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### **An Emergent Spin-Filter at the interface between Ferromagnetic and Insulating Layered Oxides<sup>1</sup>**

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Complex oxide heterostructures are of keen interest because modified bonding at the interfaces can give rise to fundamentally new phenomena and valuable functionalities. Particularly, an induced magnetization is widely observed at epitaxial interfaces between layered transition-metal oxides; however, much less effort has been spent on investigating how it affects the charge transport properties. To this end, we have studied magnetic tunneling junctions consisting of ferromagnetic manganite  $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$  (LCMO) and insulating cuprate  $\text{PrBa}_2\text{Cu}_3\text{O}_7$  (PBCO). Contrary to the typically observed steady increase of the tunnel magnetoresistance with decreasing temperature, this system exhibits an anomalous decrease at low temperatures. Polarized neutron reflectometry (PNR) and x-ray magnetic circular dichroism (XMCD) studies on LCMO/PBCO/LCMO trilayers show that the saturation magnetization of the LCMO contacts increase as the temperature decreases. In other words, degradation of the ferromagnetic contacts is ruled out as a cause. Interestingly, there exists induced net Cu moments, which indicates that the spin degeneracy of the conduction band of the PBCO barrier is lifted and thus the barrier becomes spin selective. Our calculations, within the Wentzel-Kramers-Brillouin approximation, show that the complex temperature dependence can arise from a competition between the high positive spin polarization of the manganite electrodes and a negative spin-filter effect from the interfacial Cu magnetization [1]. This work illustrates that the interface-induced magnetization in layered oxide heterostructures can have non-trivial effects on the macroscopic transport properties. Work performed in collaboration with FA Cuellar, Z Sefrioui, C Leon, J Santamaria (Universidad Complutense de Madrid), JW Freeland, SGE te Velthuis (ANL) and MR Fitzsimmons (LANL).

[1] Yaohua Liu, FA Cuellar, Z Sefrioui, JW Freeland, MR Fitzsimmons, C Leon, J Santamaria, SGE te Velthuis, “An emergent spin-filter at the interface between ferromagnetic and insulating layered oxides,” *Phys. Rev. Lett.* *in press* (2013).

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