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Optical spin waves in magnetite R.J. MCQUEENEY, Iowa State University, M. YETHIRAJ, ANSTO, W. MONTFROOIJ, Missouri University, S. CHANG, Ames Laboratory, T.G. PERRING, Rutherford Appleton Laboratory, P. METCALF, J.M. HONIG, Purdue University — For the last 70 years, the microscopic origin of the Verwey transition in magnetite (Fe_3O_4) was thought to be charge-ordering, although this has been disputed of late, bringing renewed interest in this system. The spinel structure of magnetite contains two different iron sites; A (stable valence, Fe^{3+}) and B (mixed valence, $Fe^{2.5+}$), with charge ordering of Fe^{2+}/Fe^{3+} species occurring on the B-site. As the spin waves are expected to be sensitive to charge ordering, the optical spin waves were measured above and below the Verwey transition by inelastic neutron scattering. The optical spin waves propagating on the A-site sublattice ($\sim$115 meV) are unchanged at the transition. The spin waves propagating on the B-site sublattice ($\sim$75 meV) are $\sim$5 meV stiffer and broader in the metallic phase. The results are interpreted as evidence of B-site double exchange in the metallic phase.

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