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Propagation of coherence in X-ray Optics for Nanocrystallography MENGNING LIANG, IAN ROBINSON, University of Illinois at Urbana-Champaign — Coherent X-ray Diffraction is a powerful tool for studying the internal structure of nanostructures to angstrom precision in three dimensions. A coherent diffraction pattern is a single 2D slice through the 3D Fourier Transform of an object. These diffraction images can be inverted with iterative phasing algorithms to obtain an image of a projection of the physical object. The success and accuracy of the inversion depends strongly on the quality of the initial diffraction pattern and thus on the coherence properties of the incoming X-ray beam. Coherence of synchrotron radiation depends on machine parameters but also on the optics in the beam path. Focusing optics, which are necessary to provide sufficient flux onto the sample, distort the wavefront and can especially alter the coherence of the beam. For a finite object, fringes will result from the interference of opposite sides or facets and the visibility of these fringes is a quantitative measure of the coherence quality. We present a study of the effect of optical elements in altering the coherence of an x-ray beam by using the coherent diffraction images from gold nanoparticles.

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