

Abstract Submitted
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One-way quantum computing in optical lattices with many atom measurements. TIMOTHY P. FRIESEN, DAVID L. FEDER, University of Calgary — In one-way quantum computation single qubit measurements on a highly entangled state, known as a cluster state, are sufficient to perform universal quantum computation. One of the most promising approaches for generating the cluster state is to manipulate ultracold atoms in optical lattices. Unfortunately, the small lattice spacing places severe constraints on the ability to sequentially measure the states of individual atoms by external lasers, a crucial requirement for one-way computing. With current technology, we are generally limited to many atom measurements. We have developed a deterministic protocol for one-way quantum computing based on many atom measurements on an optical lattice cluster state, requiring only polynomial classical overhead. Our scheme opens the way toward concrete experimental quantum computing in neutral atom systems.

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