

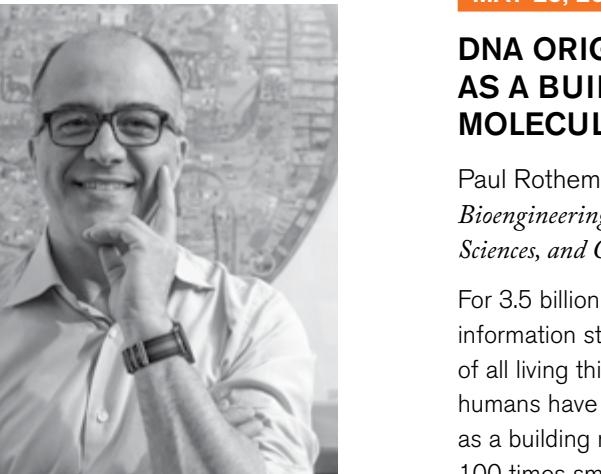


MARCH 9, 2016 / 8 PM

LISTENING TO THE THUNDER OF GRAVITY IN THE COSMOS

Rana Adhikari, *Professor of Physics*

In 1916, Albert Einstein predicted the existence of gravitational waves—vibrations of space-time produced by the most cataclysmic events in the universe that travel at the speed of light. Yet, for several decades, it was believed that these waves either did not exist or were too weak to detect. Over the past 45 years, scientists have been developing ever-more-sensitive detectors capable of measuring these space-time distortions from as far away as hundreds of millions of light years. In this talk, Adhikari will describe how our understanding of the quantum physics of the very, very small has allowed us to explore the gravitational physics of the very, very large.

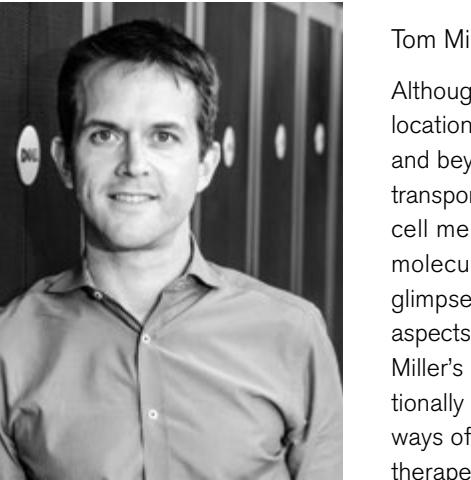


MAY 11, 2016 / 8 PM

SIGNED, SEALED, DELIVERED: HOW PROTEINS GET WHERE THEY'RE SUPPOSED TO GO IN CELLS

Tom Miller, *Professor of Chemistry*

Although proteins are synthesized only in specialized cellular locations, they are destined for delivery to all corners of the cell—and beyond. A key step in this delivery process is the efficient transport, or translocation, of the newly synthesized proteins across cell membranes, which involves a delicate balance between molecular processes. Recent studies offer high-resolution glimpses into the translocation process, but many fundamental aspects of its mechanism and regulation remain poorly understood. Miller's presentation will focus on his lab's efforts to computationally simulate the protein translocation process and to predict ways of controlling the targeting and delivery of proteins for therapeutic or biotechnological applications.



Research photography/illustration credits: Ebster World Map. [ca. 1300]. Facsimile. In Konrad Miller, *Mappaemundi*, 1895-1898 (above); Chuck Carter / Gregg Hallinan and the Keck Institute for Space Studies (cover); Mary Yui, Rothenberg lab, and Ahmet Coskun, Long Cai lab (interior)

APRIL 20, 2016 / 8 PM

WHAT COLUMBUS DISCOVERED

Nicolas Wey-Gomez, *Professor of History*

For five centuries, the voyages of Christopher Columbus have inspired heated debate over the true nature of his Indies enterprise. Did he believe he had reached Asia or a continent unknown to his European contemporaries? And what did he intend to accomplish once he had crossed the Atlantic?

In this talk, Wey-Gomez will explore some of the facts and fiction surrounding Columbus's geographical surveys of the Bahamas and Caribbean Basin. He shows how the navigator's discoveries revolutionized old ideas about the globe and how science, faith, and politics shaped the momentous encounter between Europe and the Americas.



MAY 25, 2016 / 8 PM

DNA ORIGAMI: FOLDED DNA AS A BUILDING MATERIAL FOR MOLECULAR DEVICES

Paul Rothemund, *Research Professor of Bioengineering, Computing and Mathematical Sciences, and Computation and Neural Systems*

For 3.5 billion years, life has used DNA for information storage, to hold the blueprints of all living things. Over the last 35 years, humans have invented a new use for DNA: as a building material for molecular devices 100 times smaller than the cell. In this talk, Rothemund will describe how complex DNA structures are designed via computer, synthesized using simple "kitchen chemistry," and studied with atomic force microscopes that are 1,000 times more powerful than standard light microscopes. Potential applications of DNA origami, from cancer-killing nanorobots to exquisite light sources that might someday power quantum computers, will also be discussed.



