Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Subradiance and Pauli blocking in lattices of multilevel fermionic atoms ASIER PINEIRO ORIOLI, CHRISTIAN SANNER, JUN YE, ANA MARIA REY, JILA, NIST, and Department of Physics, University of Colorado, 440 UCB, Boulder, Colorado 80309, USA — We investigate how the interplay of dipolar interactions and Pauli blocking due to fermionic statistics modifies spontaneous emission. Specifically, we consider multiple fermionic atoms trapped on a single lattice site, and study the radiative properties of a transition from a degenerate $(2J_g + 1)$ manifold of electronic internal levels to a $(2J_e + 1)$ manifold of excited states. We show the existence of a set of singly-excited dark states for $N = 2J_g + 1$ atoms per site, and the appearance of subradiant states for general N and number of excitations. We discuss various protocols to prepare such states using laser pulses and control over the coherent part of the dipolar interactions. These results would allow to significantly expand the coherence times of atomic transitions in systems which would otherwise decay too quickly. We discuss potential applications for current optical lattice clock experiments with alkaline-earth atoms such as ^{87}Sr or ^{171}Yb, as well as for quantum information devices such as quantum memories.

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Date submitted: 20 May 2019 Electronic form version 1.4