Abstract Submitted
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Numerical characterization of non-Abelian Moore-Read state in the microscopic lattice boson model[1] WEI ZHU, SHOUSHU GONG, California State University, Northridge, F. D. M. HALDANE, Princeton University, D. N. SHENG, California State University, Northridge — Identifying the interacting systems that host the non-Abelian (NA) topological phases have attracted intense attention in physics. Theoretically, it is possible to realize the NA Moore-Read (MR) state in bosonic system or double-layer system by coupling two Abelian fractional quantum Hall (FQH) states together. Here, based on the density matrix renormalization group and exact diagonalization calculations, we study two such examples in the microscopic lattice models and investigate their NA nature. In the first example, we provide a thorough characterization of the universal properties of MR state on Haldane honeycomb lattice model, including both the edge spectrum and the bulk anyonic quasiparticle statistics. By inspecting the entanglement spectral response to the $U(1)$ flux, it is found that two of Abelian ground states can be adiabatically connected through a charge unit quasiparticle pumping from one edge to the other. In the second example, we study a double-layer bosonic FQH system built from the π-flux lattice model. Some evidences of NA nature has been identified, including the groundstate degeneracy and finite drag Hall conductance. The numerical methods we developed here provides a useful and practical way for detecting the full information of NA topological order.

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Wei Zhu
California State University, Northridge

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