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Quantum Topology of Lattice Dislocations in Fractional Chern Insulators MAISSAM BARKESHLI, XIAOLIANG QI, Stanford University — An exciting prospect in condensed matter physics is the possibility of realizing fractional quantum Hall (FQH) states in simple lattice models without a large external magnetic field. Here we find a remarkable consequence of the interplay between the lattice translation symmetry and topological properties of these fractional Chern insulators. When the partially filled flat band has a Chern number N, it can be mapped to an N-layer quantum Hall system. We find that lattice dislocations can act as wormholes connecting the different layers and effectively change the topology of the space. Lattice dislocations become defects with non-trivial quantum dimension, topological degeneracy, and non-Abelian statistics, even when the FQH state being realized is a conventional Abelian FQH state.

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