Abstract Submitted
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Spin dynamics of molecular nanomagnets unraveled at atomic scale by four-dimensional inelastic neutron scattering PAOLO SANTINI, Dipartimento di Fisica e Scienze della Terra, University of Parma, I, MICHAEL BAKER, Institut Laue-Langevin, Grenoble, France, TATIANA GUIDI, Rutherford Appleton Laboratory, Didcot, UK, STEFANO CARRETTA, Dipartimento di Fisica e Scienze della Terra, University of Parma, I, JACQUES OLLIVIER, HANNU MUTKA, Institut Laue-Langevin, Grenoble, France, HANS GUEDEL, Department of Chemistry, University of Bern, CH, GRIGORE TIMCO, ERIC MCINNES, School of Chemistry, University of Manchester, UK, GIUSEPPE AMORETTI, Dipartimento di Fisica e Scienze della Terra, University of Parma, I, RICHARD WINPENNY, School of Chemistry, University of Manchester, UK — Molecular nanomagnets (MNMs) have been test-beds for addressing several elusive but important phenomena in quantum dynamics, but to this point it has been impossible to determine the spin dynamics directly. We show that recently-developed inelastic-neutron-scattering instrumentation, yielding the cross-section in vast portions of reciprocal space, enables two-spin dynamical correlation functions of MNMs to be directly determined without assuming an underlying model Hamiltonian. We use the Cr_8 antiferromagnetic ring as a benchmark to demonstrate the potential of this approach which allows us, for example, to examine how a quantum fluctuation propagates along the ring or to test the degree of validity of the Neel-vector-tunneling framework [1]. This result opens remarkable perspectives in the understanding of the quantum dynamics in several classes of MNMs. [1] M. Baker et al., Nature Physics in press (doi:10.1038/nphys2431)

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