Abstract Submitted
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**A quantum gas of polar KRb molecules in an optical lattice** JACOB COVEY, MATTHEW MIECNIKOWSKI, STEVEN MOSES, ZHENGKUN FU, DEBORAH JIN, JUN YE, JILA/Univ of Colorado - Boulder — Ultracold polar molecules provide new opportunities for investigation of strongly correlated many-body spin systems such as many-body localization and quantum magnetism. In an effort to access such phenomena, we load polar KRb molecules into a three-dimensional optical lattice. In this system, we observed many-body spin dynamics between molecules pinned in a deep lattice, even though the filling fraction of the molecules was only 5%. We have recently performed a thorough investigation of the molecule creation process in an optical lattice, and consequently improved our filling fraction to 30% by preparing and overlapping Mott and band insulators of the initial atomic gases. More recently, we switched to a second generation KRb apparatus that will allow application of large, stable electric fields as well as high-resolution addressing and detection of polar molecules in optical lattices. We plan to use these capabilities to study non-equilibrium spin dynamics in an optical lattice with nearly single site resolution. I will present the status and direction of the second generation apparatus.

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