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Dispersive Frequency Shifts in the EPR spectra of the Single-Molecule Magnet Fe_8[1] JONATHAN FRIEDMAN, MUSTAFA BAL, Department of Physics, Amherst College, Amherst, MA 01002, CHRISTOPHER BEEDLE, DAVID HENDRICKSON, Department of Chemistry and Biochemistry, University of California at San Diego, La Jolla, CA 92093 — High-frequency electron paramagnetic resonance (EPR) has been used to study single-molecule magnets (SMMs) for more than a decade. We observe dispersive effects in a cylindrical cavity when a single crystal of the Fe_8 SMM is tuned to resonance with millimeter-wave radiation. The reflected power from the cavity is measured as a function of the radiation frequency at magnetic fields from 0 to 1.5 Tesla and temperatures between 2.0 and 20.0 K. Although the sample/cavity filling factor is small, $\sim$0.1%, we observe a substantial sample-induced frequency shift of the cavity resonance when the field brings a dipole- allowed transition near resonance with the applied radiation. At 2.0 K, the resonant frequency of the cavity ($\sim$117.5 GHz) exhibits a shift on the order of 10 MHz (comparable to the width of the cavity resonance). At the same time, we observe a reduction in both the cavity Q and the amount of power absorbed by the cavity. The data allows us to gain both dispersive and absorptive information about the material.

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