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Electronic Transport in Gd and Eu Atomic-Size Contacts¹ CARLOS UNTIEDT, BERNAT OLIVERA, Universidad de Alicante (Spain), CARLOS SALGADO, Universidad Autonoma de Madrid (Spain), JOSE. L. LADO, International Iberian Nanotechnology Laboratory (INL) (Portugal), AMIN KARIMI, ELKE SCHEER, University of Konstanz (Germany), JOAQUIN FERNANDEZ-ROSSIER, International Iberian Nanotechnology Laboratory (INL) (Portugal), JUAN J. PALACIOS, Universidad Autonoma de Madrid (Spain) — Here we explore whether and how the local moments influence electronic transport properties at the atomic scale on Gd and Eu. Both Eu and Gd are known to have local moments associated with their f-electrons. These coexist with itinerant s and d bands that account for their metallic character. We have studied their conductance when only few atoms form the junction between bulk electrodes made out of the very same material. Thousands of measurements show that both metals have an average lowest conductance, attributed to an atom-size contact, below the quantum of conductance. In the case of Eu, unlike other metals, a strong dependence of the atomic conductance on the macroscopic configuration of the contacts is observed. Our DFT for both metals show f bands fully spin polarized and insulating. sp bands are dominant for transport, where d orbitals seem to have a relevant contribution in some cases. On another hand, the strong variability of the atomic conduction of Eu could be explained as a consequence of magnetic disorder due to the f-character of magnetism in this material.

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