



SEMINAIRE ISMO

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Optical spectroscopy of suspended graphene and graphene-based hybrid systems

Since 2004, graphene has risen as an outstanding system to investigate the interplay between photons, electrons and phonons in reduced dimensions. In addition, graphene is a promising candidate for realistic applications in electronic and optoelectronic nano-devices. In this seminar, we will focus on the two limiting cases of i) a suspended graphene monolayer and ii) a hybrid system composed of a single nano-emitter physisorbed on monolayer graphene.

First, we will show how the intrinsic properties of suspended graphene can be probed using inelastic light (or Raman) scattering. This technique provides quantitative information about the electronic structure, the position of the Fermi level (*i.e.* the doping level), as well as the influence of disorder, strain, temperature, etc.... We will introduce two original studies based on Raman spectroscopy: i) an all-optical determination of the mechanical properties (Grüneisen parameters and Young's modulus) of a pressurized graphene blister and ii) the observation of (magneto-)Raman scattering by inter-Landau level electronic excitations in mono to penta-layer graphene.

The second part of this seminar will address the interaction between graphene and colloidal semiconductor nanostructures, another promising class of nano-materials for photonics and optoelectronics. We performed a detailed study of Förster-type resonant energy transfer (FRET) between individual CdSe-based (0-dimensional) nanocrystals and (two-dimensional) nanoplatelets deposited on (two-dimensional) graphene. Highly efficient energy transfer results in a shortening of the luminescence decay and subsequent luminescence quenching. The energy transfer rate is further monitored as a function of the distance between the nano-emitter and the graphene layer. Our work demonstrates the realization of prototype graphene-based molecular rulers and uncovers the influence of dimensionality on the energy transfer rate.

Mardi 5 mai 2015 à 11h

Bât. 210 – Amphi 1 (2^{ème} étage)

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