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Characterization of Quasiholes in Fractional Chern Insulators[1]
RAVINDRA BHATT, ZHAO LIU, Department of Electrical Engineering, Princeton University, Princeton, New Jersey 08544, USA, NICOLAS REGNAULT, Department of Physics, Princeton University, Princeton, New Jersey 08544, USA — We provide a detailed study of the Abelian quasiholes of $\nu = 1/2$ bosonic and $\nu = 1/3$ fermionic fractional quantum Hall (FQH) states on the torus geometry and in fractional Chern insulators (FCIs). We establish the correspondence between the density distribution of a quasihole in a FCI and that of the corresponding FQH state by defining an effective magnetic length on the lattice. This effective magnetic length only depends on the lattice model that hosts the FCI. In this way, the quasihole size in a FCI can be predicted for any lattice model once the quasihole size of the corresponding FQH state is known. We discuss the effect of the lattice embedding on the quasihole size. We find that an optimal embedding exists that can support the quasihole correspondence between FCIs and FQH states. We also perform the braiding of FCI quasiholes to probe the fractional statistics of these excitations. The numerical values of the braiding phases accurately match the theoretical predictions.

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