Abstract Submitted
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Neutron-Scattering Evidence for the Spin State of a Molecule-Based Magnet with Interpenetrating Sublattices[1] RANDY FISHMAN, Oak Ridge National Laboratory, Oak Ridge, TN 37831 USA, JAVIER CAMPO, Materials Science Institute of Aragon (CSIC-University of Zaragoza), E-50009, Zaragoza, Spain, THOMAS VOS, JOEL MILLER, Department of Chemistry, University of Utah, Salt Lake, UT 84112, USA — The molecule-based magnet $[Ru_2(O_2CMe)_4]_3[Cr(CN)_6]$ contains two interpenetrating cubic sublattices. Each sublattice is magnetically frustrated by the easy-plane anisotropy of the spin-3/2 diruthenium (II/III) paddlewheel complexes, which lie at the middle of each cube edge and are antiferromagnetically coupled by the exchange interaction $J_c \sim 1.7$ meV to two spin-3/2 Cr(III) ions at the cube corners. Symmetry considerations suggest that each cubic sublattice has a non-collinear spin state with net moment along one of the cubic diagonals. The moments of the two interpenetrating sublattices are antiferromagnetically coupled at small magnetic fields and become aligned above a critical field of about 1000 Oe $\sim K_c/\mu_B$, where $K_c \sim 2 \times 10^{-3}$ meV is the weak dipolar coupling between sublattices. Powder neutron-diffraction measurements on a deuterated sample confirm that the sublattice moments lie along the cubic diagonals and provide indications for substantial quantum corrections to the spin state of each sublattice.

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