Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Increasing the filling of ultracold KRb molecules in a 3D optical lattice[1] STEVEN MOSES, JACOB COVEY, JILA, NIST, and University of Colorado, Boulder, BRYCE GADWAY, University of Illinois at Urbana-Champaign, BO YAN, MATTHEW MIECNIKOWSKI, JUN YE, DEBORAH JIN, JILA, NIST, and University of Colorado, Boulder — Ultracold polar molecules, with their long-range electric dipolar interactions, offer new opportunities for studying quantum magnetism and many-body physics. Recently, our group observed spin exchange interactions between KRb molecules in a 3D optical lattice (Yan *et al.*, Nature **501**, 521-525 (2013)), which is one of the first steps towards studying lattice spin models with polar molecules. The lattice fillings were about 10% or less in these experiments. Future experiments will benefit greatly from lower entropies and higher lattice fillings. Here, we have investigated the molecular creation process in a 3D optical lattice with the goal of maximizing the filling fraction. We start by loading a BEC of Rb and a degenerate Fermi gas of K into a 3D optical lattice. In the absence of K, Rb is a Mott insulator. We study how the Mott insulator and the filling of Rb are affected by the presence of K and develop a strategy to maintain high Rb filling throughout the molecule production process. We also find that we can convert a large fraction of these Rb to molecules when we operate with low Rb numbers.

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

Steven Moses
JILA, and University of Colorado, Boulder

Date submitted: 29 Jan 2015 Electronic form version 1.4