Abstract Submitted
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Neutron and X-ray studies in suppressing orbital order in FeV2O4 with Cr doping.[1] DALMAU REIG-I-PLESSIS, ZHANGSU WEN, ALEXANDER THALER, U. of Illinois, VASILE O. GARLEA, Oak Ridge National Lab, HAIDONG ZHOU, U. of Tennessee, JACOB RUFF, Cornell U., GREGORY MACDOUGALL, U. of Illinois — FeV_2O_4 is a spinel compound with an orbitally active V^{3+} cation on a frustrated pyrochlore sublattice and Jahn-Teller active Fe^{3+} on a diamond sublattice. Previous studies show that this material has three structural and two magnetic transitions, and that orbital order leads to coupling between the spin and lattice degrees-of-freedom. The opposite end of the doping series is the multiferroic, $FeCr_2O_4$, which has spin, but no orbital degree of freedom on the Cr^{3+} and only two structural transitions. Although both materials show a higher temperature collinear ferrimagnetic state and a non-collinear phase at lower temperature, the physics must be different since the canting transition in FeV_2O_4 is associated with the orbital order at the lowest structural transition. In this talk, I will present the results of synchrotron X-ray and neutron powder diffraction studies of the structural and magnetic transitions in the doping series $FeV_{2-x}Cr_xO_4$. Specifically, I will comment on the doping-temperature phase diagram we extract from these measurements, and the region of co-existence between distinct non-collinear spin orders which exist at finite doping.

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