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New Structure Observed in a High Resolution RIXS Study of Magnetite TIMOTHY LEARMONTH, PER-ANDERS GLANS, Boston University, JINGHUA GUO, ALS, Berkeley National Lab, KEVIN E. SMITH, Boston University — Despite being one of the earliest transition-metal oxides discovered, dating back as far as 4000 B.C.E., Fe3O4 electronic structure is still the subject of debate. Recently, x-ray emission spectroscopy (XES) has been used extensively to investigate the electronic structure of many transition-metal oxides. Because XES can effectively measure energy splittings caused by both a ligand field and electron correlation, the technique can be used to probe the nature of electronic structure near the Fermi level in these materials. Here we report resonant inelastic x-ray scattering (RIXS) measurements of the transition-metal oxide Fe3O4 at both the O K edge and the Fe L edge. Although taken with higher resolution, the O K edge spectra are substantially the same as measurements previously published with low resolution. The Fe L edge emission, however, reveals structure that was not observed in previous studies. Specifically, a sharp elastic feature near the Fermi level and a 3.5eV excitation at slightly higher excitation energies are observed. These are interpreted in light of symmetry considerations and ligand field splitting. Supported in part by U.S. DOE under DE-FG02-98ER45680

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