Quantum Entanglement and Quantum Computing

John Preskill
Kaufman Family Professor of Theoretical Physics

The quantum laws governing atoms and other tiny objects seem to defy common sense, and information encoded in quantum systems has weird properties that baff le modern hardware. Preskill will explain why this is so and how exploring quantum entanglement, quantum computers should be able to solve otherwise intractable problems, with far-reaching applications to cryptography, materials science and medicine. Preskill is less weird than a quantum computer, and easier to understand.

Mars Science Laboratory: The Search for Habitable Environments

John P. Grotzinger
Shoemaker Professor of Geological Sciences

The Mars Science Laboratory Mission was designed to explore the habitability of Mars. This includes both modern environments, as well as ancient environments represented by the Gale Crater landing site. The geologic context of the region in and around Gale-Crater is bound by local paleoclimates and paleo-environments, while a few moments of a protein’s life. The newly synthesized protein must be precisely identified, engaged with the proper cellular machinery and committed to the correct biological pathways. This talk will explore the initial protein’s life in the cell, has a profound impact on that protein’s future. During those initial seconds to minutes, the newly synthesized protein’s life begins. The protein’s life begins with the synthesis of its primary structure, followed by additional post-translational modifications, and then committed to the correct biological pathways. This talk will explore the initial minutes of a protein’s life.

Decision Making and Quality Control in Early Moments of a Protein’s Life

Shu-ou Shan
Professor of Chemistry

Proteins are the workhorses that carry out the vast majority of our cellular functions; they are essential for the survival of all cells. The first few moments of a protein’s life, from the synthesis of the peptide sequence to the initial folding and the recognition of its proper cellular location, are essential for the survival of all cells. The Watson Lecture Series has expanded to nine lectures annually. Admission is free.

THE WATSON LECTURE SERIES, founded by Richard C. Biedebach, is named for the late EARNEST C. WATSON, who founded the series in 1922. He presented one of his most popular lectures, “Liquid Air,” as one of the first programs at the new Beckman Auditorium, which is located near Michigan Ave., south of Del Mar Blvd.

All lectures are held on Wednesdays at 8:00 p.m. in Beckman Auditorium, which is located near Michigan Ave., south of Del Mar Blvd.

Through a gift from the estate of Richard C. Biedebach, the Watson Lecture Series has expanded to nine lectures annually. Admission is free.

Shunting Information: A minimum of 700 seats is available on a first-come, first-served basis, beginning at 7:30 p.m. each lecture evening.

Parking is available in the lots south of Del Mar Boulevard between Michigan and Chester Avenues, as well as in the parking structures at 341 and 405 South Wilson Avenue, and 370 South Holliston Avenue. Parking is free, with no permit required, after 4:00 p.m. on weekdays and all day on weekends.

For further information about our services, which include wheelchair seating, large-print programs, please call us at (626) 395-4652 or send an e-mail to events@caltech.edu.

For information:
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Engineering with Impact

Guruswami (Ravi) Ravichandran
John E. Goode, Jr., Professor of Aerospace Guruswami (Ravi) Ravichandran

At the heart of impact events is the propagation of stress/shock waves. Impact events have awesome power—they have shaped planets and wiped out dinosaurs. This talk will examine how we can use the power of these waves to understand extreme conditions and their utility in synthesizing unique new materials and designing protective structures.

Seeing the World in a Grain of Sand

José E. Andrade
Professor of Civil and Mechanical Engineering

Granular materials are ubiquitous in nature and, after the sand on the beach, the second most abundant materials on earth. Dispersing single at the grain scale, these materials are composed of individual particles that collectively display complex behavior controlling the material’s properties such as earthquakes, landslides, and planetary morphology. This lecture will present new methods to characterize and model granular materials for terrestrial and extraterrestrial applications. With advanced X-ray tomography, we can obtain measurements at the grain scale that can then be used to construct predictive computational models for the study of earthquake-induced liquefaction and landslides, and of systems relevant from solar system bodies.

Brain Control with Light

Viviana Gradinaru
Assistant Professor of Biology

This lecture is the Richard C. Biedebach Memorial Lecture. It is an exciting time for engineering neuronal circuits to rewire pathological behaviors like depression, addiction, and traumatic memories, and initiate neural performance with the hope of developing new understanding about how brain circuits and technological advances in imaging and optogenetic instrumentation, combined with experimental approaches, provide a platform to assess whether technology-based light response promoters can be used to probe neural circuits, offering insights into both health and disease.

Physics at the Large Hadron Collider: A New Window on Matter, Space-time, and the Universe

Harvey B. Newman
Professor of Physics

We have embarked on a journey at the border of high energies with the Large Hadron Collider (LHC) at CERN, Geneva, Switzerland. Using the Compact Muon Solenoid (CMS) and the ATLAS, the most complex instruments ever deployed, and new methods developed at Caltech, we are testing the predictions of the Higgs boson thought to be responsible for mass in the universe; searching for supersymmetry, which may be a candidate for dark matter; and hunting for evidence of extra dimensions of space and other exotic new particles. This lecture presents the latest results from the high-energy Hunter of particle physics and offers a perspective on the discoveries that lie ahead.

Under the Hood of the Earthquake Machine

Nadia Lapusta
Professor of Mechanical Engineering and Geophysics

The San Andreas and similar faults separate two tectonic plates slowly moving in opposite directions. The faults can remain locked for many years, then catch up in sudden dramatic rupture events perceived as earthquakes. These occasional episodes can cause much more damage than the gaps between them. This talk will describe how laboratory-derived friction laws and sophisticated numerical models can simulate, in remarkable detail, all stages of fault behavior—locked, slowly moving and earthquake-producing. Once these tools are validated through large-scale experiments, they can be used to forecast the seismic response to both natural and man-made perturbations. In remarkable detail, all stages of fault behavior—locked, slowly moving and earthquake-producing. Once these tools are validated through large-scale experiments, they can be used to forecast the seismic response to both natural and man-made perturbations.