Departamento de Física de Materiales

SEMINARIO

Metal-Insulator transition in Spin-Orbit Semimetal $SrIrO_3$ Ultra-Thin Films

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Perovskite $SrIrO_3$ (SIO) is a narrow-band semimetal, which combines strong spin-orbit coupling and electron correlations. The combination of these properties opens the possibility to explore and even exploit new emergent phenomena [1]. This system has also attracted much attention because it is at the verge of a Mott transition [2, 3]. Epitaxial SIO ultra-thin-layers show a thickness dependent metal-insulator transition (MIT) which is controlled by strain. We have explored this MIT using Electric Double Layer (EDL) techniques, that employ ionic liquid as gate dielectric. This technique is used to modify the carriers up to extremely high concentrations, at the level of an electron per formula unit, which can stabilize novel phases in strongly-correlated systems. We have simultaneously measured longitudinal (magneto) resistance and Hall effect across this transition. At the insulating state which exhibits a strong temperature dependence of the resistance, we have observed hysteretic-magnetoresistance and anomalous Hall effect at low temperature, indicating ferromagnetic order.

[1] Y. Tokura, M. Kawasaki and N. Nagaosa, Nature Physics, 13(11), pp.1056-1068 (2017)

[2] Y. F. Nie, P. D. C. King, C. H. Kim, M. Uchida, H. I. Wei, B. D. Faeth, J. P. Ruf, J. P. C. Ruff, L. Xie, X. Pan et al., Phys. Rev. Lett. 114, 016401 (2015)

[3] D. J. Groenendijk, C. Autieri, J. Girovsky, M. C. Martinez-Velarte, N. Manca, G. Mattoni, A. M. R. V. L. Monteiro, N. Gauquelin, J. Verbeeck, A. F. Otte, M. Gabay, S. Picozzi, and A. D. Caviglia, Phys. Rev. Lett. 119, 256403 (2017)