

UNIVERSITY OF TEXAS AT DALLAS - DEPARTMENT OF PHYSICS
PHYSICS COLLOQUIUM

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Wednesday, January 30, 2008; 4:00-5:00 PM
Room: ECSS 2.312

**Controlling the Diffraction Limit and Group Velocity
with Active Anisotropic Metamaterials**

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In this talk we explore the perspectives offered by metamaterials for manipulation of optical signals at the nanoscale. We show that in contrast to conventional dielectric waveguides, anisotropy-based systems support confined optical modes even when the waveguide size is much smaller than the wavelength. The effective modal index in these nano-thick structures is inversely proportional to the waveguide size, and can be either positive or negative, providing a versatile mechanism for manipulating the phase velocity and diffraction limit at the nanoscale. In active metamaterials, the combined effect of waveguide- and material-induced dispersions leads to a versatile control over the group velocity which can be changed from negative to large or small (in comparison with c) positive values by a relatively weak modulation of material properties. In the end, the active plasmonic metamaterial provide a unique platform for independent manipulation of group and phase velocities of electromagnetic radiation in sub-diffraction areas.

About the speaker: Dr. Viktor A. Podolskiy received the B.S. degree with honors in applied physics and mathematics from Moscow Institute for Physics and Technology in 1998, followed by M.S. degree in Computer Science and Ph.D. degree in Physics from New Mexico State University in 2001 and 2002, respectively. From 2002 till 2004, he held a Research Associate position at Princeton University. Since 2004, he holds an Assistant Professor position at Oregon State University. His research interests include optical properties of nanostructured metamaterials and photonic crystals, negative refraction, nanophotonics, nanoplasmonics, and quantum chaos in optical systems.