

Abstract Submitted  
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**EPR Study of Radical-Lanthanide Interactions in a Terbium(III) Molecular Spin Qubit**<sup>1</sup> DORSA KOMIJANI, S. HILL, NHMFL and FSU Physics, Tallahassee, FL, A. GHIRRI, M. AFFRONTE, CNR-Instituto Nanoscienze, Modena, Italy, S. KLYATSKAYA, E. MORENO PINEDA, M. RUBEN, KIT, Institute of Nanotechnology, Karlsruhe, Germany — The well-separated crystal field states of mononuclear lanthanide molecular magnets make them suitable candidates for the basis of quantum information processing. However, the effective shielding of the magnetic 4f sub-shells by the 5p and 6s orbitals in such compounds poses challenges in terms of the development of molecular spintronics devices that enable electrical readout of the qubit. A promising approach involves the use of paramagnetic linkers, such as organic radicals, which can provide a more direct magnetic coupling to the lanthanide. Here we report EPR studies of lanthanide-radical interactions by probing the magnetic anisotropy of an organic radical coupled to a  $Tb^{3+}$  ion. Ligand oxidation of  $[Tb(Pc)_2]^-$  results in a neutral complex with an unpaired electron delocalized over the ligands and the  $Tb^{3+}$  ion (with spin-orbit coupled angular momentum  $J=6$ ) [1,2]. Due to the weak mixing of the  $m_J = \pm 6$  states of the Tb ion, transition within its ground doublet cannot be observed directly via EPR. However, the anisotropic coupling between the lanthanide and the radical can be monitored through EPR transitions involving the latter. This anisotropy can be explained by a simple model which can be extended to similar compounds containing different  $Ln^{3+}$  ion.

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