

Optimal control of Rydberg lattice gases

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<http://iopscience.iop.org/article/10.1088/2058-9565/aa7daf/meta> [2]

We present optimal control protocols to prepare different many-body quantum states of Rydberg atoms in optical lattices. Specifically, we show how to prepare highly ordered many-body ground states, GHZ states as well as some superposition of symmetric excitation number Fock states, that inherit the translational symmetry from the Hamiltonian, within sufficiently short excitation times minimizing detrimental decoherence effects. For the GHZ states, we propose a two-step detection protocol to experimentally verify the optimal preparation of the target state based only on standard measurement techniques. Realistic experimental constraints and imperfections are taken into account by our optimization procedure making it applicable to ongoing experiments.

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