



Appunti di Fisica '18 & Dottorato di Ricerca in Fisica

17 aprile ore 15:00
Sala seminari, CNR-IPCF

Upconversion nanoparticles for biophotonics application

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Through introducing thousands of photon sensitizers and activators ions to form an energy-transfer network within a single nanoparticle, upconversion nanoparticles (UCNPs) can up-convert low energy near infrared (IR) photons into high energy visible emissions. Non-bleaching and non-blinking UCNPs are among the best probes for long-term tracking studies, autofluorescence-free biomolecular sensing, super resolution microscopy imaging, in vivo bio-imaging, and light-triggered nanomedicine applications.

In this talk, I will present part of our research on biophotonics application of UCNP, including single nanoparticle tracking, and UCNP super-resolution imaging. The work of single UCNP tracking represent the first system to have capability in distinguishing and tracking a single nanoparticle from the cluster of nanoparticles by human eye through a microscope. Moreover, we harness the properties of population inversion on single UCNP to realize low-power super-resolution stimulated emission depletion (STED) microscopy and achieve the resolution of 28nm. Furthermore we report that upconversion nanoparticles (UCNPs) can unlock a new mode of near-infrared emission saturation (NIREs) nanoscopy for super-resolution. We achieved a resolution of 40 nm by single beam through 60 μ m liver tissue.

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