MONASH University

Monash Centre for Electron Microscopy

Seminar

Exploring materials structure and properties on the nanoscale by computer-augmented electron microscopy

Thursday, 21st October 2021

5.00 – 6.00 pm (AEDT)

ZOOM – Register in advance for this meeting:

https://monash.zoom.us/meeting/register/tZYocO2qrzMtEtfoG8pv0VU9SZNIQIgpLV9-

Passcode: 111111

Professor Christoph Koch is a professor in the Department of Physics at Humboldt University of Berlin, Germany.

Abstract

Humboldt-Universität zu Berlin, Department of Physics & IRIS Adlershof, Berlin, Germany.

Modern transmission electron microscopes can produce images at a spatial resolution of less than 50 pm, electron energy loss spectra with a spectral resolution better than 5 meV, and electron pulses shorter than 1 fs. Pushing the limits of how precisely experimental data can be acquired comes at the price of increased complexity of operation, increased cost of ownership and with that the need for making more effective use of beam time. At the same time, although some problems are obviously easier to solve with improved resolution in space, energy, and time, recording data with higher fidelity does not necessarily increase our capability to solve materials science problems.

In this talk I will present some recent examples of how applying advanced data analysis workflows to high-quality experimental data may lead to new materials knowledge being gained. The examples range from various holographic approaches, via the extraction of the bulk dielectric function from relativistic EELS data or the recovery of the dispersion of surface plasmons on differently prepared surfaces to the retrieval of structural units in amorphous materials. Looking forward, key aspect to modern (computer-augmented) EM experiments has to be reproducibility and accessibility of the data and its processing steps to partners in research.

The Presenter

Christoph received his PhD at Arizona State University in 2002 under the supervision of Prof. John Spence. He then went on to a postdoctoral position at the Max Planck Institute for Metals Research in Stuttgart, Germany. In 2011 he accepted a professorship, endowed by the Carl Zeiss Foundation at Ulm University in Germany, and since 2015 he has a full professorship at Humboldt University of Berlin, where he heads the structure research and electron microscopy group. His group operates several electron microscopes, and focuses on the development of novel imaging, diffraction, and spectroscopy techniques and their application to relevant problems in materials science and solid state physics.

Convener: Professor Joanne Etheridge
Director, Monash Centre for Electron Microscopy, Monash University