Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Characterization of the Spin-1/2 Linear-Spin-Chain Ferromagnet $CuAs_2O_4$ KEVIN CASLIN, REINHARD KREMER, Max Planck Institute for Solid State Research, FEREIDOON RAZAVI, Brock University, ARMIN SCHULZ, Max Planck Institute for Solid State Research, ALFONSO MUNOZ, Universidad de La Laguna, FRANZ PERTLIK, Vienna University of Technology, JIA LIU, MIKE WHANGBO, North Carolina State University, JOSEPH LAW, Hochfeld-Magnetlabor Dresden — We are investigating Cu^{2+} (S =1/2) linear-spin-chains systems exhibiting low-dimensional magnetism. Linear-spin-chains are formed when CuX_6 (X=O,Cl,Br,...) Jahn-Teller distorted octahedra link together via their trans-edges. Most often, these spin-chains support ferromagnetic (FM) nearest-neighbor (NN) and antiferromagnetic (AFM) next-nearest-neighbor (NNN) spin-exchange interactions, sometimes leading to an incommensurate spin-spiral structures with multiferroic behavior. There exists a magnetic phase diagram which can predict the intra-chain behavior using a ratio of spin-exchange constants, α =Jnn/Jnnn. A quantum critical point exists on a boundary at α =- 4, small spin exchange perturbations on a system with an α ratio in the vicinity of this point may induce a pronounced response of the system. In this study, we report on $CuAs_2O_4$ mineral name trippkeite, featuring CuO_2 ribbon chains. Trippkeite is an exceptional spin-chain system because it shows long-range FM ordering and has an α ratio close to -4. Measurements of magnetic susceptibility, heat capacity, Raman spectroscopy, and electron paramagnetic resonance were performed. DFT calculations and TMRG simulations were also carried out.

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Date submitted: 14 Nov 2013 Electronic form version 1.4