



Contribution ID: 125

Type: **not specified**

# Electron Ptychography: An Emerging Imaging Technology for Physical and Biological Sciences

*Wednesday, 19 June 2024 11:05 (30 minutes)*

Coherent diffraction imaging (CDI) and ptychography [1] have been widely used in X-ray synchrotron sources. The advantage of ptychography over traditional CDI is that it does not need prior information about the probe function and overcomes some of the other issues of CDI, such as non-unique solutions and a limited field of view.

In electron microscopy, ptychography has also attracted considerable interest due to its potential to achieve super-resolution [1] without using aberration correctors. Unlike conventional imaging modes, the image-forming optics of ptychography replaced by computational methods (like a 'Digital Lens') using an array of electron diffractions collected by fast detectors (Left). New generation of direct detection cameras are particularly suited to ptychographic 4D data acquisition with new modes of operation, such as electron counting and fast acquisition. In this talk, I will review the current development and capabilities of this emerging imaging technology (electron ptychography) in my group for light atomic detecting [2], low dose imaging [3], 3D reconstruction [4-5], coupling to spectroscopy [6], EM field mapping, and cryogenic EM [7,8], which can then tackle characterization challenges across the physical and life sciences, ranging from ferroic and battery materials to biological macromolecules.

References:

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**Session Classification:** Ptychography at different wavelengths - S2