DAMOP19-2019-000493

Abstract for an Invited Paper
for the DAMOP19 Meeting of
the American Physical Society

Quantum information with Rydberg excited atoms[1]

MARK SAFFMAN, University of Wisconsin - Madison and ColdQuanta, Inc.

Optically trapped neutral atoms are one of several leading approaches for scalable quantum information processing. When prepared in electronic ground states in deep optical lattices atomic qubits are weakly interacting with long coherence times. Excitation to Rydberg states turns on strong interactions which enable fast gates and entanglement generation. I will present quantum logic experiments with a 2D array of blue detuned lines that traps more than 100 Cesium atom qubits. The array is randomly loaded from a MOT and an optical tweezer steered by a 2D acousto-optic deflector is used to fill subregions of the array. Progress towards high fidelity entangling gates based on Rydberg excitation lasers with lower noise, and optimized optical polarization and magnetic field settings will be shown.

[1]Work supported by NSF, ARL-CDQI, DOE, and ColdQuanta.