Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Control of quantum magnetic deflagration in Mn12 acetate. ALBERTO HERNANDEZ-MINGUEZ, JOAN MANEL HERNANDEZ, FERRAN MACIA, ANTONIO GARCIA-SANTIAGO, JAVIER TEJADA, Universitat de Barcelona, PAULO SANTOS, Paul Drude Institut, EXPERIMENTAL MAGNETISM TEAM, SEMICONDUCTOR SPECTROSCOPY COLLABORATION — Magnetic avalanches in Mn12-ac involve spin tunneling through an energy barrier which is controlled by the applied magnetic field. The reversal proceeds through the propagation of a narrow magnetic reversal front at constant velocity through the crystal [1]. In this contribution, we demonstrate that the ignition of the deflagration can be controlled in a deterministic way using surface acoustic waves (SAWs). For that purpose, the Mn12 crystal was mounted on the surface of a piezoelectric LiNbO3 substrate containing an interdigital transducer (IDT) for the excitation of SAWs. In the super-paramagnetic regime (above 3 K), the Mn12 magnetization shows pronounced changes when the IDT is excited at its resonant frequencies, thus proving that the crystals can be used as very sensitive acoustic detectors. At low temperatures (below 3 K), both the ignition rate and the velocity of the deflagration front present peaks for the values of the magnetic fields that bring the spin levels on both sides of the tunneling barrier into resonance, thus demonstrating the occurrence of both quantum magnetic ignition and quantum magnetic deflagration [2]. [1] Y. Suzuki et. al., Phys. Rev. Lett. 95, 147201 (2005). [2] A. Hernández-Mínguez et. al., Phys. Rev. Lett. 95, 217205 (2005).

Javier Tejada
Universitat de Barcelona

Date submitted: 25 Nov 2005 Electronic form version 1.4