

present

The Seventeenth Annual Moti Lal Rustgi Memorial Lecture

Quantum Cascade Lasers: Widely Tailorable Light Sources from the Mid-infrared to the Far-infrared

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Harvard University

Abstract

Quantum Cascade Lasers (QCLs) represent a radical departure from diode lasers in that they don't rely on the bandgap for light emission. This freedom from bandgap slavery has many far-reaching implications that will be fully explored in this talk. I will trace the path from invention to exciting advances in the physics and applications of these revolutionary lasers which cover the mid- and far-infrared spectrum and are broadly impacting sensing, spectroscopy, and sub-wavelength photonics. The unipolar nature of QCLs combined with the capabilities of electronic band-structure engineering leads to unprecedented design flexibility and functionality compared to other lasers. Topics to be discussed also include: high power and room temperature CW operation in the Mid-IR, room temperature QCL-based Terahertz, and QCL with broadband lasing properties. QCLs have been used as a platform to demonstrate new plasmonic device concepts ranging from resonant optical antenna, to collimators and polarizers. The talk will conclude with applications to chemical sensing and trace gas analysis along with the ongoing commercialization of this technology.

Date: Monday, April 11, 2011

Time: 5:00 pm

Room: Woldman Theater, 112 Norton Hall, UB North Campus

Dr. Capasso is the Robert Wallace Professor of Applied Physics at Harvard University, which he joined in 2003 after a 27 year research career at Bell Laboratories where he became a Bell Labs Fellow and held several management positions including Vice President for Physical Research. His research has spanned a broad range of topics in the areas of electronics, photonics, mesoscopic physics, nanotechnology and quantum electrodynamics, and he is a co-inventor of the quantum cascade laser. He is a member of the National Academy of Sciences, the National Academy of Engineering, a fellow of the American Academy of Arts and Sciences and an Honorary Member of the Franklin Institute. His awards include the King Faisal International Prize for Science, the APS Schawlow Prize, the IEEE Edison Medal, the OSA Wood Prize, the Materials Research Society Medal, the Rank Prize in Optoelectronics, the IOP Duddell Medal, and the Willis Lamb Medal, among others. He is a Fellow of the OSA, APS, IEEE, SPIE, IOP and AAAS.

