Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Toward the individual trapping and probing of ultracold polar molecules[1] MICHAEL HIGHMAN, University of Illinois at Urbana-Champaign, MING LI, SVETLANA KOTOCHIGOVA, Temple University, BRIAN DEMARCO, BRYCE GADWAY, University of Illinois at Urbana-Champaign — Rotational states of ultracold polar molecules are long lived, noise insensitive, and host natural entangling interactions that stem from the molecules' large internal electric dipole moment. Such properties, alongside the fact that they can be manipulated through many of the same methods developed for neutral atoms, make them enticing for use in a wide range of applications in quantum computation or analog quantum simulation. However, unlike on neutral atom systems, no general-purpose, high-fidelity probing process currently exists for generic molecules due to their complex internal structure. We discuss a new approach to nondestructively image molecules that exploits their optical birefringence when prepared in rotationally excited states. We then detail current experimental progress toward creating individually trapped ground state sodium-rubidium molecules as well as our plans for implementing this nondestructive imaging scheme.

[1]National Science Foundation Graduate Research Fellowship (NSF GRFP)

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Date submitted: 01 Feb 2019 Electronic form version 1.4