Keck INSTITUTE FOR SPACE STUDIES

for more information
go to:
www.kiss.caltech.edu

The Keck Institute for Space Studies
presents

Light, Atomic Clocks, and Einstein's Relativity

Dr. John L. Hall

JILA, University of Colorado and NIST
Nobel Laureate in Physics, 2005

Wednesday
November 4, 2015
5:00 P.M. Lecture
4:30 P.M. Refreshments

Lees-Kubota Hall
Guggenheim Building
California Institute of Technology

Even though this is the 55th year of the Laser, progress in its control and application in precision measurements is still accelerating. The Optical Frequency Comb technology exploded in 1999-2000 from the synthesis of advances in independent fields of Laser Stabilization, UltraFast Lasers, and NonLinear Optical Fibers, enabling a thousand-fold advance in optical frequency measurement, and searches (in the 17th digit) for time-variation of physical "constants". Several Optical Frequency Standards now have far better performance than the well-established Cs clock that defines Time in the SI (Metric System) measurement system. But adopting a new "Atomic Clock" to "tick out the Seconds" will be daunting - in many ways.

Current advances in ultra-precise locking are also making possible stable optical frequencies defined by length and the speed of light, as well as by locking lasers to the resonant frequency of atoms. These two "clocks" represent our current prototypes of the clocks postulated by Einstein in 1905 in formulating the theory of Special Relativity, which now should be testable into the 18th decimal in a proposed Space-based experiment now being planned by our international Space-Time Asymmetry Research collaboration (STAR). An improvement in the modulation strategy may allow unexpectedly good frequency standard performance in a compact device, and so be useful on earth as well.

Seating is limited and is available on a first come, first served basis.