**Materials Seminar**

Department of Materials Science & Engineering

# Wednesday February 28, 2018

2:00 – 3:00 ~ JDT 500

Faculty Candidate

"Structural Tuning of Orbital and Spin Order in Frustrated Antiferromagnet"

**Speaker:**

**Dr. Christianne Beekman**  
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Florida State University

Abstract:

Magnetic oxides comprised of a frustrated magnetic network of 3d transition metals, in which orbital, spin and structural degrees of freedom are strongly coupled, have been an active playground for researchers due to the promise of finding routes to new behaviors, such as charge-order, spin glass behavior and new types of multiferroics [1-3]. Spinel vanadates, poster materials for orbital physics in frustrated antiferromagnets, have been intensely studied to gain a better understanding on how orbital order can help relieve spin degeneracy. For example, FeV2O4 and MnV2O4 compounds show multiple structural phase transitions as a function of temperature eventually leading to non-collinear and orbital ordered ground states [4] that exhibit ferroelectricity and signs of appreciable magnetoelectric coupling [2]. CoV2O4, the focus of this research, is the most interesting of the vanadates because of its proximity to a localized-itinerant crossover regime. Experimentally, CoV2O4 defies predictions by showing orbital degeneracy seemingly lasting to very low temperatures. Only recently a weak spin canting and a first order structural transition associated with an orbital glass transition has been identified at T = 90 K at the edge of detectability [5,6]. The proximity to itinerancy has been indicated as the cause for the difficulties in observing these transitions reproducibly. In contrast to the weak effects seen in cubic bulk samples, orthorhombic CoV2O4 thin films demonstrate unmistakable signatures of spin canting and structural effects that indicate long-ranged orbital order [7]. Apparently, the slight change in the unit cell has driven the system deeper into the insulating state showing that structural tuning in thin films is a viable knob for ground state manipulation in frustrated systems.

Biography:

Dr. Beekman holds currently the position of Assistant Professor at Florida State University. She was a postdoctoral researcher at Oak Ridge National Laboratory after she received her PhD. at Leiden University, Netherlands.

This Seminar will be followed by Dr. Beekman’s vision for future research in MSE 3-3:30. ***Please join us for refreshments at 3:30***

References

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