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Charge transport through a 4f spin state in a single molecule magnet CYRUS F. HIRJIBEHEDIN, BEN WARNER, PHILIPP SEIBT, UCL, UK, MICHAEL WATERS, U. of Nottingham, UK, ANDREW J. FISHER, UCL, UK, JORIS VAN SLAGEREN, U. of Stuttgart, FADI EL HALLAK, UCL, UK — The coupling between charge and spin in nano-scale systems is of fundamental interest and also key for creating novel devices at this scale. There may be advantages in utilizing magnetism produced by f-shell states, especially in controlled local environments such as molecules. Recently, it has been shown that charge transport through a molecule can access f-shell states despite their localization. Here we show that for charge transport through $DyPc_2$ that is strongly coupled to a copper surface it is possible to directly access the 4f spin. Spatially resolved scanning tunneling spectroscopy shows a variation in the amplitude of a Fano line shape near the Fermi energy, indicative of a Kondo effect due to screening of a localized spin coupled to a metallic continuum. The spin is attributed to the 4f states on Dy rather than the delocalized spin of an electron on the Pc ligands. This work demonstrates that the coupling to the surface can define which spins are present on a molecule as well as whether the spin state can be accessed in transport.

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