FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI
DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"
INTERNATIONAL DOCTORAL PROGRAM IN SCIENCE

Optics and acoustics with a single nano-object: environment effects

Dott. Fabio MEDEGHINI
Université Claude Bernard Lyon 1, Institut Universitaire de France

Abstract
When reducing the size of a material from bulk down to nanoscale, the increasing surface-to-volume ratio and the presence of interfaces make the properties of nano-objects very sensitive to their local environment.
Here we show how optical and acoustic properties of single metal nanoparticles evolve by altering their environment and morphology.
For the first time, surface plasmon resonance of individual gold nanobipyramids has been experimentally studied under a pressure-adjustable surrounding, and its evolution physically interpreted through theoretical modeling. In order to access to the optical response under high-pressure at single-particle level, a challenging combination of a spatial modulation spectroscopy (SMS) microscope with a diamond anvil cell has been achieved.
Acoustic vibrations of individual gold nanodisks on sapphire substrate have been experimentally characterized by combining the SMS microscope with an ultrafast pump&probe setup. The dependence of their damping on the disk morphology has enlightened the presence of quality-factor enhancements. Numerical modeling has provided a physical insight for the observed phenomena, showing that mode hybridizations occur at speci c aspect ratios, reducing the acoustic energy loss through the nanoobject/environment interface.

Seminario

Lunedì 18 giugno 2018
Sala Riunioni, ore 11.00
Via dei Musei 41 - Brescia

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