Exactly soluble lattice models for abelian topological phases
CHIEN-HUNG LIN, MICHAEL LEVIN, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, Maryland 20742, USA
— We construct exactly soluble bosonic lattice models that realize a large class of abelian topological phases. These models are a generalization of the "string-net" models of Ref. [1], but unlike the original construction, we find that our models can realize phases with broken time reversal symmetry. We analyze the braiding statistics of the quasiparticle excitations and show that they are described by nonchiral $U(1) \times U(1) \times \cdots \times U(1)$ Chern-Simons theories(i.e. equal numbers of left and right moving edge modes).

[1] M. Levin and X.-G. Wen, Phys. Rev. B 71, 045110 (2005)

Chien-Hung Lin
Condensed Matter Theory Center, Department of Physics,
University of Maryland, College Park, Maryland 20742, USA

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