

# Welcome from the Chair

## Welcome from the Department Chair

September 2011

Dear UCD Physics community,

I take the position of Department Chair at a time of dramatic transition for UC Davis. Large funding cuts driven by the state budget crisis have forced us to reinvent many aspects of how UCD operates. Our campus leaders envision an ambitious path toward financial stability and even greater excellence. We are moving toward a model where more of our funding comes from tuition (including from an increasing number of out of state and international students) from external grants and from philanthropic support. Also, changes are underway to improve the efficiency with which we all work together on campus and the transparency with which resources are allocated.



Amid all this change, the fundamental elements that make this department great are more compelling than ever. The field of physics is thriving. Explorations of condensed matter and complex systems are revealing new insights into exotic emergent behaviors in large systems. Studies of elementary particles and astrophysical objects are changing our thinking about the fundamental properties of matter space and time. New interdisciplinary connections with a diverse array of fields such as biology, chemistry and "big data" science hold great possibilities. All these topics excite our sense of wonder and discovery, and many offer the promise of transformative contributions in areas of practical concern such as energy, information technology and medicine. Our department has leading researchers in all these areas.

An increasing number of students choose to study physics, both because it is amazing, and because the training in creative and technical problem-solving is highly valued in many walks of life. And our department has a truly impressive collection of faculty and staff that has propelled us from 44th to 26th in the *US News and World Report* rankings in an unprecedentedly brief eight year time span (to 2010). This is momentum we expect to build on in the years to come.

We face a future where great changes are afoot and in which we have great things to offer. We must fully engage the changes taking place around us to make sure we become even better positioned to thrive and advance our passions for great research and learning. We must also work to protect and strengthen the role of the University of California as place of opportunity for all. I am honored to be in a position to contribute to this process and to work with the impressive UCD physics community to realize our dreams together.

As you look through these pages you will learn what is happening in our department and get a sense of why I am so proud to be a UCD Physicist. I especially want to celebrate the arrival of our prominent new faculty member Prof. Mike Mulhearn in the High Energy Experiment group, and welcome our excellent new cohort of graduate students and undergraduate majors.

Best Wishes  
Andreas Albrecht  
Professor and Chair

## Letter From Departing Chair Warren Pickett

The Physics Department has completed another academic year as we move instruction-wise into Summer Sessions and research-wise into numerous summer activities. An especially bright spot recently was the commemoration in early June of the historical leadership by John Jungerman in establishing federally-funded research in our department beginning in the 1950s. The building housing Crocker Nuclear Laboratory (CNL), immediately west of the Physics Building, has been named John A. Jungerman Hall. This naming is especially appropriate, since John was founding director of CNL. A crowd of perhaps 200 former colleagues and current friends joined John in a ceremony emceed by Dean Winston Ko and a reception in CNL with tours of the lab. This is a momentous year for John and for the department, and also marks the 60<sup>th</sup> anniversary of the College of Letters and Science.



We also have a new faculty member, which is another high point of our year. Effective July 1, Dr. Michael Mulhearn joins our faculty. Mike is an experimental high energy physicist who has been conducting his research at the Tevatron at Fermilab from his home base at the University of Virginia. He is transitioning his research to the Large Hadron Collider (LHC) at CERN, where a number of our other high energy faculty members also concentrate their research efforts.

On the other side of the faculty roster, I note that Linton Corruccini and Larry Coleman are retiring at the end of June. These colleagues devoted 38 and 35 years respectively to our department, to the campus, to UC, and to the Physics community. They have been strong contributors as the department has moved from unranked to our current position of #26 according to the highly watched US News and World Report rankings. We celebrate their outstanding service, and look forward to their continued activity in department matters.

Another change is the new, incoming administration of the department. In September Andy Albrecht will assume the Chair position; we thank him for taking on the responsibilities of this office. New vice chairs will also be in place. We thank outgoing vice chairs Richard Scalettar (graduate) and Lori Lubin (undergraduate) for their dedication and their effective administration of department matters assigned to them. The new vice chairs are Rena Zieve (graduate) and Max Chertok (undergraduate). This new administration keeps the department in very able hands.

