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Variational Monte Carlo Study of a Non-Abelian Spin-1 Spin Liquid JULIA WILDEBOER, N.E. BONESTEEL, NHMFL, Florida State University — Using variational Monte Carlo we analyze the properties of a non-Abelian spin-1 spin liquid state proposed in [1]. In this state the bosonic $\nu = 1$ Moore-Read Pfaffian wavefunction is interpreted as a wavefunction for a gas of bosons on a 2D square lattice with one flux quantum per plaquette. For this wavefunction the number of bosons on a given lattice site can be 0,1 or 2, corresponding, respectively, to $S_z = -1, 0$ or 1 for a spin-1 degree of freedom on that site. Calculations are performed both in the planar geometry and on the torus. For the torus there are three distinct states corresponding to the three-fold degeneracy of the $\nu = 1$ bosonic Moore-Read state, and we show that the correlation functions in these states become identical in the limit of large system size. The Renyi entanglement entropy is also calculated for different system partitions in order to extract the topological entropy $\gamma = \ln \mathcal{D}$ where $\mathcal{D}$ is the total quantum dimension, predicted to be $\mathcal{D} = 2$ for this state.
[1] M. Greiter and R. Thomale, Phys. Rev. Lett. 102, 207203 (2009).

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