Optical Characterization at the Nanoscale

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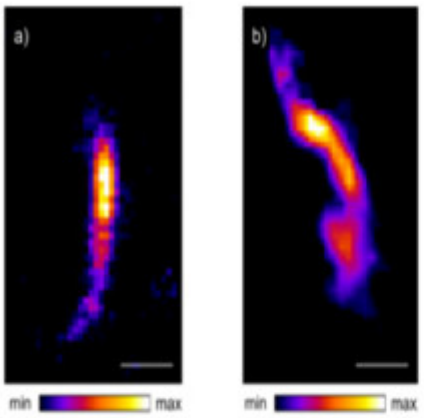

Figure.1 SNOM PL of individual CNT at room temperature. The white bar is 1 mm.

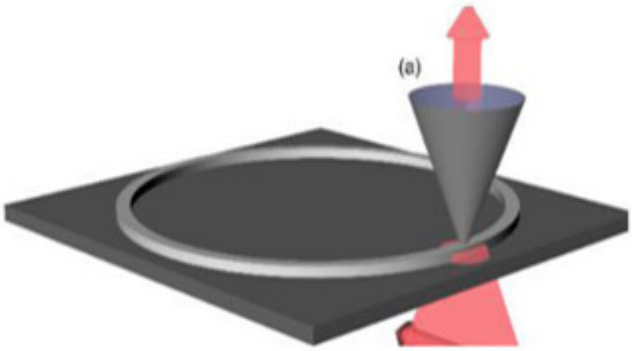

Figure.2 Scheme of the SNOM forward resonant scattering imaging

When: Wednesday, February 07, (2018), 15:00.

Place: Department of Theoretical Condensed Matter Physics, Faculty of Science, Module 5, Seminar Room (5th Floor).

Speaker: Massimo Gurioli, Department of Physics and Astronomy, University of Florence, Sesto Fiorentino (FI), Italy.

The tremendous progress in nanophotonics towards efficient quantum emitters at the nanoscace requires investigation tools able to access the detailed features of the both sources and optical modes with deep-subwavelength spatial resolution. This scenario has motivated the development of different nanoscale optical imaging techniques.

In this contribution, we will overview our activity in exploiting near field microscopy for optical characterization at the nanoscale, both for semiconductor nanostructures and photonics nanoresonators. We will show that the scanning near field optical micro-scopy (SNOM) is a powerful method to access the excitons confined at the nanoscale and to image the electric-magnetic field in nanophotonics.

In the first part we will present experi-ments on carbon nanotubes where the confined excitons are mapped along the micrometer long tube extension, evincing localization and tube bending [1,2]. Exemples are given in Figure 1.

In the second part we will discuss a novel technique involving the combination of scanning near-field optical microscopy with resonant scattering spectroscopy. The scheme of a RS-SNOM measurement on a microring is given in Figure 2. Our approach enables imaging the electric and magnetic field intensity (including phase, amplitude and polarization) in nano-resonators with sub-wavelength spatial resolution (λ/20) [3-8].

We conclude with recent results on the exploitation of our resonant scattering SNOM for addressing the exceptional points in photonics.

References

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