

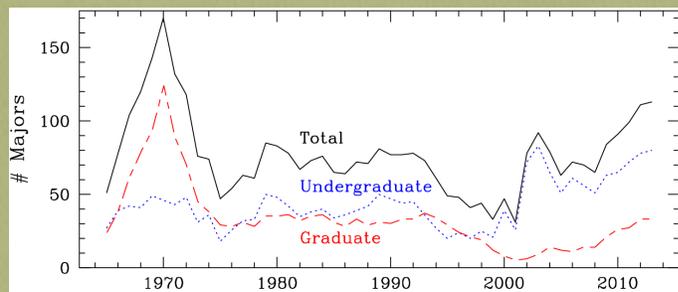


February 2014

News from the High Plains



Spring Graduates



Historical student numbers

COLLEGE OF ARTS & SCIENCES
Department of Physics & Astronomy
(307) 766-6150
physics@uwyo.edu

UWYO.EDU/PHYSICS

Greetings Alumni & Friends,

Physics & Astronomy at 7200' is alive and kicking. The enclosed plot shows how our student population has seen significant growth over the past decade to a present total of 115, including 38 graduate students (see also the Sputnik-era spike!). This growth has gone hand-in-hand with the University's decision to recommit to physics.

Our astronomy program now has expertise in star formation, planetary formation, galaxies, quasars, instrumentation, and cosmology. UW physicists work on a wide array of areas in condensed matter physics and biophysics. Much of the focus has been on developing and understanding nanostructures geared toward efficient energy transportation and conversion (e.g., solar cells). Our physics faculty have also been working with the departments of Chemistry, Chemical & Petroleum Engineering, and Mechanical Engineering to develop a cross-college, interdisciplinary Materials Science and Engineering program. This program allows students to take courses from multiple departments, carry out collaborative research, and ultimately pursue a terminal degree in their home departments with a concentration in Materials Science.

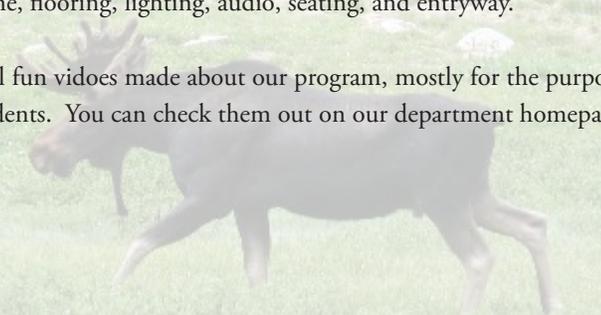
In terms of infrastructure, our program is almost unrecognizable from where it stood just a few years ago. We now have a first-class nano-fabrication and characterization lab that includes key pieces of equipment such as an electron-beam evaporator, X-ray diffractometer, reactive ion etcher, chemical vapor deposition systems, mask aligner, etc. Our newest faculty member, TeYu Chien, is building up a lab centered around a state-of-the-art scanning tunneling microscope. Our observatory WIRO is also continuing to see upgrades. The control system and internet connection for our telescope at WIRO have been completely revamped, making the facility far more reliable. A new large-format optical camera will come online later this year.

Three new courses were offered last year: Prof. Myers developed a graduate course on how to "mine" large astronomical data surveys and Prof. Jang-Condell developed a new graduate course on exoplanets. Prof. Pierce developed a new course in electronics and digital instrumentation involving arduino microcontrollers. Students designed several interesting final projects, including a theremin, a dirigible, a hovercraft, and a virtual keyboard enabled by a Wii remote sensor.

Thanks to a gift of \$875k from the Windy Ridge Foundation, we are planning for a Summer 2014 make-over of our planetarium. Besides a fancy new digital projector, we'll upgrade the dome, flooring, lighting, audio, seating, and entryway.

Finally, we had several fun videos made about our program, mostly for the purposes of recruiting new students. You can check them out on our department homepage.

All the best,
Danny Dale
Department Head



NEW IN THE DEPARTMENT



Dr. TeYu Chien

Professor TeYu Chien received his Ph. D degree in physics from the University of Tennessee, Knoxville in 2009. He worked as a postdoctoral researcher in Argonne National Laboratory (2009-2011) and at Northwestern University (2011-2013) before he arrived in Laramie in 2013. His research area is focused on electronic properties and many-body effects of low-dimensional materials and devices, such as metal surfaces, interfaces of complex oxide systems and interfaces in next generation solar cell devices. The goals are to understand fundamental physics in these low-dimensional environments and to seek out novel applications.

Beth Clement

Beth Clement joined the Physics & Astronomy department as an Office Associate in August, 2013. She spent the previous 10 years at a financial planning office in Denver following her graduation from the University of Colorado, Colorado Springs with a degree in Marketing. When not in the office, Beth enjoys traveling, playing volleyball, spending time with her family and friends, cheering on the Broncos, and trying to get her puppy to stop destroying her yard. She was recently engaged to UW chemist Brian Leonard and is having fun planning their upcoming wedding.



We welcomed quite a few new graduate students this year, from both near and far.



