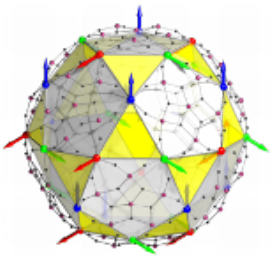

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Electric field control of magnetism in heterostructures of oxide perovskites

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Magnetoelectric multiferroics are promising candidates for fast, dense and cooler electronics. Numerous oxide perovskites are either magnets or traditional ferroelectrics but only a few of them display both types of order and magneto-electric coupling in a single phase. Ferromagnetic-ferroelectric or ferromagnetic-piezoelectric thin film heterostructures of oxide perovskites provide an alternative approach to achieve and study electric field control of magnetism. In such systems, the matching of lattice constants between different perovskite oxides can promote the coherent growth of heterostructures with sharp interfaces.
Here, we address the possibility of electric field control of magnetism in two systems: (a) two layers of ferroelectric BaTiO3 and ferromagnetic La0.67Sr0.33MnO3 on a Nb-doped SrTiO3 substrate, and (b) a single layer of La0.67Sr0.33MnO3 on piezoelectric 0.7(Pb(Mg1/3Nb2/3)O3)-0.3(PbTiO3) substrate. The samples are grown by oxide molecular beam epitaxy and high oxygen pressure sputtering, followed by a systematic characterization of their structural and magnetic properties in the laboratory. Atomically resolved magnetism is investigated as a function of applied electric field using a combination of polarized neutron reflectivity and advanced electron microscopy.

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