Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Three-fold angular modulation of the tunnel splittings in a trigonal Mn3 single-molecule magnet** JAMES ATKINSON, Department of Physics, University of Central Florida, ROSS INGLIS, EUAN BRECHIN, School of Chemistry, The University of Edinburgh, ENRIQUE DEL BARCO, Department of Physics, University of Central Florida — We report the results of magnetization studies performed on a Mn3 single-molecule magnet of trigonal site symmetry, which detail Berry phase interference phenomenon that we relate to the geometry of the individual constituent ions. We observe for the first time the three-fold modulation of the quantum tunneling probabilities expected for a system of this symmetry, including tunnel-quenching effects resulting from destructive topological interference at tunneling resonances. These effects are symmetric with respect to a full inversion of the applied field (longitudinal and transverse) as a consequence of the time reversal invariance of the spin Hamiltonian. A multi-spin interaction Hamiltonian representing the three exchange-coupled manganese ions shows good agreement with experimental results. Shifts of the Berry phase minima in the transverse field magnitude and angular modulations of the tunnel probability for the various resonances enable a complete determination of the exact three-dimensional spatial orientations of the single-ion anisotropy tensors.

James Atkinson
Department of Physics, University of Central Florida

Date submitted: 29 Oct 2013 Electronic form version 1.4