Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Qudit quantum computation on matrix product states with global symmetry DONGSHENG WANG, DAVID STEPHEN, ROBERT RAUSSENDORF, University of British Columbia — Resource states that contain nontrivial symmetry-protected topological order are identified for universal measurement-based quantum computation. Our resource states fall into two classes: one as the qudit generalizations of the qubit cluster state, and the other as the higher-symmetry generalizations of the spin-1 Affleck-Kennedy-Lieb-Tasaki (AKLT) state, namely, with unitary, orthogonal, or symplectic symmetry. The symmetry in cluster states protects information propagation (identity gate), while the higher symmetry in AKLT-type states enables nontrivial gate computation. This work demonstrates a close connection between measurement-based quantum computation and symmetry-protected topological order.

Dongsheng Wang
University of British Columbia

Date submitted: 11 Nov 2016 Electronic form version 1.4