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Single Shot Nanoscale Magnetic Imaging at the Linac Coherent Light Source¹ BENNY WU, TIANHAN WANG, Stanford University, CATHERINE GRAVES, DILING ZHU, WILLIAM SCHLOTTER, JOSHUA TURNER, JOACHIM STOHR, Linac Coherent Light Source, ANDREAS SCHERZ, Stanford Institute for Materials and Energy Science — One of the major challenges of modern magnetism research is the manipulation and control of the magnetization on ultrafast timescales. Using the unprecedented brightness of the Linac Coherent Light Source (LCLS), we have been able to image the nanoscale magnetic worm domain structures in [Co/Pd] multilayer systems with a single x-ray pulse through x-ray Fourier transform holography on the Co L3 absorption edge. We established the threshold fluences for both non-destructive imaging and sample damage. In combination with the femtosecond pulses of LCLS, single shot coherent imaging will enable the observation of nanoscale magnetization dynamics on the sub-picosecond timescale for problems such as ultrafast demagnetization and all-optical magnetization reversal.

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