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Toward spin physics with polar molecules in 2D KYLE MATSUDA, GIACOMO VALTOLINA, LUIGI DE MARCO, WILLIAM TOBIAS, JUN-RU LI, JUN YE, JILA and University of Colorado — Ultracold polar molecules are a promising platform for studying many-body quantum physics due to their long-range and anisotropic dipolar interactions. In particular, the interplay between the range of the interactions and spatial dimensionality leads to the emergence of exotic many-body phenomena when the molecules are confined in a 2D geometry. We will describe progress toward the preparation of a degenerate gas of KRb molecules in a single 2D plane, before we load them into a 3D optical lattice. In this setting, rotational excitations of the molecules can be mapped to a system of hard-core bosons, which are predicted to exhibit Bose condensation at a critical filling of molecules in the lattice [1]. In addition, dipolar interactions between the molecules are expected to result in an effective spin-orbit coupling [2]. [1] M. P. Kwasigroch and N. R. Cooper, PRA 96, 053610 (2017). [2] S. V. Syzranov, M. L. Wall, V. Gurarie, and A. M. Rey, Nat. Comm. 5, 5391 (2014).

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