Abstract Submitted
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Coherence conditions for groups of Rydberg atoms[1] JESUS HERNANDEZ, FRANCIS ROBICHEAUX, Auburn University — We investigate the excitation of a collection of cold atoms to Rydberg states. By direct numerical solution of Schrödinger's equation, we are able to compute various interesting properties of the many body wave function. The high polarizability of Rydberg atoms allows them to support large dipole moments which in turn can interact over long ranges. If the interaction energy between two excited atoms is large enough the resultant energy shift will move the two excitation state out of resonance, thus effectively blocking a two excitation state form occurring. One particular topic investigated is the quantum phase gate, where both groups of atoms are within a blockade radius and subjected to a $\pi - 2\pi - \pi$ sequence of pulses. We examine the regime where the groups are neither totally within nor totally outside the blockade radius. Testing the conditions for coherence will help establish constraints for quantum information. If time permits, counting statistics as related to the Mandel Q parameter will be used to measure blockade effectiveness.

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