

**SPIN-FLOP AND QUANTUM PHASE TRANSITIONS IN A QUASI-TWO-DIMENSIONAL Cr(IV) ( S=1) MOLECULAR COMPLEX** Jonathan Christian<sup>1</sup>, N. Kaur<sup>2</sup>, V. Ramachandran<sup>1</sup>, J-H Park<sup>3</sup>, Y. Takano<sup>4</sup> and N. Dalal<sup>1</sup>

<sup>1</sup> *Department of Chemistry and Biochemistry, Florida State University, Tallahassee, FL 32306, USA*

<sup>2</sup> *Department of Physics, Purdue University, West Lafayette, IN, 47907-2036, USA*

<sup>3</sup> *National High Magnetic Field Laboratory, Tallahassee, FL, 32310, USA*

<sup>4</sup> *Department of Physics, University of Florida, Gainesville, FL, 32611-8440, USA*

Studies of quantum critical phenomena is a topic of high interest from the view of obtaining a fundamental understanding of critical phenomena and quantum solids. In an effort to search for such materials, our group has initiated studies on the synthesis and characterization of compounds based on the unusual oxidation states of Chromium. We have reported that the compound  $\text{Cr}(\text{C}_4\text{H}_{13}\text{N}_3)(\text{O}_2)_2\text{H}_2\text{O}$ , known simply as Cr(IV)dien, is a possible model system for such studies ( Y.H. Kim et al., Phys. Rev. Lett. 103, 247201 2009). We have now completed specific heat, magnetocaloric and torque magnetometric measurements on Cr(IV)dien as a function of crystal orientation in an external field, and have obtained phase diagrams at milliKelvin temperatures. This presentation will focus on the observation of the spin-flop transition, the unusual phase diagram as T approaches 0 K, the T-window analysis and the unexpected value of critical index (beta) and its possible interpretation.