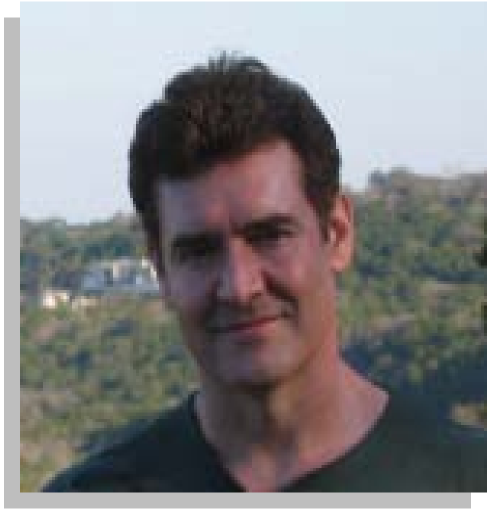
Electrical & Computer ENGINEERING SEMINAR

Thursday, April 23, 2009
Scaife Hall Auditorium
Room 125
4:30 p.m.
Refreshments at 4:00 p.m.



Professor Dennis G Deppe
College of Optics & Photonice
University of Central Florida

Professor Dennis G. Deppe is the Florida Photonics Center of Excellence Endowed Chair in **Nanophotonics** in the College of Optics and Photonics at the University of Central Florida. He received his B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois in 1981, 1985, and 1988, respectively. He was a member of the technical staff at AT&T Bell Laboratories from 1988 to 1990, when he took a faculty position at the University of Texas at Austin. In 2005 he joined UCF. His research has led to awards that include the OSA Nicholas Holonyak Award, the IEEE LEOS Engineering Achievement Award, and he is a Fellow of the IEEE and the OSA.

Prof. Deppe and his research group have published over 200 journal articles, and made over 200 conference presentations, and he holds numerous patents in the area of semiconductor lasers.

Quantum Dot Laser and Microcavity Technologies

Self-organized quantum dots are being heavily studied with applications to several new forms of semiconductor light sources including laser diodes and spontaneous light emitters. The quantum dots offer new technology opportunities for **high power laser diodes, low cost laser diode** for telecommunications, ultrafast, integrated photonics, and new types of vertical cavity surface emitting lasers (VCSELs) for interconnects and sensing. Because of its built-in electronic confinement and small size, the quantum dot also enables new types of spontaneous light sources for quantum information, or quantum sensors. These spontaneous light sources use **microcavity physics** to obtain high output coupling efficiency. In this talk we will discuss many of these applications and present experimental and theoretical results of the new devices.

The ability to reach **low threshold current density and low internal loss** are especially important for high power and integrated photonic applications. **Recently we've demonstrated threshold current density <10 A/cm^2 and internal optical loss <0.25 cm^{-1}.** These combined characteristics can reduce the operating power density of the laser diode, increase its efficiency, and reduce thermal crosstalk between integrated photonic elements. There is also some evidence that the quantum dot laser can operate with reduced sensitivity to optical feedback, which may enable elimination of optical isolators. Its **inhomogeneously** broadened gain region and fast gain and absorption recovery also **produce stable modelocked operation**. When applied to the VCSEL the built-in electronic confinement enables device scaling to small size.

ECE Seminar Hosts

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