Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Decoherence in Quantum Magnets: Theory and Experiment on T_2 IGOR TUPITSYN, Pacific Institute of Theoretical Physics, UBC, Canada, PHILIP STAMP, Department of Physics and Astronomy, UBC, Canada, SUSUMU TAKAHASHI, MARK SHERWIN, University of California, Santa Barbara, USA, JOHAN VAN TOL, Florida State University, Tallahassee, USA, CHRISTOPHER BEEDLE, DAVID HENDRICKSON, University of California, San Diego, USA — The individual properties of molecular magnets are controlled by chemistry rather than nanoengineering, and are highly tunable. This makes them ideal candidates for solid-state qubits. However decoherence in many solid-state systems is anomalously high, and their advantages cannot be exploited until decoherence is understood and suppressed. In molecular magnets decoherence is caused by coupling to the nuclear spin bath, to phonons, and to each other via dipole-dipole and exchange interactions. Here we study decoherence in 2 different crystals of Fe8 nanomolecules, in several field orientations, both theoretically and experimentally. The experimental results for the decoherence time T_2 agree with the existing theory (Morello et al., Phys Rev Lett 97, 207206 (2006)). To our knowledge this is the first time that experimental decoherence rates agree with theory in magnetic systems.

Igor Tupitsyn
Pacific Institute of Theoretical Physics, UBC, Canada

Date submitted: 06 Dec 2009 Electronic form version 1.4