Abstract Submitted
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Dissipative generation of long range entanglement with Rydberg atoms[1] ALEX CARR, MARK SAFFMAN, University of Wisconsin — We propose and analyze an approach for preparation of atomic spin singlet states using Rydberg mediated interactions and dissipation. Using asymmetric Rydberg interactions the two-atom Bell singlet is a dark state of the Rydberg pumping process. In a many spin setting anti-ferromagnetic states of nonlocal Ising models can be studied. Master equation simulations demonstrate Bell singlet preparation fidelity $F = 0.999$ with only 3 MHz of Rydberg-Rydberg interaction strength. This implies that high fidelity entanglement can be created at distances beyond 20 μm, an order of magnitude greater than can be achieved with coherent Rydberg gates. Combining this approach with gate teleportation will allow for long distance gates in atomic qubit arrays.

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