IAP Seminar

Francisco Balzarotti

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Vienna BioCenter

Tuesday, 14th January 2020, 16:00 s.t.
TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B

Super Resolution Microscopy at the Molecular Scale

Abstract: Superresolution microscopy methods such as STED and PALM/STORM have revolutionized far-field optical fluorescence microscopy by manipulating state transitions of the emitters, offering potentially unlimited resolution. In practice, however, the resolution of an image is limited by the finite photon budget of fluorescent probes, while the finite emission rate imposes a spatial-temporal trade-off in tracking applications.
In this seminar, I will introduce the recent molecular localization concept termed MINFLUX, which tackles these limitations by synergistically combining the strengths of both superresolution families. Moreover, an iterative variant of the concept allows imaging in cells with three dimensional isotropic resolution and surpasses the typical ∝ N^(-1/2) dependence, as photons are made increasingly informative as they are acquired. Applied to single molecule tracking, the concept demonstrated a 20-fold reduction of the required photon detections, increasing the temporal resolution and the number of localizations per track by 100-fold, while applied to imaging, MINFLUX achieved resolutions at the ~nm scale. This technological advance is poised to propel the biological fields by quantifying protein clusters and complexes and their dynamics.

Francisco Balzarotti obtained a degree in Electrical Engineering in 2007 at the University of Buenos Aires, Argentina. In 2012, he received a PhD from the same institution while working in plasmonics and optical nanolithography. Until 2019, he worked as a researcher at the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany, within the department of NanoBiophotonics led by Nobel Laureate Prof. Stefan W. Hell. There, he specialized in super resolution microscopy and developed a localization notion termed MINFLUX. Since 2020, he is a Group Leader at the Research Institute of Molecular Pathology in Vienna, Austria, also with the support of a Starting Grant from the European Research Council.

All interested colleagues are welcome to this seminar lecture (45 min. presentation followed by discussion)

Friedrich Aumayr
(LVA-Leiter)

Gerhard Schütz
(Seminar Chair)