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Magnetic structures and dynamics of multiferroic systems obtained with neutron scattering

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Multiferroics are materials which possess ferroelectric and magnetic order. For technological applications, we desire that these two order parameters be tightly coupled. Unfortunately, despite years of searching, there has been a paucity of these materials which are both ordered at room temperature, while evincing control of magnetism by an applied voltage. Thus, engineering artificial multiferroics using heterostructuring at the atomic scale is rapidly becoming an attractive alternative. In this work, we combined two crystallographically similar but poor multiferroic materials (LuFeO3 and LuFe2O4) to engineer a new family of ferromagnetic multiferroic heterostructures [1] which exhibit magnetoelectric coupling at room temperature. I will discuss the role of neutron scattering in understanding these materials. [1] J. Mundy, et. al., Atomically engineered ferroic layers yield a room temperature magnetoelectric multiferroic, Nature 537, 523 (2016)