Abstract Submitted for the DAMOP20 Meeting of The American Physical Society

Developing a quantum gas microscope for NaRb molecules¹ LYSANDER CHRISTAKIS, JASON ROSENBERG, GEOFFREY ZHENG, WASEEM BAKR, Princeton University — The study of many-body physics with ultracold gases has benefited greatly in recent years from quantum gas microscopy, which allows for single particle detection and manipulation of individual atoms within an optical lattice. In parallel, numerous research groups have achieved rapid progress in creating and probing ultracold gases of polar molecules. Here we present our progress towards synthesizing these two research areas via a quantum gas microscope of bosonic NaRb molecules. We currently perform fluorescence imaging of a degenerate rubidium gas in a 2D optical lattice with single site resolution. We are working towards realizing Na/Rb mixtures in our apparatus and preparing NaRb molecules. We will detect the molecules in the lattice by dissociating them and imaging the constituent atoms. Our apparatus also features in-vacuum electrodes for tuning the interactions between the molecules via electric fields which should enable evaporating the molecules to degeneracy and open the door to microscopic studies of strongly dipolar Bose gases.

¹We acknowledge funding from the David and Lucile Packard Foundation (grant no. 2016-65128) and the NSF (grant no. 1912154). L.C. acknowledges funding from the NSF GRFP.

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Date submitted: 31 Jan 2020 Electronic form version 1.4