Abstract Submitted
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Designing Superconducting Mm-wave Photonic Crystal Cavities for Rydberg Cavity Quantum Electrodynamics AZIZA SULEYMANZADE, MARK STONE, JOSHUA WAKEFIELD, LIN SU, JASMINE KALIA, DAVID SCHUSTER, JONATHAN SIMON, Univ of Chicago — I will describe progress towards a hybrid experimental system for engineering strong interactions between single optical and mm-wave photons using Rydberg atoms as an interface. Entanglement between photons with 100 gigahertz and optical frequencies creates a new platform to access exotic photonic quantum states as well as powerful new techniques in quantum computing and simulation at 1K. I will present recent experimental developments including trapping and cooling atoms in a cryogenic Magneto Optical Trap, measuring high-Q superconducting cavities at 100 GHz and coupling atoms to an optical cavity inside our custom designed and home-made cryostat. I will discuss in detail our use of photonic crystals as a new design for fabricated 100-gigahertz superconducting resonators.

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