Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Recent Progress In Exactly Solvable Discrete Models for Topological Phases in Two Dimensions[1] YONG-SHI WU[2], YUTING HU, SPENCER D. STIRLING[3], Department of Physics and Astronomy, University of Utah — The study of two-dimensional topological phases in condensed matter systems is a frontier in the field of condensed matter theory as well as topological quantum computation. Discrete or lattice models, which are exactly solvble have been proposed by Kitaev and by Levin and Wen, respectively, some years ago. Here we present a summary of recent progress in studying these models and their generalizations. The topics to be covered include 1) Duality between the Kitaev and Levin-Wen models in certain special cases; 2) General procedure for computing ground state degeneracy when the models are put on a topologically non-trivial surface; 3) More detailed study of the properties (exchange and exclusion statistics etc) of topological excitations (e.g. fluxons); 4) General framework for studying constraints of topological invariance on a wide class of discrete models on more general fluctuating graphs; 5) Generalization of these models to general graphs that incorporates more general degrees of freedom. Our approach, though closely related to topological field theory and tensor category theory, could be understood by physicists.

[1]YSW is supported in part by US NSF grant No, 1068558
[2]Key State Laboraatory of Surface Physics, and Department of Physics, Fudan University, Shanghai, China
[3]Department of Mathematics, University of Utah Yong-Shi Wu
Department of Physics and Astronomy, University of Utah

Date submitted: 10 Nov 2011 Electronic form version 1.4