

VINCENT MEYER COLLOQUIUM

Professor Ursula Keller



Ursula Keller joined ETH as a tenured professor of physics in 1993 currently serves as a director of the NCCR MUST which is an interdisciplinary research program launched by the Swiss National Science Foundation in 2010. It brings together 16 Swiss research groups working in Ultrafast Science across the fields of physics and chemistry. She received the Ph.D. in Applied Physics from Stanford University in 1989 and the Physics "Diplom" from ETH in 1984. She was a Member of Technical Staff (MTS) at AT&T Bell Laboratories in New Jersey from 1989 to 1993.

Attoclock: shining new light on old questions in quantum mechanics

Wednesday, June 5, 2013 ■ 12:30 ■ Meyer Bldg., Auditorium 1003
[Refreshments at 12:30, lecture starts at 12:45]

Abstract: Novel time-resolved attosecond streaking techniques such as energy streaking and the attoclock (i.e. angular streaking) are currently being applied in an attempt to answer a very fundamental questions in quantum mechanics, such as how fast can light remove a bound electron from an atom or a solid? Furthermore, the question of how long a tunneling particle spends inside the barrier has remained unresolved since the early days of quantum mechanics. The main theoretical contenders, such as the Buttiker-Landauer, the Eisenbud-Wigner (also known as Wigner-Smith), and the Larmor time give contradictory answers. Yet recent attempts at reconstructing valence electron dynamics in atoms and molecules have entered a regime where the tunneling time genuinely matters. Therefore it is often posited that the tunneling time is instantaneous because both the Keldysh and the related Buttiker-Landauer times are imaginary (corresponding to the decay of the wavefunction under the barrier). At the other extreme, it is often suggested that quantum mechanical uncertainty precludes a deterministic tunneling time, so little can be said. We used the attoclock technique to measure the tunneling delay time in strong laser field ionization of helium and reveal a real and not instantaneous tunneling time. The matching theoretical model predicts a strong implications on the investigation of electron dynamics in attosecond science, because a significant delay must be taken into account about when the electron hole dynamics begin to evolve.

Professor Keller will also deliver an additional lecture
Recent advances on average power scaling of ultrafast semiconductor and solid-state lasers

Monday, June 3 2013 ■ 16:30 ■ Meyer Bldg. Auditorium 1003

For further information see:

<http://webee.technion.ac.il/Vincent-Meyer-Colloq1uium>