

Abstract Submitted
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Towards Many-Body Quantum Engineering in a Near-Concentric Optical Cavity EMILY DAVIS, GREGORY BENTSEN, MONIKA SCHLEIER-SMITH, Stanford University — Light-mediated interactions between atoms coupled to an optical cavity offer a powerful approach to engineering Hamiltonians giving rise to many-body entanglement. The interactions are non-local, and both their strength and sign can be dynamically controlled. We present an experiment optimized for generating coherent and controllable light-mediated interactions by trapping atoms in the waist of a near-concentric cavity. The unique near-concentric geometry provides strong atom-light coupling and furthermore allows high spatial resolution for local addressing and imaging from the side of the cavity. The latter capability will enable entanglement of atomic sub-ensembles and detection of spatial correlations. We report here on the completed construction and characterization of the near-concentric cavity, as well as progress towards many-particle quantum control.

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