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Lensless Holographic X-ray Imaging of Magnetic Nanostructures WILLIAM SCHLOTTER¹, Applied Physics, Stanford University, J. LUNING, J. STOHR, SSRL, Stanford Linear Accelerator Center, S. EISEBITT, M. LORGEN, W. EBERHARDT, O. HELLWIG², BESSY, Berlin, Germany — Applying soft xrays to Fourier transform holography, we have imaged a magnetic nanostructure with 50 nm resolution. The key element is an x-ray opaque mask containing two apertures which are 1.0μ m and 100nm in diameter. By integrating the magnetic sample film to the mask structure, the larger aperture defines the field of view, and the smaller aperture transmits a holographic reference beam. Illumination with coherent soft x-rays produces an interference hologram in the far field which is recorded with a CCD detector. A single spatial Fourier transform of the hologram yields an image of the magnetic domain structure. This truly lensless full field imaging technique is ideally suited for ultrafast imaging with a single x-ray pulse from the now imminent x-ray lasers.

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