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**Single-molecule magnets “without” intermolecular interactions**

W. WERNSDORFER, Institut Neel, CNRS, Grenoble, France, L. VERGNANI, M.J. RODRIGUEZ-DOULTON, A. CORNIA, INSTM, Uni-Modena e Reggio Emilia, Italy, P. NEUGEBAUER, A.L. BARRA, LNCMI, CNRS, Grenoble, France, L. SORACE, R. SESSOLI, INSTM, Uni-Firenze, Italy — Intermolecular magnetic interactions (dipole-dipole and exchange) affect strongly the magnetic relaxation of crystals of single-molecule magnets (SMMs), especially at low temperature, where quantum tunneling of the magnetization (QTM) dominates. This leads to complex many-body problems [1]. Measurements on magnetically diluted samples are desirable to clearly sort out the behaviour of magnetically-isolated SMMs and to reveal, by comparison, the effect of intermolecular interactions. Here, we diluted a Fe<sub>4</sub> SMM into a diamagnetic crystal lattice, affording arrays of independent and iso-oriented magnetic units. We found that the resonant tunnel transitions are much sharper, the tunneling efficiency changes significantly, and two-body QTM transitions disappear. These changes have been rationalized on the basis of a dipolar shuffling mechanism and of transverse dipolar fields, whose effect has been analyzed using a multispin model. Our findings directly prove the impact of intermolecular magnetic couplings on the SMM behaviour and disclose the magnetic response of truly-isolated giant spins in a diamagnetic crystalline environment.

[1] W. Wernsdorfer, et al, PRL 82, 3903 (1999); PRL 89, 197201 (2002); Nature 416, 406 (2002); IS Tupitsyn, PCE Stamp, NV Prokof'ev, PRB 69, 132406 (2004).

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