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Cavity QED with Single Atoms and Photons

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Across a broad front in physics, an important advance in recent years has been the increasing ability to observe and manipulate the dynamical processes of individual quantum systems. In this endeavor, an important physical system has been a single atom strongly coupled to the electromagnetic field of a high-Q cavity within the setting of cavity quantum electrodynamics (cavity QED). Because of several unique advantages, cavity QED is playing an important role in the new science of quantum information, such as for the realization of complex quantum networks and for the investigation of quantum dynamics of single quantum systems. My presentation will describe recent advances in the Quantum Optics Group at Caltech related to strong coupling for single atoms and photons and to applications in quantum information science [1-5]. This research is supported by the National Science Foundation PHY-0140355, by the Caltech MURI for Quantum Networks administered by the ARO, and by the Advanced Research and Development Activity (ARDA).

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