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Spin moment over 10-300 K and the delocalization of magnetic electrons above the Verwey transition in magnetite P. A. MONTANO, U. of Illinois Chicago and USDOE, YINWAN LI, U. of Illinois Chicago and Argonne National Laboratory, B. BARBIELLINI, Northeastern U., P. E. MIJNARENDS, Northeastern U. and Delft University of Technology, S. KAPRZYK, Northeastern U. and and AGH (Poland), A. BANSIL, Northeastern U. — In order to probe the magnetic ground state, we have carried out temperature dependent magnetic Compton scattering experiments on an oriented single crystal of magnetite (Fe_3O_4), together with the corresponding first-principles band theory computations to gain insight into the measurements. An accurate value of the magnetic moment μ_S associated with unpaired spins is obtained directly for the first time over the temperature range of 10-300K. μ_S is found to be non integer and to display an anomalous behavior with the direction of the external magnetic field near the Verwey transition. The anisotropy of the magnetic Compton profiles shows a dramatic jump through the Verwey temperature T_v and indicates that magnetic electrons in the ground state of magnetite become delocalized above T_v . Work supported by the USDOE.

> Pedro A. Montano U. of Illinois Chicago and USDOE

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