Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Landau-Zener in a continuously measured molecular spin FILIPPO TROIANI, Istituto Nanoscienze, CNR (Italy), MARCO AFFRONTE, Universit di Modena e Reggio Emilia (Italy), STEPHAN THIELE, CLEMENT GODFRIN, FRANCK BALESTRO, WOLFGANG WERNSDORFER, Institut Nel, CNRS (France), SVETLANA KLYATSKAYA, MARIO RUBEN, Karlsruhe Institute of Technology (Germany) — The dynamics of a quantum system driven through an avoided level crossing represernts a relevant problem in many physical contexts. Here we present a joint theoretical and experimental investigation of a single-molecule magnet (namely, a terbium double-decker complex) in a three-terminal geometry. The Tb spin is driven through an avoided level crossing by a time-dependent magnetic field, and its dynamics is monitored through a continuous measurement of the conductance. The dependence of the spin-reversal probability on the field sweeping rate presents clear deviations from the Landau-Zener formula, which applies to the case of closed systems. The comparison between direct and inverse Landau-Zener transitions points at the dominance of dephasing, with respect to inelastic incoherent processes. The spin dynamics is simulated within a master equation approach. The observed behaviors are reproduced by assuming that dephasing takes place in the basis of the time-dependent Hamiltonian eigenstates. The spin dephasing is traced back to the continuous measurement of the electron spin, and a fundamental role is played by the finite time resolution of the conductance measurement.

Filippo Troiani
CNR-Istituto Nanoscienze (Italy)

Date submitted: 06 Nov 2015 Electronic form version 1.4