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Electronic Raman Scattering in Magnetite: Spin vs. Charge gap[1]
LEV GASPAROV, University of North Florida, G. GUNTHERODT, II. Physikalisches Institut, RWTH-Aachen University, Germany, H. BERGER, EPFL-Lausanne, Switzerland — We report Raman scattering data on single crystals of magnetite (Fe_3O_4) with the Verwey transition temperature of 123 and 117K. Both single crystals reveal broad electronic background extending up to 900 wavenumbers ($\sim$110 meV). Redistribution of this background is observed when the samples are cooled below the transition temperature. In particular, spectra of the low temperature phase show diminished background below 300 wavenumbers followed by an enhancement of the electronic background between 300 and 400 wavenumbers. $\Downarrow$ To enhance the effect of the background distribution we divide the spectra just below the transition by the spectra just above the transition. The resultant broad peak-like feature is centered at 368 $\pm$5 wavenumbers (45 meV). The peak position of this feature does not scale with the transition temperature. We discuss two alternative assignments of this feature to a spin or charge gap in magnetite.

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