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(POS-5) Effects of Positioning Errors on Ptychographic Imaging

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Ptychography is a scanning coherent diffraction imaging technique that reconstructs the two-dimensional complex X-ray transmission function from the far-field diffraction patterns obtained at well known, predefined scan points [1,2]. Ptychography played a crucial role in imaging a wide range of technologically important samples ranging from micro-chips to biological cells, spatial resolutions as high as 17 nm were reported [3-7]. Ptychographic imaging depends on three main components: coherent X-ray sources, precise nano-positioning of samples, and efficient phase retrieval algorithms. A systematic investigation of the impact of nano-positioning errors of these scan points on ptychographic reconstructions has not been conducted. We will examine the effects of these errors in two distinct scenarios: (1) when the predefined scan points are missed, but the actual scan point positions are accurately known, and (2) when the predefined scan points are hit accurately, but the recorded positions are erroneous. By analyzing these cases, we aim to enhance our understanding of how positioning errors influence ptychographic reconstructions.

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Keyword-1

Ptychography

Keyword-2

Positioning errors

Keyword-3

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