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Relating Symmetry to Magnetic Anisotropy in a Trigonal Mn(III) Complex Using EPR JONATHAN MARBEY, Physics Dept. Florida State University / National High Magnetic Field Lab, PEI-RUNG GAN, EN-CHE YANG, Chemistry Dept, Fu Jen Catholic University, STEPHEN HILL, Physics Dept. Florida State University / National High Magnetic Field Lab — The design of single-molecule magnets (SMMs) relies on the ability to tune the structure that gives rise to magnetic anisotropy. In the absence of an applied magnetic field, this anisotropy lifts the degeneracy of spin states, generating an energy barrier separating spin-up and down. In such cases, magnetic information can be stored in the polarization state of the molecule provided the barrier is large compared to k_BT, and tunneling through the barrier can be avoided. Both of these properties are strongly influenced by molecular structure/symmetry, thus motivating detailed studies of structure-property relations. One approach to creating SMMs involves assembling multiple paramagnetic ions with appreciable magnetic anisotropy into larger high-symmetry molecules. In this regard, trigonal molecules provide interesting insights into the effects of molecular symmetry and local single-ion anisotropy on the overall molecular anisotropy. In this study, electron paramagnetic resonance measurements were performed on a trigonal $Mn(III)_3$ molecule, containing rigorous C_3 symmetry, using a vector magnet. Unlike similar molecules studied in the past, the principle axes of the individual Mn(III) sites are tilted such that there is a significant suppression of the 2nd order anisotropy. This allows for a rare, yet precise, characterization of the higher order trigonal anisotropy that emerges within the coupled spin Hamiltonian.

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