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Co Doping Effect on the Crystal and Magnetic Phases in the Frustrated Spinel $Mn_{1-x}Co_xV_2O_4$ JIE MA, TAO HONG, HUIBO CAO, ADAM ACZEL, WEI TIAN, Oak Ridge National Lab, ZHILING DUN, The University of Tennessee, Knoxville, YIMING QIU, JOHN COPLEY, NIST Center for Neutron Research, H.D. ZHOU, The University of Tennessee, Knoxville, MASAAKI MATSUDA, Oak Ridge National Lab, THE OAK RIDGE NATIONAL LAB TEAM, THE UNIVERSITY OF TENNESSEE, KNOXVILLE COLLABORATION, NIST CENTER FOR NEUTRON RESEARCH COLLABORATION — Co doping effect on the MnV_2O_4 spinel system has been investigated by the elastic and inelastic neutron scattering techniques. Our data present that a magnetic phase transition exists from collinear to noncollinear ferrimagnetic structure between the Mn^{2+}/Co^{2+} and V^{3+} moments and the Co doping decreases the V^{3+} canting angle. The most remarkable finding is that with Co doping, the collinear to noncollinear transition, which coincides with the cubic to tetragonal structural transition related with the orbital ordering of the V^{3+} ions in pure MnV_2O_4, occurs independently without the structural transition. Our results indicate that the Co doping changes the orbital nature of the V^{3+} ions and enhances the magnetic coupling between the Mn^{2+}/Co^{2+} and V^{3+} moments. We discuss how the orbital and magnetic order are correlated in this system.

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