. Allen Exploration Ventures, an oil & gas exploration company working the Gulf Coast.

Daniel Carroll (1975 Ph.D.) I have been with Sandia National Lab in Albuquerque for 26 years. I am currently on assignment in Washington D.C. at the NNSA in the area of Space Nuclear Detonation Detection.

Karl Klett (1988 M.S.) Currently I am a research physicist at the U.S. Army Research Laboratory in Adelphi, MD. My work is in the areas of radiometry, spectrometry, and infrared phenomonology. Prior to this, I was employed by JPL (1989-1997), Raytheon Corporation (1997-2001), and Swales Aerospace (2001-2007).

Mary Dahm (1993 B.S.) I received an M.S. in Physics (emphasis in Astrophysics) in 1996 from the University of Denver. I worked for six years in aerospace in the Denver area, and now teach astronomy and physics at Front Range Community College in Westminster (CO) and do medical coding as my day job.

Timothy Titus (1996 Ph.D.) is currently the U.S. Geological Survey Astrogeology Science Center Director (Acting) in Flagstaff, AZ. This is a 120 day detail which started in October 2010. I started working in Astrogeology in 1997. In addition to being the director, I am also a team member of 3 active space flight missions: Dawn, Mars Reconnaissance Orbiter (MRO) Compact Reconnaissance Imaging Spectrometer for Mars (CRISM), and the Mars Odyssey THERmal Emission IMaging System (THEMIS).

My current research ranges from Mars polar processes to thermal characterization of cave microclimates. I am also a member of the Arizona Army National Guard.

Justin Schaefer (2003 B.S.) I received an M.S. in Astronomy from the University of Florida in 2006 M.S. I left academia and returned to live and play in the mountain west. I am currently a Radiation Effects Engineer with SEAKR Engineering in Centennial, CO.

Michael Mayo (2003 B.S.) I earned a Ph.D. in Physics from the University of Missouri (biophysics theory) in 2009. My current position is Research Physicist in the Environmental Laboratory at the Engineer Research and Development Center, US Army Corps of Engineers.

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