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Theory of Magnetic Field-Induced Bose-Einstein Condensation of Triplons in $Ba_3Cr_2O_8$ TYLER DODDS, BOHM JUNG YANG, YONG BAEK KIM, University of Toronto — We report on a theoretical investigation of the spin-1/2-dimer compound $Ba_3Cr_2O_8$ in view of the Bose-Einstein condensation (BEC) of triplet excitations under an applied magnetic field. We apply the self-consistent Hartree-Fock-Popov (HFP) approach to a microscopic Hamiltonian, using the realistic triplon dispersion measured in an inelastic neutron scattering experiment. We investigate the temperature range where the BEC picture of magnetic ordering can be applied in this approach. The effective repulsive interaction between triplons is much weaker in $Ba_3Cr_2O_8$ than in the canonical spin-dimer compound $TlCuCl_3$. Combined with a narrower triplon band, the smaller interaction in $Ba_3Cr_2O_8$ leads to a higher density of triplons at the critical point and a larger HFP correction to the critical applied field. Nonetheless, the HFP approach provides a reasonable explanation of the transverse magnetization and specific heat data of $Ba_3Cr_2O_8$.

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