(pictured from left to right)

Jyoti Pandey - U. Wyoming, Nepal
Uma Poudyal - Tribhuvan U., Nepal
Tika Neupane - Tribhuvan U., Nepal
Ravi Neupane - Tribhuvan U., Nepal
Subash Kattel - Tribhuvan U., Nepal
Dylan Kloster - W. Washington
David Kasper - U. Minnesota
Joseph Gutierrez - Adamson U., Philippines
(not pictured)
Michelle Mason - UC Berkeley
Cody Minns - Indiana U.
Chris Garcia

STUDENT PROFILES

Beau Yeik

I was fortunate to have the opportunity to work with Dr. Zhang and Dr. Lowell Burnett (UW 1970 Physics Ph.D.) at Quasar Federal Systems in San Diego. Several years back they created passive sensors that utilize E and B fields, and are currently exploring biological, geological, and meteorological applications. I spent the first half of the summer performing experiments to determine the boundaries of a metal detection portals. The experiments entailed ascertaining the effects of an object's size, composition and velocity as it passed through the portal. I also performed market research on current metal detection portals and stray voltage detection, as well as their market viability.

I then spent time building simple circuit boards but soon moved on to the detection of electrical fields in thunderstorms. To achieve the latter, we mounted electrical sensors onto a "drone" or Unmanned Aerial Vehicle (UAV). I made minor modifications to their on-board sensors (CPUs, GPS, antennae) to achieve acceptable reception, and worked on the data collection infrastructure. A highlight of the summer experience was traveling to Socorro, New Mexico to test the UAVs in an actual thunderstorm. After some preliminary tests, we conducted two flights in and near a thunderstorm. The summer wrapped with analysis of the data taken in New Mexico.

The experience, burritos, my mentors, and the general platform of the company itself were exceptional.



Beau (far left) with his San Diego crew



Sabit Horoz

Sabit is studying synthesis of CdSe Quantum Dots by laser ablation of a bulk target in water using a nanosecond pulsed laser. The as-prepared CdSe QDs were subsequently used to make ligand-free QD-sensitized ZnO nanowire solar cells. The preparation, photoluminescent properties and device performance of the QDs and cells were investigated and analyzed. The performance of the cells suggests promising potential of this liquid-based synthesis method for QD-sensitized photovoltaic solar cells.



Scott Maloney

Scott's research involves the study of semiconducting metal-oxide nanowires and their use as transistors and active layers in solar cells. Nanowires have many interesting properties that make them good candidates for high-efficiency electronic devices. They are single crystal structures with a high electron diffusion length, and their linearity allows current to transfer more directly than it would in a bulk material. They are also cheaper (i.e. require less energy) to make than bulk pure crystalline silicon. His group can study the properties of these wires by printing microscopic contacts over them using photolithography.

ALUMNI NEWS

David Klassen (Ph.D. 1993) After graduating from UW I had a one-year post-doc at Cornell University working with Jim Bell. I then accepted a tenure-track faculty position in Physics & Astronomy at Rowan University in Glassboro, NJ. Rowan is a comprehensive state school that had just recently started up an engineering program and was expanding its science faculty in support of that. I have continued my planetary science research, both ground-based and working with MRO spacecraft data, as well as teaching a multitude of undergraduate courses. For the past several years I have been the Associate Chair of the department, and this year was promoted to full professor. In 2000 I married Mary Ann Hickman, another UW grad, who had accepted a position at nearby Swarthmore College and we enjoy living in the outskirts of historic Philadelphia. When not working we enjoy traveling (usually tacking a week or so onto the beginning or end of the summer American Association of Physics Teachers conference), working in the garden, and I've lately taken up the grand puzzle of genealogy.

David Ciardi (Ph.D. 1997) is currently an Associate Research Scientist at the NASA Exoplanet Science Institute located at the California Institute of Technology in Pasadena, CA. After UW, David went to the University of Florida in 1998 as a postdoctoral scholar working with Elizabeth Lada on star formation utilizing the Wide-Field

Infrared Explorer (WIRE). After WIRE malfunctioned upon entering Earth-orbit, David took his extensive infrared instrumentation experience obtained at UW and joined the infrared instrumentation group at UF where he designed the spectroscopic modes for the mid-infrared instruments T-ReCS (Gemini) and CanariCam (GTC). David left for the NASA Exoplanet Science Institute at Caltech in 2003; since arriving at Caltech, David has been involved in various exoplanet searches from both the ground and space and is currently a science team member of both the CoRoT and Kepler exoplanet missions.

Brannon McCullough (B.S. 2004) entered the Biological and Biomedical Science PhD program at Yale University in 2005 and in 2008 he received an MPhil. in Molecular Biophysics and Biochemistry. He has been investigating the mechanics of how actin filaments are severed by cofilin, a process that is central to cell motility. He is finishing his dissertation research and will defend early next year. Brannon will then start a postdoc at the University of Minnesota to investigate the mechanochemistry of brain cancer cell motility and migration by testing computational models with quantitative microscopy experiments.

Jeff Sudol (Ph.D. 2000) I am a tenured, assistant professor in the Department of Physics at West Chester University. I am currently modeling the dynamical evolution of the HR 8799 planetary system.

Thank you to our recent donors! David & Dianne Bertsch, Wilbur & Margaret Bunch, Burnett Family Charitable, Daniel & Kimberly Dale, Cheryl Dellai, Robert Ellefson, Terrence & Margaret Flower, Lowell Hill, W. F. & Janet Klawiter, Chip & Carol Kobulnick, Leslie Fung & Michael Johnson, Roland Lamberson, W. David & Lois Larmouth, Terry Scott & Jean Meyer-Scott, D. Mark Manley & Mari Takai-Manley, Paul M. Miller, William Roberts, Jerry Tastad, Windy Ridge Foundation. If you would like to donate please visit uwyo.edu/foundation.

Physics & Astronomy
Dept 3905
1000 E. University
Laramie, WY 82071