



WALTER PFEIFFER 'Optical Near-Field Control and Nanoscale Spectroscopy'

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May 11, 2012

Seminar, May 11, 2012, 12:00. Seminar Room

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The combination of ultra-short laser excitation, adaptive pulse shaping and photoemission electron microscopy (PEEM) opens a new realm for the investigation of plasmonic and nanophotonic excitations. In this overview presentation coherent control of nanooptical excitations and a new type of nanoscale coherent spectroscopy is covered.

Polarization pulse shaping, i.e. the design of ultra-short laser pulses with continuously changing polarization state, allows nanoscale excitation switching in the vicinity of a metal nanostructure. The locally emitted photoelectrons are monitored with PEEM down to ~50 nm spatial resolution, revealing both adaptive control of localization and ultrafast spatio-temporal switching of the excitation.

Besides excitation control the locally recorded photoelectrons reveal the collective electron excitation in nanostructures via a modified coherent 2D spectroscopy scheme. As example long-living (150 fs) plasmonic resonances on a corrugated silver film are reported and explained in a model based on the hybridization of bright antenna modes interacting with the far field and a dark mode composed of multiply scattered surface plasmon polaritons. The observation of long-lived coherent excitations on a metal surface has important implications for surface enhanced spectroscopies.

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Hosted by Prof. Romain Quidant