

Interfacial Magnetism in Complex Oxide Heterostructures

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Interfacial driven electronic reconfigurations are a topic of recently increased interest. Since in many complex oxide materials changes of their electronic structure go hand in hand with their magnetic properties insight into the spatial extent of emerging new behavior can be obtained from the magnetization depth profile. This magnetization depth profile is readily obtained from polarized neutron reflectometry (PNR) and I will present two examples: (i) in exchange biased Co/LaFeO₃ bilayers PNR shows that a net magnetic moment of 2 μ_B per Fe atom develops in the antiferromagnetic LaFeO₃ within 10 Å of the interface with Co [1]. (ii) ferromagnetic/superconducting superlattices of La_{0.7}Ca_{0.3}MnO₃ (LCMO) and YBa₂Cu₃O_{7- δ} (YBCO) show magnetoresistive behavior close to the T_C of YBCO that is reminiscent of giant magnetoresistance (GMR) [2]. Using PNR we show that the GMR in the YBCO is indeed correlated with the antiferromagnetic orientation of the magnetization of adjacent LCMO layers. Together with further transport measurements this suggests that the observed GMR is due to spin injection from LCMO into the YBCO. However the situation is more complicated, since PNR also shows that the LCMO has no net moment close to the YBCO interface, which may be due to the charge transfer between the two materials [3].

[1] A. Hoffmann, *et al.*, Phys. Rev. B **66**, 220406(R) (2002).

[2] V. Peña, *et al.*, Phys. Rev. Lett. **94**, 057002 (2005).

[3] A. Hoffmann, *et al.*, Phys. Rev. B **72**, 140407(R) (2005).