

## Physics Division Seminar

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## Hybrid Quantum Interface Between Neutral Atoms and a Superconducting Resonator

Host: Matt Dietrich

Monday, May 14, 2018 – 203, R150, 3:30 PM

Hybrid quantum computation bridges disparate quantum technologies in order to achieve fast gates with long coherence times. I will present progress towards a hybrid quantum interface between single atoms and microwave excitations of a superconducting coplanar waveguide (CPW) resonator. The hybrid interface is based on trapping single Cesium atoms in a 4K cryostat in close proximity to the CPW. Two-photon excitation via the  $6S_{1/2} \rightarrow 5D_{5/2}$  quadrupole transition prepares  $90P_{3/2}$  Rydberg states that are strongly coupled to excitations of the CPW. Toward this end, a new vacuum chamber and optical system for atom trapping, transport, and excitation has been built. Results for single atom trapping and Rydberg spectroscopy within the new optical system and report on progress towards observation of atom-microwave photon coupling will be presented. I will also present theoretical calculations of Rydberg polarizability dressing to minimize the influence of background electric fields on the Rydberg states.