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

Ultrafast transient holography: pump-probe microscopy goes widefield

Interviene
Franco V. A. CAMARGO
Italian National Research Council (CNR-IFN, Milan, Italy)

Abstract

In this seminar I will describe a new femtosecond holographic technique developed in our group in CNR-IFN and Politecnico di Milano, which allows us to overcome a longstanding issue of ultrafast microscopes that limited experimental implementation to single pixel approaches. I will show how off-axis holography can be employed with femtosecond pulses to obtain shot-noise limited widefield transient microscopy. I will present results on the femtosecond transient scattering of dozens of individual gold nanoparticles scattered in a microscope slide covering sample areas of 100×100μm2.[1] Further, I will demonstrate how the holographic nature of the technique can be used to turn it into an effective three-dimensional imaging tool when coupled with digital holography tools, which we have used to shoot videos of Brownian motion of dozens of gold nanoparticles in aqueous solution and reconstructing their 3D trajectories. [2] Finally, I will discuss how to convert this approach to study the photophysics and exciton or charge transport properties in solid state samples whilst vastly boosting the sensitivity when compared with standard ultrafast microscopy techniques.

[1] Matz Liebel, Franco V. A. Camargo, Giulio Cerullo, Niek F. van Hulst, "Ultrafast Transient Holographic Microscopy", Nano Lett., 21, 4, 1666−1671 (2021).
[2] M. Liebel, F. V. A. Camargo, G. Cerullo, N. F. van Hulst, "Widefield phototransient imaging for visualizing 3D motion of resonant particles in scattering environments," Nanoscale, 14, 3062-3068, (2022).

Seminario

Venerdì 24 marzo 2023
Aula 27, ore 11.30
Università Cattolica del Sacro Cuore
via Garzetta 48, Brescia

Fai clic qui per partecipare alla riunione

UNIVERSITÀ CATTOLICA del Sacro Cuore