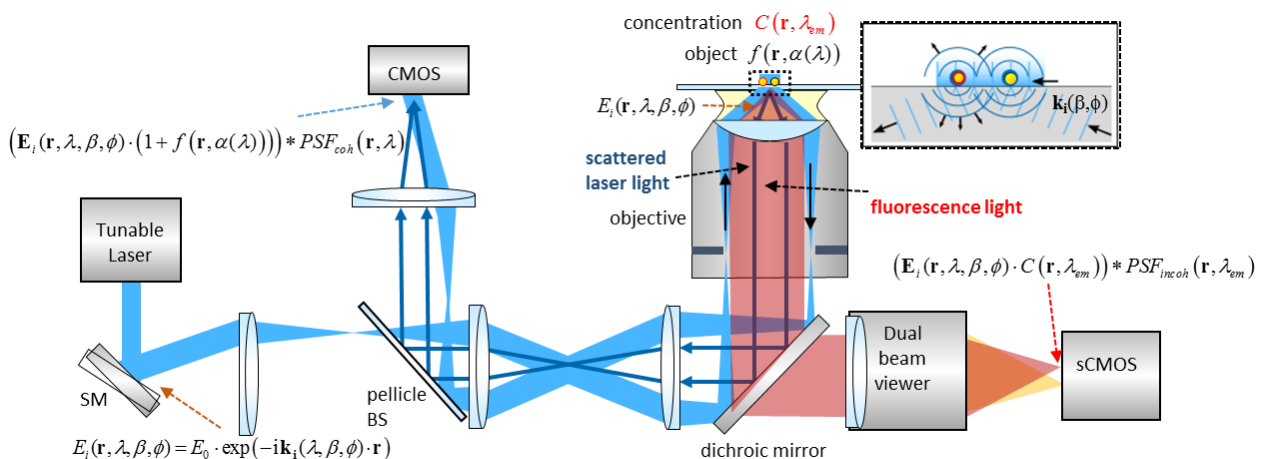


Open PhD or Post-Doc Position

Topic:

Rotating Coherent Scattering Microscopy using absorption phase delays

Background: ROCS is a novel optical microscopy concept, where objects are illuminated coherently and images are generated coherently as well. By exploiting defined multiple interferences under oblique illumination and angular integration of many coherent images, a spatial resolution of nearly 100nm can be achieved in principle, at a temporal resolution of typically 100 Hz and with excellent image contrast. Within the preliminary work of our group, we could achieve a spatial resolution of 150 nm through rotating coherently scattered (ROCS) laser light in TIR-dark-field mode [1]. With this technique we could acquire thousands of images without loss in image quality (e.g. fluorophore bleaching) and without image reconstruction.



Schematic of a ROCS imaging system: Partially coherent images from back-scattered laser light are combined by rotation in the azimuthal angle ϕ change with the incident k -vector, which can be controlled by the laser wavelength λ and the polar angle β of incidence. Fluorophores delay the phase of the backscattered laser light and emit fluorescence light at the same time for object identification and control.

In a project funded by the DFG (by a 65% E13 position), we first want to reach a new imaging record with 120 nm spatial and 100 Hz temporal resolution. We want to distinguish specifically marked structures in the image through specific absorption and phase retardation of the scattered laser light - first at nanometer-sized particles and then at cellular structures and living cells.

We are seeking a motivated candidate with a strong background in optics and microscopy. The candidate should setup a multi-laser system, perform advanced experiments & theoretical considerations & computer simulations to better understand partially coherent interference and image formation of correlated and uncorrelated photons propagating through complex media.

We are a young and motivated team with a strong background in microscopy, in optical trapping & tracking and in biophysics. We are looking forward to answering your questions !

[1] Ruh,..., Rohrbach, "Superior contrast and resolution by image formation in rotating coherent scattering (ROCS) microscopy," *Optica* 5, 1371-1381 (2018).