

Spin and Orbital Ti magnetism at LaMnO₃ / SrTiO₃ interfaces

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The discovery of new phases at the interface between complex oxides has attracted a lot of attention in recent years. The surprising macroscopic properties arising at these interfaces (2 dimensional superconductivity, ferromagnetism ... [1, 2]) has been discussed under the light of novel physical scenarios, such as electronic and orbital reconstructions [3, 4], and has turned complex oxide heterostructures into potential candidates for the design of novel electronic devices with new functionalities.

In this talk I will focus on the electronic, magnetic and orbital interface structures of Ti and Mn ions at LaMnO₃ (LMO)/ SrTiO₃ (STO) heterostructures explored by a soft x ray absorption experiment with polarization analysis [5]. X ray absorption spectroscopy (XAS) indicates the presence of interfacial Ti³⁺ at the nominally Ti⁴⁺ STO layers originated by a LaO extra plane per LMO layer. X ray magnetic circular dichroism (XMCD) experiments evidence a new kind of Ti ferromagnetism with spin and orbital contributions not present in bulk titanates.

Different magnetic couplings (ferro, antiferro) between Ti and Mn ions are governed by different 3d orbital occupations of Mn ions at the interface. I will discuss on the influence of the different Mn orbital reconstructions on the modification of the Mn-Ti hybridization and its relation with the different manganese – titanate strain patterns of the samples.

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