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Imaging Magnetic Nanostructures via Resonant Soft X-Ray Spectro Holography OLAV HELLWIG, Hitachi GST, San Jose, CA, USA, STEFAN EISEBITT, CHRISTIAN GUENTHER, ANDREAS MENZEL, FLORIN RADU, BASTIAN PFAU, WOLFGANG EBERHARDT, BESSY mbH, Berlin, Germany, WILLIAM SCHLOTTER, RAMON RICK, SSRL, Menlo Park and Stanford University, Stanford, CA, USA, ANDREAS SCHERZ, JAN LUENING, JOACHIM STOEHR, SSRL, Menlo Park, CA, USA, IAN MCNULTY, Argonne NL, Argonne, IL, USA — We will present how to exploit the coherence and tunable polarization of soft X-ray synchrotron radiation for imaging magnetic nanostructures via Fourier Transform Holography. This new lensless imaging technique is based on the direct Fourier inversion of a holographically formed soft x-ray interference pattern. Our implementation is particularly simple and is based on placing the sample behind a lithographically manufactured mask with a micron-sized sample aperture and a nano-sized reference hole. By exploiting the magnetic dichroism in resonance at the L_3 edges of the magnetic transition metals, images of magnetic nanostructures have been obtained with a spatial resolution of 50 nm. Different examples will be presented. The technique is transferable to a wide variety of specimen, appears scalable to diffraction-limited resolution (about 2 nm), and is well suited for ultra-fast single-shot imaging with future X-ray free electron laser sources.

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