Department für Biomedizinische Wissenschaften
Institut für Physiologie, Pathophysiologie und Biophysik
Abteilung für Physiologie und Biophysik
Veterinärplatz 1, 1210 Wien

Vienna, October 14th, 2016

Invitation to the guest lecture:

"Multisite label-free recording of the life and death of living mammalian neurons"

Prof. Sylvie ROKE
Laboratory for fundamental BioPhotonics LBP, Lausanne, Switzerland

Wednesday, November 2nd, 2016
16:00 c.t.

place: Hörsaal D

We appreciate your interest in this lecture and would be glad to see you there!

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Multisite label-free recording of the life and death of living mammalian neurons

Sylvie Roke

Laboratory for fundamental BioPhotonics, École Polytechnique Fédérale de Lausanne (EPFL), 1015, Lausanne, Switzerland

Nonlinear microscopes, such as multiphoton and second harmonic generation microscopes, are increasingly used in life science research thanks to their molecular / structural specificity, high resolution, large penetration depth, and volumetric imaging capability. Second harmonic generation (SHG), a non-resonant label and probe free method acquires its contrast from the symmetry selection rules of nature. It is inherently sensitive to structures that do not possess centrosymmetry, which renders it intrinsically sensitive to polar structures, such as those found in microtubules and collagen fibrils. Endogenous two-photon fluorescence reports on metabolic activity in cells. Although both methods are highly promising for life science research, compared to fluorescence microscopy the optical throughput and possibility photodamage are severely limiting.

By modifying the optical layout and illumination parameters that are typical for multiphoton microscopes, we improve the imaging throughput of a nonlinear microscope compared to a confocal scanning system by ~3 orders of magnitude. At the same time the layout allows for much lower levels of photodamage (such that living cells can be imaged ~10^6 times longer). With the thus improved system we perform 3D imaging on living mammalian brain cells in culture, and assign from the images recorded in different modes organelles and processes. In addition, we perform a multisite recording of the subcellular workings of a popular drug used in brain degradation research. Neuronal development is also investigated in terms of microtubule assembly and metabolic activity.