THE EARNEST C. WATSON LECTURE SERIES

is named for its founder, the late Ernest C. Watson, who was a professor of physics at Caltech from 1919 until his retirement in 1959. Spotlighting a small selection of the pioneering research our faculty is currently conducting, the Watson Lectures are geared toward a general audience, part of the Institute's ongoing commitment to benefiting the local community through education and outreach. Through a gift from the estate of Richard C. Biedebach, the Watson Lecture Series has expanded to nine lectures annually.

TIME & LOCATION All lectures are held on Wednesdays at 8 p.m. in Beckman Auditorium, which is located near Michigan Avenue, south of Del Mar Boulevard.

ADMISSION & SEATING A minimum of 700 seats are available on a free, no-ticket-required, first-come, first-served basis, beginning at 7:30 p.m. each lecture evening.

PARKING There are lots south of Del Mar Boulevard between Wilson and Chester Avenues as well as parking structures at 341 and 405 South Wilson Ave., and 370 South Holliston Ave. Parking is free, with no permit required, after 5 p.m. on weekdays and all day on weekends.

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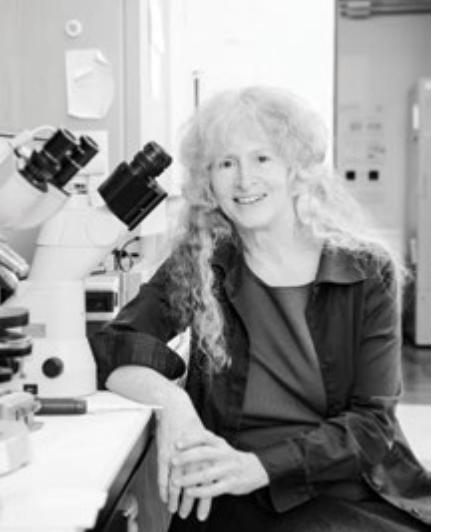


OCTOBER 14, 2015 / 8 PM

BACK TO THE BEGINNING: THE ROSETTA COMET RENDEZVOUS MISSION

Paul Weissman, *Senior Research Scientist,
Jet Propulsion Laboratory*

Comets are the most primitive bodies in the solar system. They retain a physical and chemical record of conditions in the solar nebula, the vast cloud of interstellar dust and gas where our solar system formed more than 4.5 billion years ago. Rosetta is the first spacecraft to orbit a cometary nucleus and will study it for more than two years as the comet moves closer to the Sun and then back out again. In this lecture, Weissman will recount Rosetta's arrival at the target comet in August 2014 and will discuss the many scientific discoveries accomplished so far.



NOVEMBER 18, 2015 / 8 PM

CHOOSING THE T-CELL PROFESSION: HIGHER EDUCATION FOR STEM CELLS

Ellen Rothenberg, *Albert Billings Ruddock Professor of Biology*

All of the body's blood-cell types undergo continuous regeneration, thanks to development from blood stem cells. Among the most versatile of these stem cell descendants are T cells, which develop under the influence of specific environmental signals—despite a molecular tug-of-war underlying large parts of their progress. In this talk, Rothenberg will introduce the intracellular molecules that interpret these signals and program the cells to enter the T-cell "profession." She will show how the developmental mechanism is revealed by processes ranging from dynamic mapping of regulatory proteins in action to movies of individual cells poised to take the critical step forward.

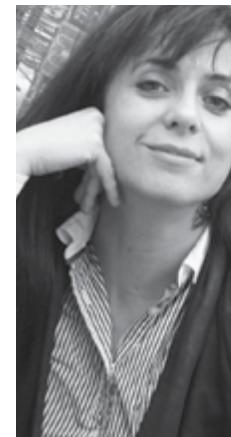


DECEMBER 2, 2015 / 8 PM

COMPLEX QUANTUM COSMOS: SCIENCE PUZZLES AND TECHNOLOGY SOLUTIONS

Maria Spiropulu, *Professor of Physics*

The ATLAS and Compact Muon Solenoid experiments at the Large Hadron Collider are some of the most complex experimental physics instruments currently in existence. They were built to probe the mechanisms that endow mass to the elementary particles, explore the origins of dark matter, and discover new physics beyond the standard model of particles and their interactions. In this lecture, Spiropulu will discuss why the discovery of the Higgs boson is a major milestone in our understanding of the universe. She will also share the profound implications of its properties and elaborate on how the Higgs boson and new emerging puzzles associated with it connect to future discovery.



FEBRUARY 10, 2016 / 8 PM

CHASING EXTRASOLAR SPACE WEATHER

Gregg Hallinan, *Assistant Professor of Astronomy
- Biedebach Memorial Lecture -*

The earth's magnetic field protects its atmosphere from the solar wind during explosive events known as coronal mass ejections. Similar magnetic fields may be crucial in defining the habitability of exoplanets, particularly when their host stars are young and very magnetically active. Hallinan's presentation will focus on his group's efforts to detect such extrasolar space weather on nearby stars, including the intense emissions produced by stars during flares and coronal mass ejections, and the aurorae produced by planets when they experience extreme magnetic storms. Playing a key role in these efforts is a new radio telescope at Caltech's Owens Valley Radio Observatory.