MS25-02 | Electron Crystallography is a Powerful and Feasible Extension to every X-Ray Facility

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Structure determination from crystal diffraction plays an important role in chemistry and biology. X-rays has been the main radiation source. X-ray crystallography has been well developed for many decades and also set standards for validation and data storage for other fields of interest. X-ray crystallography is limited by sample size. Typically a few micrometer in every dimension are to lower limit for structure determination (unless access to free electron lasers is available). Electron crystallography overcomes this size limit.

As long as the sample is crystalline, with a few dozen of unit cells in each direction, it can produce a diffraction pattern through electron radiation. With the latest demonstration, that even the chirality of organic compounds can be determined, electron crystallography has become a fully independent companion of X-ray crystallography [1]. I am going to present how we set up an electron difffractometer simply by mounting an EIGER hybrid pixel detector to a transmission electron microscope, and how we calibrated the instrument to meet the requirements of a typical X-ray facility [2]. While our work focused on chemical compounds [3], I will also share my experience considering the application of electron crystallography with respect to structural biology, including possible phasing scenarios.

[1] Brazda et.al, Science (2019), 364, 667-669
[2] Heidler et.al, Acta Crystallogr. (2019), D75, 458-466
[3] Gruene et.al, Angew. Chemie Int. Ed. (2018), 57, 16313-16317