DAMOP20-2020-000137

Abstract for an Invited Paper
for the DAMOP20 Meeting of
the American Physical Society

Optical Tweezer Arrays of Cold Molecules

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Potential wide-ranging scientific applications have led to significant efforts in controlling molecules at the single quantum state level. Aimed squarely at this goal, laser cooling of molecules has led to the first molecular MOTs and, recently, to magnetically and optically trapped molecules. Optical tweezer arrays are a powerful platform, offering the possibility of high-fidelity readout and control of both individual molecules as well as systems. This platform is suited for applications ranging from precision measurement to quantum simulation and quantum information processing. We report on the creation of such an array of CaF molecules. In combination with internal state control of the molecules, we perform state dependent collisional studies of CaF through tweezer merging. We will discuss further prospects for shielding of CaF molecular collisions, as well as progress towards performing quantum simulations.