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Spin structure in an interfacially-coupled epitaxial ferromagnetic oxide heterostructure

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We report the spin structure of an exchange-biased ferromagnetic oxide heterostructure, $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3 / \text{SrRuO}_3$, through magnetization and polarized neutron reflectometry measurements. We reveal that the magnetization reversal process of the $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ biased layer critically depends on the frozen-in spin structure of the SrRuO_3 biasing layer during the cooling process. Furthermore, we observe unexpected double-shifted hysteresis loops of the biased layer that originates from the formation of lateral 180° magnetic domains within the biasing layer, a new mechanism not found in conventional exchange-bias systems [1]. The effects of the thus-formed spin structure on the magnetotransport properties will be presented as well. This work was done in collaboration with L. J. Belenky, V. Lauter, H. Ambaye, C. W. Bark, C. B. Eom, M. S. Rzchowski, J. Smith, and M. Zhu.

[1] X. Ke et al, Phys. Rev. Lett. **110**. 237201 (2013).