Coupled ptychography and tomography reconstruction of experimental data

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Three-dimensional X-ray microscopy by ptychographic tomography is usually per formed by separating the steps of acquiring two-dimensional ptychographic reconstructed projection images at different projection angles and afterwards performing the three-dimensional tomographic reconstruction. Recently it has been suggested that those two separate steps can be coupled / joined together, allowing for the sharing of information between angular views during the ptychographic reconstruction step [1, 2, 3]. We performed such a coupled X-ray ptychographic tomography reconstruction for the first time on an experimental dataset, improving the achieved resolution in the process [4]. Furthermore we validated the predicted relaxation of the overlap criterion between adjacent scan positions in the tomographic plane by successively leaving out columns of recorded diffraction patterns and achieving robust reconstructions even beyond the point of no overlap between neighboring scan points.

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