



# Joint LLC Seminar

Thursday May 5, 15:15  
The Rydberg Lecture Hall, Dep. of Physics

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## **Polarized microscopy, towards molecular-organization imaging in cells and tissues**

Fluorescence imaging and nonlinear coherent optical microscopy can reveal important spatial properties in nanomaterials, cells and biological tissues from fixed situations to *in vivo* dynamics. While microscopy can guide interpretation through morphological observations at the sub-micrometric scale, optical imaging cannot directly access the way molecules are organized in specific ultrastructures, occurring at the molecular scale. This property, which is important in many fields, from material engineering to biomechanics, is today most often studied using electron microscopy (EM) or X ray diffraction, which are not compatible with real time imaging. We will show that reporting molecular organization in protein filaments, aggregates or lipid membranes down to the nano scale is made possible using polarization resolved optical microscopy, which takes advantage of the orientation-sensitive coupling between optical excitation fields and molecular transition dipole moments [1]. We have recently developed polarization sensitive approaches in fluorescent super resolution microscopy to reveal actin filaments' organization in the cell cytoskeleton that is usually studied by EM [2,3]. We will discuss the advantages of transposing polarized methodologies to scanning nonlinear optical microscopy [4] for structural imaging, and the challenges still to overcome with respect to fast live imaging, and propagation at large depths in scattering tissues.

- [1] S. Brasselet, *Advances in Optics and Photonics* 3, 205–271 (2011)
- [2] V. Curcio et al. *Nat. Communications* 11 (1) (2020) DOI: 10.1038/s41467-020-19064-6
- [3] C. Rimoli et al. *Nat. Communications* 13, 301 (2022). DOI: 10.1038/s41467-022-27966-w
- [4] P. Gasecka et al. *Biophys. J.* 113 (7), 1520–1530 (2017) DOI: 10.1016/j.bpj.2017.07.033

**The Rydberg Lecture Hall is located at the Department of Physics,  
Professorsgatan 1**

**Coffee and refreshments will be served  
before the seminar, from 15:00**

