

# Séminaire

**Vendredi 20 avril 2018**

11 heures

Salle 44 (Pierre Grivet) du C2N site Orsay

**Massimo GURIOLI**

Department of Physics and Astronomy, University of Florence, Via Sansone 1, 50127 Sesto Fiorentino (FI), Italy

## " Near field: exploitation and imaging in nano-photonics."

### Abstract

The tremendous progress in nanophotonics towards efficient quantum emitters at the nanoscale requires investigation tools able to access the detailed features of the electromagnetic field with deep-subwavelength spatial resolution. This scenario has motivated the development of different nanoscale photonic imaging techniques. Among them superresolution (awarded by Nobel Prize), which, however, is not a near field method.

In this talk, we will discuss in detail the differences between superresolution and scanning near field optical microscopy. Then we will overview our activity in using near field microscopy for optical imaging and engineering at the nanoscale both in semiconductor nanostructures and photonics nano-resonators.

For the imaging, we will mainly discuss a novel technique involving the combination of scanning near-field optical microscopy with resonant scattering spectroscopy, leading to Fano profiles signal for the optical modes [1]. By exploiting both tip perturbation and collection, either in forward or in backward geometry, our approach enables the imaging of the electric and magnetic field intensity (including phase, amplitude and polarization) in nano-resonators with sub-wavelength spatial resolution ( $\lambda/20$ ) [1-4]. We will discuss results both in photonic crystals [1-4] and in disordered modes [5-8].

For the engineering, we will show how the ability to control light at the nanoscale can be exploited to tailor and tune the photonic modes [5] and also for fabricating semiconductor quantum dots with control of the spatial location [9]

### References

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- [3] F. La China, et al. Appl. Phys. Lett. 107, 101110 (2015)
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- [5] F. Riboli, et al. Nat. Materials 13: 720 (2014)
- [6] N. Caselli, et al. APL Photonics 1, 041301 (2016)
- [7] N. Caselli, et al. APL 110, 081102 (2017)
- [8] N. Caselli, et al. Nat. Comm., 9, 396 (2018)
- [9] F. Biccari et al, Adv Materials, in press (2018)