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Spontaneous Vortex Nanodomain Arrays at Ferroelectric Heterointerfaces XIAOQING PAN, CHRISTOPHER NELSON, YI ZHANG, Dept. of Mater. Sci. & Eng., Univ. of Michigan, Ann Arbor, MI, BENJAMIN WINCHESTER, LONG-QING CHEN, Dept. of Mater. Sci. & Eng., Penn State Univ., University Park, PA, COLIN HEIKES, CAROLINA ADAMO, ALEXANDER MELVILLE, DARRELL SCHLOM, Dept. Sci. & Eng., Cornell Univ., Ithaca, NY, CHAD FOLKMAN, CHANG-BEOM EOM, Dept. of Mater. Sci. & Eng., Univ. of Wisconsin-Madison, Madison, WI — The polarization of $BiFeO_3$ subjected to different electrical boundary conditions by hetero-interfaces is imaged with atomic resolution using a Cs-corrected transmission electron microscope. Unusual nanodomains are seen and their role in providing polarization closure is understood through phase-field simulations. Hetero-interfaces are key to the performance of ferroelectric devices and this first observation of vortex arrays at ferroelectric hetero-interfaces reveals properties unlike the surrounding film including mixed Ising-Néel domain walls, which will affect switching behavior, and a drastic increase of in-plane polarization. Imaging this magnetic analogous effect at ferroelectric hetero-interfaces provides the ability to see device-relevant interface issues.

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