Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Transition of a Z_3 topologically ordered phase to a trivial phase[1]
CHING-YU HUANG, TZU-CHIEH WEI, C. N. Yang Institute for Theoretical Physics and Department of Physics and Astronomy, State University of New York at Stony Brook — Topologically ordered quantum systems have robust physical properties, such as quasiparticle statistics and ground-state degeneracy, which do not depend on the microscopic details of the Hamiltonian. We consider a topological phase transition under a string tension g on a Z_3 topological state. This is first studied numerically in terms of the gauge-symmetry preserved quantum state renormalization group proposed by He, Moradi and Wen (arXiv:1401.5557). Modular matrices S and T can be obtained and used as order parameters to determine the critical string tension g_c. Then from a mapping to a classical 2D three-state Potts model on square lattice we obtain analytically the transition g_c via the transition temperature of the three-state Potts model. We find the numerically determined g_c agrees well with the analytic result via the mapping.

[1]This work was supported in part by the National Science Foundation.

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Date submitted: 14 Nov 2014 Electronic form version 1.4