Physics Colloquium

Michigan Technological University

Tuesday, February 11, 2014
at 11:00 am
Room 139 Fisher Hall

Nonlinear Optics at Reduced Dimensions

Hayk Harutyunyan
Argonne National Laboratory
Argonne, Illinois

Abstract: When light interacts with low-dimensional systems, new optical phenomena can arise because of the reduced dimensionality. Classic examples include quantum dots with discrete electronic energy levels or plasmon resonances of metallic nanoparticles. In addition to the dimensionality or shape, the light-matter interaction can be further tuned by using optical nonlinearities. Typically, the induced polarization currents depend linearly on the intensity of the radiation field. However, when the linear relationship breaks down new interesting phenomena arise like frequency conversion or intensity dependent refractive index. We combine this new possibility with the interesting properties of low dimensional systems and use them for applications ranging from sub-diffraction resolution imaging to on-chip frequency conversion.

Bio: Hayk received his PhD in applied physics, working on excited state dynamics of carbon nanotubes, from the University of Pisa, Italy in 2009 (under Profs. Achim Hartschuh and Maria Allegrini) and then was a postdoctoral research fellow in the University of Rochester with Prof. Lukas Novotny. In 2012 Hayk was awarded the Distinguished postdoctoral fellowship at Argonne National Laboratory where he works in Nanophotonics group. Hayk's current research interests include: graphene photonics, nano-optics, plasmonics and nonlinear optics.

MichiganTech