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Perfect GHZ States from Imperfect Cluster States in Optical Lattices MICHAEL GARRETT, DAVID FEDER, University of Calgary — Cluster states form a class of non-separable multipartite graph states, the entanglement of which is exceptionally persistent against the effects of single-qubit measurements. One of the most promising experimental approaches to the formation of cluster states employs a gas of ultracold atoms confined in an optical lattice. Starting with a Mott insulator state of pseudospin-1/2 bosons at unit filling, cluster states can be generated efficiently by preparing each spin state in its own sublattice, and inducing collisional phase shifts by varying the laser polarizations. In practice, systematic phase errors are expected to arise during this entangling process, resulting in the formation of imperfect cluster states. In this poster, we present a technique for using imperfect cluster states to distill perfect GHZ states. Applications include fault-tolerant quantum computing, open-destination quantum teleportation, quantum cryptography, Heisenberg-limited spectroscopy, and atomic clocks.

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