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Pulsed-Radiation-Induced Magnetization Relaxation in Single-Molecule Magnets M. BAL, J. R. FRIEDMAN, Dept. of Physics, Amherst College, W. CHEN, Physics Dept., Stony Brook University, M.T. TUOMINEN, Dept. of Physics, Univeristy of Massachusetts at Amherst, S. SHAH, E.M. RUMBERGER, D.N. HENDRICKSON, Dept. of Chemistry and Biochemistry, UC San Diego, N. AVRAHAM, Y. MYASOEDOV, H. SHTRIKMAN, E. ZELDOV, Dept. of Condensed Matter Physics, The Weizmann Institute of Science — Millimeter-wave radiation induces large dips in the magnetization of a single crystal of the Fe_8 single-molecule magnet (SMM) when the radiation is on resonance with transitions between energy levels. In our recent studies, we pulsed the radiation with the goal of determining T_1, the lifetime of the first excited state. We found that during a 0.2-ms pulse of intense radiation the spin system and the lattice are driven out of thermal equilibrium. Experiments at shorter time scales, carried out with the use of an inductive thin-film pick-up loop, revealed a surprisingly long relaxation time for magnetization on the order of ~ 10 μs. A poor signal-to-noise (S/N) ratio required averaging of $\sim 4 \times 10^5$ individual traces to obtain acceptable data. Incorporating a superconducting interference device (SQUID) as a low-noise voltmeter into our experimental setup improves the S/N ratio, allowing us to explore the origin of the observed long relaxation time. The results of these experiments on Fe_8 as well as other SMMs will be presented.

Mustafa Bal
Amherst College

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