Abstract Submitted
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Magnetic field-induced splitting of Bragg peaks in resonant magnetic x-ray diffraction from square artificial spin ice[1] JAMES LEE, Advanced Light Source (ALS) and Materials Science Division (MSD), Lawrence Berkeley National Laboratory (LBNL), SHRAWAN MISHRA, ALS, LBNL, VINAYAK BHAT, BARRY FARMER, Department of Physics, University of Kentucky, XIAOWEN SHI, ALS, LBNL, LANCE DE LONG, Department of Physics, University of Kentucky, STEVEN KEVAN, ALS and MSD, LBNL, SUJOY ROY, ALS, LBNL — Artificial spin ice (ASI) is a class of periodic magnetic nanostructures that can display magnetic phenomena like that of natural spin ices, including analogs of magnetic monopoles. Based on the ice structure and field history, ASI systems can form a variety of energetically degenerate magnetic structures. When we probed the magnetic structure of a square ASI using spatially coherent Fe L_3 ($\approx$707eV) x-rays, we found that ASI Bragg peaks split when exposed to magnetic fields. This field-induced splitting is reversible: Bragg peaks display gaussian profiles in zero-field. We will present a scattering model, analogous to the theory of anti-phase domains in alloys, that reveals the magnetic structure of the square ASI necessary to create split Bragg peaks.

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