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Quantitativeness and Projection Processing for X-ray Ptychographic Nanotomography

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Ptychographic nanotomography is a recently developed technique for which the imaging of tomographic projections relies on simultaneous phasing of multiple diffraction patterns, exploiting the accuracy of iterative phase retrieval to recover the phase of the sample for a given orientation. After tomographic reconstruction we obtain a quantitative and high-resolution map of the sample electron density. A capability currently in use for the study of cement pastes, carbon fibers, bio-nanoporous systems and bone-disease research.

Here we present robust algorithms developed for alignment and processing of projections, and a method for tomographic reconstruction from wrapped phase. Advances that have significantly increased the success rate of data processing and allowed us to establish ptychographic tomography as a standard technique at cSAXS.

We will further present experimental characterization of the sensitivity and accuracy in determining electron density. For this purpose we have measured a homogeneous test sample of known composition and density and investigated the compromise between resolution and sensitivity for this technique.

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Poster

Primary author: Dr GUIZAR-SICAIROS, Manuel (Paul Scherrer Institut)

Co-authors: Dr DIAZ, Ana (Paul Scherrer Institut); Dr MENZEL, Andreas (Paul Scherrer Institut); Dr HOLLER, Mirko (Paul Scherrer Institut); Dr BUNK, Oliver (Paul Scherrer Institut); Dr TRTIK, Pavel (EMPA Swiss Federal Laboratories for Materials Science and Technology)

Presenter: Dr GUIZAR-SICAIROS, Manuel (Paul Scherrer Institut)

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