Department members continue to draw accolades. During this past year many faculty have been awarded fellowships in learned societies and attracted similar and much higher honors. Staff have received significant recognitions, and we have again been successful in highly regarded teaching awards. See our recent [awards list](#). Participation of faculty in the larger research community, nationally and internationally, continues to grow. All of these factors contribute to the enhancement of our program, adding to the excellent research output and our strong record of producing highly-regarded students and attracting leading postdocs to work with us.

A project near and dear to us has drawn a very important accolade as well. In late 2010 the Large Synoptic Survey Telescope received the top ranking of the astronomers' Decadal Survey. See the newsletter article for more details about this exciting project directed by UC Davis physics professor Tony Tyson.

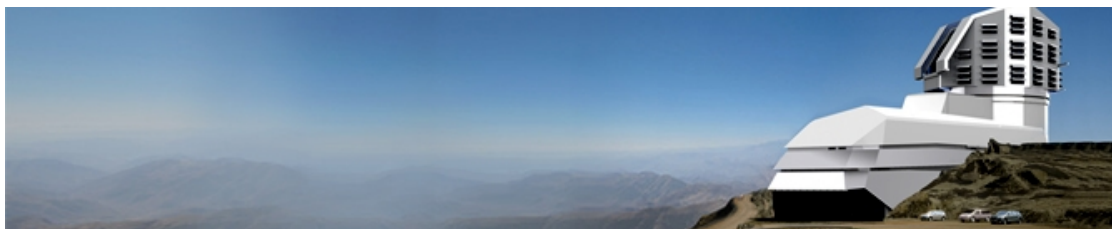
The education mission of the department continues to thrive – perhaps *burgeon* characterizes this better -- as the number of students continues to move upward. Our undergraduate majors number over 200, and we have around 150 graduate students. The incoming graduate class of

22 will replenish the students who obtained their PhD in 2011: 16 walked at commencement, and several others will finish later this year.

To better showcase the department to the world, we recently overhauled our departmental web pages and launched them in late June. Our internet presence now also includes a Facebook page to better-connect current members, our alumni, and anyone else who might "[like](#)" us.

-- Warren Pickett, Chair

## Astronomers' Decadal Survey Gives Top Ranking to UCD-led Project



Every ten years the National Academy of Sciences conducts a review of astronomy and astrophysics research in the United States and lists priorities for the decade ahead. The most recent survey, conducted in 2010, gives its top ranking for new ground-based facilities to the proposed [Large Synoptic Survey Telescope \(LSST\)](#). The director of this multi-hundred-million-dollar project with 36 member institutions is our own Professor Tony Tyson, and the co-chair of one of the key LSST science collaborations is our own Professor David Wittman. Many other UC Davis faculty, students and postdocs are contributing as well to this exciting project.

The LSST will be a new kind of telescope. With a light-gathering power among the largest in the world, it can detect faint objects with short exposures. Its uniquely wide field of view allows it to observe large areas of the sky at once. Taking more than 800 panoramic images each night, it can cover the sky twice each week. Follow this link for a sneak preview based on simulations: <http://www.lsst.org/lsst/gallery/data/sim102010>. Data from LSST will be used to create a 3D map of the Universe with unprecedented depth and detail. This map can be used to locate the mysterious [dark matter](#) and to characterize the properties of the even more mysterious [dark energy](#).

Supported by private gifts, the Department of Energy, and the National Science Foundation (NSF), the group at UCD continues its R&D work on LSST in several key areas: novel algorithms for estimating distances from galaxy colors (so-called "photometric redshifts"), measurements of weak gravitational lensing distortions of distant galaxies due to intervening dark matter, and CCD camera hardware. Some of these innovations are being applied to the UCD-led LSST precursor survey, the Deep Lens Survey. The LSST team at UC Davis is currently preparing for the next major review of the project, in response to a recent go-ahead by NSF's National Science Board.

