

Reconstruction of thin-film magnetic domains using an illumination mask

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X-ray diffraction reconstruction usually requires the specimen to have a bounded support. Together with the measured diffraction amplitudes, the absence of scatterers outside the support provides sufficient information for the reconstruction. We present a method for speckle reconstruction which implements a pinhole's Fresnel diffraction pattern as an illumination mask, avoiding the use of the bounded support. This method is used to image thin-film nanoscale magnetic domain patterns[1], an area of research which commands significant theoretical and applied interests. Successful reconstructions from noisy diffraction data simulated from magnetic circular dichroism scattering [2] are presented.

[1] Eisebitt, S.; Luning, J.; Schlotter, W. F.; Lorgen M.; Hellwig, O.; Eberhardt, W.; Stohr, J. *Nature*, 2004, Vol 432.

[2] Blume, M. *J. Appl. Phys.* 57 (1), 15 April 1985.