Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The role of frustration, low-dimensionality and low crystallographic symmetry on the magnetic order in β-$TeVO_4$ DAGMAR WEICKERT, N. HARRISON, B.L. SCOTT, M. JAIME, Los Alamos Natl Lab, A. LEITMAE, I. HEINMAA, R. STERN, O. JANSON, NICPB, Tallinn, H. BERGER, EPFL, Lausanne, H. ROSNER, MPI CPfS, Dresden, A.A. TSIRLIN, Augsburg University, Germany — β-$TeVO_4$ is a model compound to study $S = 1/2$ zigzag $J_1 - J_2$ chain behavior in a low symmetry (space group P21/c) environment. Weak coupling between individual chains and significant frustration between J_1 FM nearest-neighbor and J_2 AFM next-nearest neighbor interactions leads to competing ground states at low temperature that can be tuned depending on the size and direction of the applied magnetic field[1]. We use specific heat, magnetostriction, thermal expansion and NMR experiments on single crystals to explore the $H - T$ phase diagram in all three directions a, b, c. Our study identifies 1st and 2nd order transitions to anisotropic SDW, helical order and a stripe phase in magnetic fields up to 10 T. Measurements of the magnetostriction and magnetization in capacitor-driven pulsed magnets up to 30 T and at temperatures down to 0.46 K reveal an almost isotropic high field phase with perpendicular phase boundaries of currently unknown origin. The high field phase is accompanied by strong magneto caloric effect. Our experimental results are supported by DFT band-structure calculations analyzing the microscopic spin Hamiltonian and quantifying the leading exchange constants. [1] Weickert et al., PRB 94, 064403 (2016).

Dagmar Weickert
Los Alamos Natl Lab

Date submitted: 07 Nov 2016 Electronic form version 1.4