SEMINAIRE ISMO

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Long-range interactions in plasmonic : application to Surface enhanced Raman scattering

Long-range plasmonic interactions can be advantageously exploited in the context of Surface enhanced Raman scattering (SERS) experiments. Such interactions arise from an additional channel of plasmon excitation, due to a diffracted order in the plane of the substrate, named the Rayleigh anomaly, occurring for specific grating constants ΛC. The first diffracted order in the plane substrate arises at ΛC = λ/n, (n being the refractive index of the substrate and λ the incident wavelength). When the lattice resonance wavelength $\lambda_{Lattice}$ is close to the position of the Rayleigh anomaly, the quality factor of the lattice resonance is significantly improved, leading to a maximum of local electric field enhancement.

In this work, we consider square arrays of gold discs fabricated by electron beam lithography, and evidence a long-range interaction in normal incidence for specific grating constants in various media (air, water, …). We show that such arrays supporting long-range coupling are good candidates for improving SERS signals of a molecular probe, the mercapto-benzoic acid (chosen for its ability to form monolayers), provided that the grating constant is blue-shifted compared to the Rayleigh anomaly position. Our experiments are in very good agreement with calculated data (extinction spectra and Raman enhancement factors), using the Finite Difference Time Domain method (FDTD).

Le séminaire sera donné en français, avec des diapositives en anglais

Mardi 12 juin 2018 à 11 h

Amphithéâtre du bât 520 (3ème étage)

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