# Nanodiffraction for spatially-resolved studies of complex materials

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X-ray diffraction has been used to study the structure of well-ordered crystalline materials since its discovery about a century ago. Nowadays, the excellent parameters of the new synchrotron sources allow us to focus the X-ray flux to a nanometer-scale spots. Apart from the obvious advantages of studying nanoscale objects with a focused x-ray beam, it is also possible to perform a raster scan of a larger sample to obtain spatially-resolved information of its structure. This is especially advantageous to characterize the fabricated nanodevices or study the structure of novel non-crystalline materials. Depending on the typical length scale of the non-uniformity of the sample, different size of the x-ray beam should be chosen.

This talk will be focused on spatially resolved studies of superlattices performed at the Coherence beamline P10 of PETRA III. These superlattices are formed from lead-halide perovskite nanoparticles coated with organic ligands. By utilizing the raster scan with an x-ray beam focused to approximately 200 nm, and measuring simultaneously SAXS and WAXS signal with a 2D detector, it is possible to determine the structure of the superlattice and characterize the properties of individual nanoparticles in the superlattice.

**References**

[1] D. Lapkin, et al., Nat. Commun. 13 (2022) 892
[2] J. Hiller et al., ACS Nano 19 (2025) 26117
[3] J. Hiller et al., Nano Lett. 26 (2026) 2955