

Photonics Lectures by Prof Nader Engheta

Departments of Electrical and Systems Engineering, Bioengineering,
Physics and Astronomy, and Materials Science and Engineering,
University of Pennsylvania, Philadelphia, USA

Venue: SPMS-LT1 (28 Oct) & SPMS-LT3 (29 Oct)
Host: Asst. Prof. Cesare Soci



CDPT collaborator Professor Nader Engheta will give a series of seminars to present his research activities. At the end of the seminars, he will welcome informal interaction sessions with members of our faculty and graduate students.

28 October 2014, 4:30pm-5.30pm SPMS-LT1 (SPMS-04-07)

Metastructures for Manipulating Light-Matter Interaction

In this talk, I will give an overview of some of our ongoing research activities in the areas of metamaterials, metasystems, and nanoscale optics. Time permitting I will discuss some of the following topics: (a) the extreme-parameter nanophotonics, (b) nanomaterials that perform mathematical operations (nanoscale analog computers), (c) nonreciprocal nanostructures for unusual flow of photons, (d) metamaterial “bits” and “bytes” as building blocks for digital metamaterials, and (e) graphene photonics, to name a few. In my group we are exploring new classes of phenomena and potential applications in engineering functional metastructures. I will present our latest results, and forecast future directions and possibilities.

29 October 2014, 4:30pm-5.30pm SPMS-LT3 (SPMS-03-02)

Nature-Inspired Optical Sensing and Imaging: Causing Invisible to become Visible

Certain animal species in nature have visual systems that are sensitive to light’s polarization – a capability that is lacking in the human eyes. Understanding the biophysical mechanism behind the polarization vision and reverse engineering its functionality leads to exciting novel methods and techniques in sensing and imaging. Motivated and inspired by the features of polarization-sensitive visual systems in nature, we have been developing various man-made, non-invasive imaging methodologies, sensing schemes and visualization and display schemes with useful applications in the optical and microwave domains. These techniques provide better target detection, enhanced visibility in otherwise low-contrast conditions, longer detection range in scattering media, polarization-sensitive adaptation based on changing environments, surface deformation-variation detection, “seeing” objects in shadows, and other novel outcomes and applications. In this talk, I will discuss several optical aspects of the biophysical mechanisms of polarization vision, and present sample results of our bio-inspired imaging methodologies.

Short Biography

Nader Engheta is the H. Nedwill Ramsey Professor at the University of Pennsylvania in Philadelphia. He received his Ph.D. degree from Caltech. Selected as one of the Scientific American Magazine 50 Leaders in Science and Technology in 2006 for developing the concept of optical lumped nanocircuits, he is a Guggenheim Fellow, an IEEE Third Millennium Medalist, a Fellow of IEEE, American Physical Society (APS), Optical Society of America (OSA), American Association for the Advancement of Science (AAAS), and SPIE-The International Society for Optical Engineering, and the recipient of several awards for his research including 2014 Balthasar van der Pol Gold Medal from the International Union of Radio Science (URSI), 2013 Benjamin Franklin Key Award, 2013 Inaugural SINA Award in Engineering, 2012 IEEE Electromagnetics Award, 2008 George H. Heilmeyer Award for Excellence in Research, the Fulbright Naples Chair Award, NSF Presidential Young Investigator award, the UPS Foundation Distinguished Educator term Chair, and several teaching awards. His current research activities span a broad range of areas including nanophotonics, metamaterials, nano-scale optics, graphene optics, imaging and sensing inspired by eyes of animal species, optical nanoengineering, microwave and optical antennas, and engineering and physics of fields and waves. He has co-edited (with R. W. Ziolkowski) the book entitled “Metamaterials: Physics and Engineering Explorations” by Wiley-IEEE Press, 2006. He was the Chair of the Gordon Research Conference on Plasmonics in June 2012.

SCHOOL OF PHYSICAL AND MATHEMATICAL SCIENCES

DIVISION OF PHYSICS AND APPLIED PHYSICS

SPMS-PAP-02-01, 21 NANYANG LINK, SINGAPORE 637371

Tel: (65) 6316 2962 Fax: (65) 6795 7981

