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Magnetic Field Induced Quantum Phase Transition in Multiferroic Vanadium Spinels E.-D. MUN, National High Magnetic Field Lab (NHMFL), Los Alamos National Lab (LANL); now at Ames Lab, G.-W. CHERN, Theoretical Division, LANL, V. PARDO, F. RIVADULLA, Universidad de Santiago de Compostela, Spain, R. SINCLAIR, H.D. ZHOU, University of Tennessee, Knoxville, V.S. ZAPF, NHMFL, LANL, C.D. BATISTA, Theoretical Division, LANL — Vanadium spinels with the formula AV2O4 (A = Cd, Mg, Zn, etc) show strong magnetic frustration due to a structure of corner-sharing tetrahedra. A tetragonal structural distortion and an "up up down down" magnetic ordering along diagonal chains result at low temperatures, which breaks spatial-inversion symmetry. CdV2O4 is insulating enough that this magnetic order produces ferroelectricity. Here we present data on CdV2O4 and MgV2O4, showing a field-induced quantum phase transition near 40 Tesla, which is a very small energy scale compared to the dominant magnetic exchange interactions. This transition suppresses ferroelectricity and produces a magnetization jump. We show that this transition can be explained by a model that includes spin-orbit coupling effects, and also a trigonal structural distortion at zero and applied magnetic fields.

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