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Resonant Scattering Investigations of Density Wave Ordering in the Bilayer Nickelate La3Ni2O7

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The discovery of high-temperature superconductivity in La3Ni2O7 under has motivated the investigation of parent or competing phases which could shed light on the underlying pairing interaction and phase diagram. Here, we employ resonant elastic and inelastic soft x-ray scattering and polarimetry on thin films of bilayer La3Ni2O7 to reveal the existing of a spin density wave (SDW) which forms unidirectional diagonal spin stripes with moments lying within the NiO2 plane and perpendicular to the SDW wavevector. These stripes form anisotropic domains with shorter correlation lengths perpendicular versus parallel to the SDW wavevector, revealing nanoscale rotational and translational symmetry breaking analogous to the cuprate and Fe-based superconductors [1]. In addition, we also investigate another polymorph of La3Ni2O7, a repeating monolayer-trilayer structure (so-called "1313") and compare the magnetic excitations and ordering between the two polymorphs.

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