

Abstract Submitted  
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**Magnetic order and negative thermal expansion in  $\text{Ca}_2\text{Ru}_{1-x}\text{Fe}_x\text{O}_4$**  SONGXUE CHI, FENG YE, HUIBO CAO, Oak Ridge National Lab, TONGFEI QI, GANG CAO, Center for Advanced Materials and Department of Physics and Astronomy, University of Kentucky — The recent discovery of colossal negative thermal expansion (NTE) in  $\text{Ca}_2\text{Ru}_{1-x}\text{M}_x\text{O}_4$  (M=Cr, Mn, Fe and Cu) has highlighted a novel paradigm for NTE functional materials, where the onset of NTE traces the metal insulator (MI) transition temperature while a NTE anomaly is coupled to the magnetic order. This is in contrast to the conventional NTE behavior where electronic and magnetic properties play no roles. The nuclear and magnetic structures of  $\text{Ca}_2\text{Ru}_{1-x}\text{Fe}_x\text{O}_4$  ( $x=0.02, 0.05, 0.08$  and  $0.12$ ) have been studied using neutron scattering. The effect of Fe-doping on two coexisting magnetic modes and its role in the abnormal thermal response of the lattice will be discussed.

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