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Iterative Phase Retrieval Coherent Diffraction Imaging Algorithm[1] SAMUEL RAOUL DJIANI, DR. INNA PIVKINA, DR. EDWIN FOHTUNG, New Mexico State University — The rapid growth of nanoscience and nanoscale materials requires non-destructive probes capable of mapping the local structure (shape, chemical homogeneity and density modulations) in three dimensions of materials functional properties such as strain and electron density distribution. The Bragg Coherent Diffraction Imaging (BCDI) method has been developed for nondestructive imaging of 3D strain evolution within small crystals. This has widespread applications for medicine, material science and condensed matter systems. The inversion of diffraction data is a critical step that uses a computer algorithm that takes advantage of internal redundancies when the measurement points are spaced close enough together to meet the "oversampling" requirement. The first step is to postulate a 3D "support" volume in which all the sample density will be constrained to exist. Arguably, the bestmethod so far for phase. Here we demonstrate the development of a BCDI inversion algorithm that combines HIO, ER and phase constraint HIO to retrieve the phases and amplitudes from measured diffraction patterns. We demonstrate the applicability of the technique to imaging polar distortions in complex BaFe12O19 nanoparticles showing room temperature magneto-electric coupling.

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