UNL Department of Physics and Astronomy and & Nebraska Center for Materials and Nanoscience present:

Interface Reconstructions: Possibilities at (111)-Oriented Ferromagnetic/Antiferromagnetic Perovskite Interfaces

PRESENTED BY

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THURSDAY

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4:00 PM

IN JH 136

Refreshments will be served in the JH 1st Floor Vending Area at 3:30

ABSTRACT

Perovskite oxides are technologically interesting because of their strong structure-property coupling, with interesting functional properties ranging from ferromagnetism, ferroelectricity to high-temperature superconductivity. Of special interest are reconstructions of epitaxial interfaces promoting novel functional properties, and over the last 15 years there has been focus on the possibilities of obtaining novel properties at oxide interfaces including 2DEGs. In this talk I will discuss the emergence of magnetic reconstructions at such interfaces, and give an overview of our work (111)-oriented perovskite interfaces in this context. To address this question, (111)-oriented epitaxial heterostructures of antiferromagnetic (AF) $LaFeO_3$ and ferromagnetic $La_{0.7}Sr_{0.3}MnO_3$ is used as model system. To probe the interface spin texture, we rely on a combined soft x-ray spectroscopy, neutron reflectometry, magnetometry, TEM and DFT investigation. By increasing the $LaFeO_3$ thickness, a change from out-of-plane to in-plane AF spin axis takes place above 16 d_{111}-layers, below which a magnetic interface reconstruction with a net switchable Fe moment of $LaFeO_3$ is observed when deposited of $SrTiO_3$. By using orthorhombic substrates, the magnetic anisotropy of the reconstructed interface can be controlled, from 6-fold when deposited on cubic $SrTiO_3$ to 2-fold. In the presentation I will especially focus on the importance of the interplay between local AF order and concurrent structural reconstructions at interfaces to establish a magnetic reconstruction and role of strain, opening for tuning the AF-spin texture by interface engineering.

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