Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Entangled states decoherence in coupled molecular spin clusters FILIPPO TROIANI, ATTILA SZALLAS, VALERIO BELLINI, CNR-INFM S3 , MARCO AFFRONTE, University of Modena and Reggio Emilia — Localized electron spins in solid-state systems are widely investigated as potential building blocks of quantum devices and computers. While most efforts in the field have been focused on semiconductor low-dimensional structures, molecular antiferromagnets were recently recognized as alternative implementations of effective few-level spin systems. Heterometallic, Cr-based spin rings behave as effective spin-1/2 systems at low temperature and show long decoherence times [1]; besides, they can be chemically linked and magnetically coupled in a controllable fascion [2]. Here, we theoretically investigate the decoherence of the Bell states in such ring dimers, resulting from hyperfine interactions with nuclear spins. Based on a microscopic description of the molecules [3], we simulate the effect of inhomogeneous broadening, spectral diffusion and electron-nuclear entanglement on the electron-spin coherence, estimating the role of the different nuclei (and of possible chemical substitutions), as well as the effect of simple spin-echo sequences. References: [1] F. Troiani, et al., Phys. Rev. Lett. 94, 207208 (2005). [2] G. A. Timco, S: Carretta, F. Troiani et al., Nature Nanotech. 4, 173 (2009). [3] F. Troiani, V. Bellini, and M. Affronte, Phys. Rev. B 77, 054428 (2008).

Filippo Troiani
CNR-INFM S3

Date submitted: 19 Nov 2009 Electronic form version 1.4