A New Type of Tunnelling Magnetoresistance in Sr_2FeMoO_6

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Sr_2FeMoO_6 is a magnetic metal with an unusually high Curie temperature (~ 420 K) and belongs to the double perovskite family of compounds. It shot in to fame a few years ago due to its remarkable magnetoresistive properties. [1] We shall briefly discuss the novel origin of ferromagnetism in this and related compounds based on a mechanism driven by the kinetic energy, [2] establishing these as members of a new class of magnetic materials. We show [3] that the magnetoresistance in Sr_2FeMoO_6 arises from a magnetically triggered nearly-resonant tunnelling condition in contrast to other mechanisms discussed so far in the context of TMR materials. Finally, I shall present our recent results [4] that are relevant to the nature of disorder in this material, which has drastic influence on not only magnetic but also electronic structure of these compounds [5], providing a critical test-bed for Altshuler-Aronov theory.

This work has been contributed by S. Ray, D. Topwal, P. Mahadevan, T. Saha-Dasgupta, A. Kumar, P. Sanyal, H.R. Krishnamurthy, C. Dasgupta, R. Cimino, S. Turchini, S. Zennaro, N. Zema, K. Tanaka, M. Kobayashi, A. Fujimori, H. Kato, Y. Tokura, C. Meneghini, F. Liscio, F. Bardelli, and S. Mobilio.

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