

Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Probing Quantum Magnetism with Polar Molecules via Interaction Induced Dephasing SALVATORE R. MANMANA, KADEN R.A. HAZZARD, ANA MARIA REY, JILA / University of Colorado at Boulder — We show that strongly correlated many body states of quantum magnetic models can be dynamically generated even under current experimental conditions [1] at low filling factors and at temperatures above quantum degeneracy. This opens the way to verify a recent theoretical prediction [2] that the molecules' rotational states can be used to directly emulate quantum spins with strong ($> 1\text{kHz}$) “spin-spin” interactions. We do this by considering the dynamics of fully polarized initial states which are easily realized in current experiments. Our analytic and DMRG calculations show that the dynamic experiments can quantitatively verify and characterize the spin model (XXZ) description of the system. As an outlook we propose how to experimentally generate interesting entangled states with polar molecules.

[1] A. Chotia et al., arXiv:1110.4420

[2] A.V. Gorshkov et al., PRL 107, 115301 (2011); PRA 84, 033619 (2011).

Salvatore R. Manmana
JILA / University of Colorado at Boulder

Date submitted: 27 Jan 2012

Electronic form version 1.4