



Department Seminar:

Monday, June 3, 2019, at 2:00 p.m.;

— all are invited to meet at around 1:40 for a chat with coffee & cookies —

Prof. Christoph T. Koch

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Diffraction Imaging and Spectroscopy of Nanomaterials in Transmission using low energy electrons

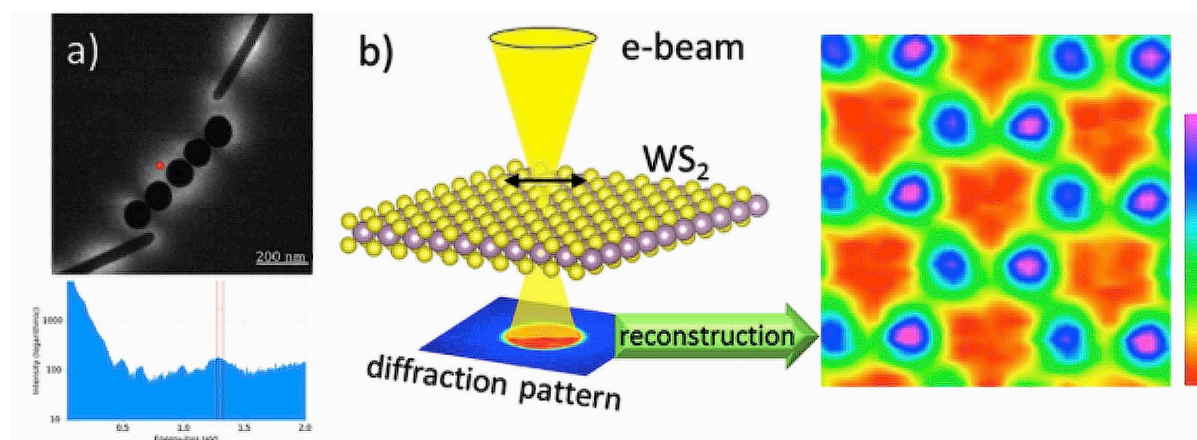
PC Seminar Room G2.06, Building G, Faradayweg 4

R. Ernstorfer

Abstract:

The possibility of correcting spherical aberration in transmission electron microscopes (TEMs) has shifted the focus to lower accelerating voltages, since this reduces knock-on damage and also avoids having to build very large high-voltage instruments, while still enabling atomic resolution. And even though radiolysis increases with reduced accelerating voltage, the elastic scattering cross section increases even more strongly, so that the available information per unit damage increases with decreased accelerating voltage even for most organic materials [1]. The positive side effect of a reduced accelerating voltage is an improved energy-resolution in many high-resolution EELS setups [2,3,4]. In addition, ptychographic imaging of very thin objects has been demonstrated to achieve a resolution higher than the information limit [5].

In this talk I will present results obtained by electron diffraction mapping, ptychography, and mapping of electron energy-loss spectroscopy (EELS) carried out in a modified scanning electron microscope (SEM) as well as a dedicated scanning transmission electron microscope (STEM), an aberration-corrected and monochromated Nion HERMES [4], which combines a spatial resolution of $< 0.6 \text{ \AA}$ with a spectral resolution of $< 6 \text{ meV}$. The materials systems being presented include organic and inorganic 2D materials, but also plasmonic nanostructures.



- [1] M.J. Peet et al. Ultramicroscopy (2019) in press.
- [2] H. Boersch, et al. Zeitschrift für Phys. **180**, 415 (1964).
- [3] M. Terauchi, Journal of Microscopy, **194**, 203 (1999).
- [4] O. Krivanek et al., Ultramicroscopy (2019) in press..
- [5] Y. Jiang, Nature **559**, 343 (2018).