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Convergence of Topological Entanglement Entropy for Finite Size Systems CLARE ABREU, California State University, Los Angeles, RAUL HERRERA, University of California, San Diego, EDWARD REZAYI, California State University, Los Angeles — Quantum information theoretic concepts have been widely used to study topological phases of condensed matter, the prime examples of which are fractional quantum Hall states. Interest in these phases is driven in part by their potential use in fault-tolerant topological quantum computation. In particular, quantum entanglement has proven to be a useful tool to probe topological order. We present numerical studies for some model fractional quantum Hall states in spherical and toroidal geometries. We implement bipartitioning of the system with both orbital and real space cuts for small size systems. Additionally, we compare the topological entanglement entropies obtained from low-order Renyi entropies to the expected value to determine whether our results converge for small sizes. We extend these studies to generic Hamiltonians and discuss the prospect of obtaining the topological entanglement entropy from finite size calculations in these systems.

Clare Abreu
California State University, Los Angeles

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