SEMINAIRE ISMO

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Linear and ultrafast optical response of a single nano-object

The large size and environment dependences of the optical response of nano-objects have led to considerable interest in the academic and industrial domains. In particular, they have been extensively exploited to design new optical materials or to create nanosensors, opening the fields of nanophotonics and plasmonics. Because of the very weak optical response of a single nano-object, most investigations have been performed simultaneously probing a large number of particles. Only a mean response is thus obtained, masking the details of the individual behaviors and limiting comparison with theoretical models.

These limitations can be overcome by investigating a single nano-object, which requires development of very high sensitivity optical detection schemes. In this talk, we will present a far-field optical method to detect light scattering or absorption by a single object, based on spatial modulation spectroscopy (SMS). We'll discuss plasmonic experiments on single metal nanoparticles, focusing on the impact of the object environment on its optical response (including high-pressure extreme conditions). Experimental results will be compared to numerical modeling using finite element response. Extension of this method to ultrafast nonlinear spectroscopy of a single nanoparticle will also be introduced. It permits to quantitatively study the physical origin of the optical nonlinearities, and to investigate the ultrafast electronic, acoustic and thermal responses at the nanoscale.

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Amphithéâtre du bât 520 (3ème étage)
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