

# SEMINAR

## LIGHT CONTROL IN PERIODIC METALLIC AND DIELECTRIC MICRO- AND NANO-STRUCTURED ENVIRONMENTS

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We will report on our recent theoretical work on passive and active control of light in micro and nanostructures. The excitation of surface plasmon-polaritons in nanostructured metals enable concentrated electromagnetic fields in subwavelength volumes close to the metallic surface. Plasmonics, lead to a plethora of intriguing physical phenomena and applications, such as, nonlinear optical effects, optical antennas, metamaterials with negative effective permeability at visible frequencies, subwavelength imaging, nanoscale optoelectronic circuits, surface enhanced Raman scattering, and solar energy absorption. The richness and complexity of plasmonic interactions makes it necessary to apply full electrodynamic simulations for the design of new structures with the desired optical properties. We will present an overview of our recent theoretical work on the optical properties of plasmonic nanostructures. In particular we will concentrate on the optical properties of metallic nanodiscs, nanorods, and nanosandwiches and explain the physics behind some interesting phenomena like artificial optical magnetism, negative refraction and hyperlensing.

Metallic nanostructures that lack space-inversion symmetry is another interesting class of metamaterials, an example is chiral structures like helical, spiral-staircase, arrangements of metallic nanorods. Towards active control of photonic environments we will consider resonant acousto-optic interaction in dual cavities where both optical and acoustic waves are on resonance, and discuss the conditions for elastic modulation of light through elastic waves as well as control of light emission in multilayer cavities. Finally, we will consider gyrotropic spheres of magneto-optic materials and discuss some examples of time-reversal and space-inversion symmetry breaking, that leads to spectral nonreciprocity and one way waveguiding.

## REMINDER

**Dr Nikos Papanikolau**  
**Light control in periodic metallic and dielectric  
micro- and nano-structured environments**  
**10 July, 2013 – 12:00**  
Place: ICN2 Seminar Hall, ICN2 Building, UAB  
Invited by: Prof Clivia Sotomayor Torres