Large positive linear magnetoresistance in the two-dimensional t_{2g} electron gas at the EuO/$SrTiO_3$ interface

K. J. Kormondy,[1] L. Gao,[1] X. Li,[2] S. Lu,[3] A. B. Posadas,[1] S. Shen,[1] M. Tsoi,[1] M. R. McCartney,[4] D. J. Smith,[4] J. Zhou,[2] L. L. Lev,[5,6] M.-A. Husanu,[5,7] V. N. Strocov,[5] and A. A. Demkov[1]

[1]*Department of Physics, The University of Texas at Austin, Austin, Texas, 78712, USA*
[2]*Materials Science and Engineering Program/Mechanical Engineering, University of Texas at Austin, Austin, Texas, 78712, USA*
[3]*School of Engineering for Matter, Transport and Energy, Arizona State University, Tempe, AZ 85287, USA*
[4]*Department of Physics, Arizona State University, Tempe, Arizona, 85287, USA*
[5]*Paul Scherrer Institute, Swiss Light Source, CH-5232 Villigen PSI, Switzerland*
[6]*National Research Centre "Kurchatov Institute", 1 Akademika Kurchatova pl., 123182 Moscow, Russia*
[7]*National Institute of Materials Physics, 405A Atomistilor Str. 077125, Magurele, Romania*

The high mobility two-dimensional t_{2g} electron gas (2DEG) present at oxide/oxide interfaces is currently under intense investigation [1-2]. In this talk, we will discuss the integration of highly spin-split ferromagnetic semiconductor EuO onto perovskite $SrTiO_3$ (001). A careful deposition of Eu metal by molecular beam epitaxy results in crystalline EuO growth via oxygen out-diffusion from $SrTiO_3$ [3]. This in turn leaves behind a highly conductive interfacial layer through generation of oxygen vacancies. Below the Curie temperature of 70 K of EuO, this spin-polarized two-dimensional t_{2g} electron gas at the EuO/$SrTiO_3$ interface displays very large positive linear magnetoresistance (MR). Soft x-ray angle-resolved photoemission spectroscopy (SX-ARPES) reveals the t_{2g} nature of the carriers. First principles calculations strongly suggest that Zeeman splitting, caused by proximity magnetism and oxygen vacancies in $SrTiO_3$, is responsible for the MR [4]. This system offers an as-yet-unexplored route to pursue proximity-induced effects in the oxide two-dimensional t_{2g} electron gas [5].

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+ Author for correspondence: demkov@physics.utexas.edu