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Quantum Monte Carlo Calculation of the Topological Entanglement Entropy in a Kagome Spin Liquid ROGER MELKO, Waterloo, SERGEI ISAKOV, ETH Zurich, ANN KALLIN, Waterloo, MATTHEW HASTINGS, Microsoft Research and Duke — We develop a quantum Monte Carlo procedure to compute the Renyi entanglement entropy of interacting quantum many-body systems at nonzero temperature. We illustrate the method by calculating the topological entanglement entropy in a featureless Mott Insulating phase of a Bose-Hubbard model on the kagome lattice. The topological entanglement entropy displays a characteristic finite-temperature crossover behavior discussed previously in the context of the toric code. At zero-temperature it becomes the log of the quantum dimension of the topological order, confirming the existence of a Z2 spin liquid phase in the groundstate of this model.

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