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Influence of the Verwey transition on the magnon dispersion of magnetite R.J. MCQUEENEY, Iowa State University, M. YETHIRAJ, Oak Ridge National Laboratory, W. MONTFROOIJ, University of Missouri, J.S. GARDNER, Brookhaven National Laboratory, P. METCALF, J. HONIG, Purdue University — Inelastic neutron scattering measurements of the magnon spectrum of magnetite (Fe_3O_4) were performed above and below the metal-insulator (Verwey) transition. Above the Verwey transition, the magnon dispersion behaves as expected for a classical Heisenberg ferrimagnet. Below T_V, a large gap (8 meV) forms in the middle of the acoustic magnon branch at **q**=(0,0,1/2) and E=43 meV. This wavevector corresponds to the main superlattice reflection of the low symmetry monoclinic structure that exists below T_V. It is plausible that the splitting is related to charge ordering occurring on the Fe spinel B-sites in the insulating phase. We examined this possibility by using Heisenberg models with large unit cells (up to 96 magnetic sites) to calculate the magnon dynamics when the superexchange is modified to reflect crystallographic symmetry lowering due to either atomic distortions or charge ordering. Neither of these models predicts the spin wave gap. Other physics is likely at play, such as strong magneto-elastic coupling, which may further complicate our understanding of the Verwey problem.

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