Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Measuring dipolar spin exchanges in ultracold polar KRb molecules[1] STEVEN MOSES, BO YAN, BRYCE GADWAY, JACOB COVEY, KADEN HAZZARD, ANA MARIA REY, DEBORAH JIN, JUN YE, JILA, NIST, and University of Colorado, Boulder — By encoding spin in rotational states, we have observed spin exchanges of ultracold polar KRb molecules that are confined in a deep three dimensional optical lattice [Yan *et al.*, Nature **501**, 521 (2013)]. The interactions manifest as a density dependent decay of the spin coherence of the system, which is probed via Ramsey spectroscopy. In addition to decaying, there are oscillations in the contrast, with frequency components that are consistent with the dipolar interaction energies. By adding additional pulses, we can suppress pairwise dipolar interactions. We have studied these spin exchanges for two different pairs of rotational states, which differ by a factor of two in interaction strength, and find the decay and oscillations to be roughly twice as fast in the case of stronger interactions. This work lays the foundation for future studies of quantum magnetism with polar molecules in optical lattices.

[1]We acknowledge funding from NIST, NSF, DOE, AFOSR-MURI, DARPA, and the NDSEG Graduate Fellowship.

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Date submitted: 15 Nov 2013 Electronic form version 1.4