



Contribution ID: 152

Type: Oral

## Enhancing spatial resolution in MÖNCH detectors for electron microscopy via deep learning

Wednesday, June 28, 2023 9:00 AM (20 minutes)

Hybrid Pixel Detectors (HPDs) have been widely adopted for diffraction-based modalities in electron microscopy thanks to their high frame rates ( $> 1$  kHz) and large dynamic range. However, they are less suitable for imaging applications because of their poor spatial resolution due to relatively large pixels ( $\geq 25 \mu\text{m}$ ) and to the multiple scattering of high-energy electrons ( $> 100$  keV) in the thick sensor layer. To fully realize the potential benefits of fast, radiation hard HPDs for all modalities of electron microscopy, we are developing deep learning methods to reconstruct the impact points of incident electrons for the  $25 \mu\text{m}$  MÖNCH pixel detector.

We have developed several deep learning models to localize the electron impact point based on both simulations and measured data. Sub-pixel resolution has been achieved for 200 keV electrons. We will show details of the deep learning model training, evaluation results including images of some standard samples, and the data processing pipeline for the MÖNCH detector for its use in electron microscopy.

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**Session Classification:** Applications

**Track Classification:** Applications