**Universe@UCDavis** LSST will produce over 200 billion gigabytes of data, resulting in both analysis challenges and science opportunities. The University has responded to these challenges/opportunities by launching in 2005 the Universe@UCDavis Initiative. The multi-disciplinary initiative is focused on the frontier of physics and information: LSST's experimental/observational probes of Dark Energy and Dark Matter. The centerpiece of the initiative is six new faculty hires in four departments - two in Physics, two in CS, and one each in Math and Statistics. Just one position, in CS, remains to be filled. We expect that much of the statistical and database analysis algorithm R&D will have spinoff to other fields.

## Picnic Day 2011, Cosmic Convergence and The Nano Matrix

At picnic day this year the physics club put on its physics show (watch last year's on [youtube](#)), and hands-on physics demos as usual. In addition we had six 30-minute-long public lectures by our faculty. The lectures were quite popular; we packed a 150-seat auditorium for three hours. Most popular was Professor Carlip's lecture on black holes, which filled not only the seats but the aisles too.

The talks were:

Knox	Seeing Sound in the Primordial Plasma
Svoboda	Do We Live in a Universe of WIMPs?
Erbacher	The Smallest Things in the Universe: Subatomic Particles
Luty	The quest for the fundamental laws of physics: a tale of 3 universes
Carlip	Black Holes, Extra Dimensions and All That
Cahill	The Physics of 9/11/2001

I would put the first five of these talks in the category of what we are calling here at UC Davis, 'cosmic convergence.' This convergence refers to the high degree of overlap between the questions of interest to particle physicists and cosmologists. I comment on our picnic day lectures and cosmic convergence in a video component to the newsletter that I posted to our Facebook page [here](#).



In the above video I also mention the great condensed matter physics work being done at UC Davis, and allude to a TEDxDavis presentation by Professor Gergely Zimanyi. This video just became available and you really must watch it. It is true performance art. Follow Gergely "Morpheus" Zimanyi as he leads you on a nanoscience adventure. <http://tedxtalks.ted.com/video/TEDxDavis-Gergely-Zimanyi-Nano>

Lloyd Knox  
Professor of Physics

## Alumni Seminar Series

This spring, like we have done every spring since 2007, we held our alumni seminar series as a one-unit course for our undergraduate and graduate students. This course is very valuable for our current students because our alumni give a perspective that the faculty cannot provide. And for me, as a physics teacher, it is always gratifying to hear our alumni refer to the benefits they see of their time spent hard at work here studying physics. It is also heart warming to see them respond to this opportunity to give back to the department.

Over the past few years we have heard several themes come out repeatedly from our alumni:

- 1) In many circles, a physics degree leads to instant respect for the intelligence of the degree-holder.
- 2) Pursuing a physics degree is good practice for tackling a variety of problems – even ones that have nothing to do with physics.
- 3) Training in physics somehow helps one to have a systems-level view of an organization, market, or complex product, which allows one to see connections that others miss.
- 4) Physicists can find solutions to complex problems, even outside their area of expertise.

We also hear repeatedly about things that have nothing to do with physics, such as the importance of networking, good communication skills, and doing things that you love doing. These are useful bits of wisdom for our students to be hearing first hand from those working outside of academia, who were once where they are now.



Greg Spooner

We thank this year's participants for their enthusiastic response to our request; their time spent preparing and the time and expense of traveling to and from campus. They did this for nothing in return, other than the opportunity to tell their story to our current students.

They were Kevin McLin (BS 1985, Sonoma State University), Greg Spooner (BS 1985, Phd 1992, Cutera, Inc.), Horace Hines (PhD 1976, Philips Medical), Marcus Romani (Meline Engineering), Briann Zaugg (BS 1996, Applied Micro Circuits Corporation), Mark Lawrence (California Scientific), Susan Johnston (BS 1987, Livermore High School) and Tom Cahill (UC Davis).

If you would like to give a presentation, please register [here](#).