Towards a controlled-phase gate using Rydberg-dressed atoms
AARON HANKIN, Univ of New Mexico, YUAN-YU JAU, GRANT BIEDERMANN, Sandia National Laboratories — We are implementing a controlled-phase gate based on singly trapped neutral atoms whose coupling is mediated by the dipole-dipole interaction of Rydberg states. An off-resonant laser field dresses ground state cesium atoms in a manner conditional on the Rydberg blockade mechanism [1,2], providing the required entangling interaction. We will present our progress [3] toward implementing the controlled-phase gate with an analysis of possible sources of decoherence such as RF radiation from wireless communication devices. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy’s National Nuclear Security Administration under contract DE-AC04-94AL85000.