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Competition between the inter- and intra-sublattice interactions in $Yb_2V_2O_7$ ZHILING DUN, Department of Physics and Astronomy, University of Tennessee, JIE MA, HUIBO CAO, TAO HONG, MASAAKI MATSUDA, Quantum Condensed Matter Division, Oak Ridge National Laboratory, YIMING QIU, JOHN COPLEY, NIST Center for Neutron Research, JINGUANG CHENG, Beijing National Laboratory for Condensed Matter Physics, and Institute of Physics, MINSEONG LEE, EUNSANG CHOI, National High Magnetic Field Laboratory, Florida State University, STEVE JOHNSTON, Department of Physics and Astronomy, University of Tennessee, Knoxville, HAIDONG ZHOU, Department of Physics and Astronomy, University of Tennessee, Knoxville; National High Magnetic Field Laboratory, Florida State University — We studied single crystals of $Yb_2V_2O_7$ using dc and ac susceptibility measurements, elastic and inelastic neutron scattering measurements, and linear spin wave theory. The experimental data shows a ferromagnetic ordering of V^{4+} ions at 70 K, a short-range ordering of Yb^{3+} ions below 40 K, and finally a long-range non-collinear ordering of Yb^{3+} ions below 15 K. With external magnetic field oriented along the [111] axis, the Yb-sublattice experiences a spin flop transition related to the "three-in one-out" spin structure. By modeling the spin wave excitations, we extract the Hamiltonian parameters. Our results confirm that although the extra inter-sublattice Yb-V interactions dramatically increases the Yb ordering temperature to 15 K, the intra-sublattice Yb-Yb interactions, based on the pyrochlore lattice, still stabilize the Yb ions' non-collinear spin structure and spin flop transition.

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