

Abstract Submitted
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Wannier states and pseudopotential Hamiltonians for fractional Chern insulators CHING HUA LEE, Department of Physics, Stanford University, DONG-NING SHENG, Department of Physics and Astronomy, California State University, RONNY THOMALE, XIAO-LIANG QI, Department of Physics, Stanford University — Fractional Chern insulators are fractional quantum Hall states realized in lattice models with full lattice translational symmetry in the absence of an external magnetic field. In fractional quantum Hall systems, pseudopotential Hamiltonians have been constructed for which the ideal ground states such as Laughlin states are exact ground states. In this work, we constructed pseudopotential Hamiltonians for the fractional Chern insulators by making use of the Wannier function representation. The physical interaction Hamiltonians can be expanded in pseudopotentials, from which one can analyze the preferred fractional quantum Hall states in the corresponding systems. The results of this analysis are compared with exact diagonalization. Our approach may be generalized to studying nonabelian fractional Chern insulator states and time-reversal invariant fractional topological insulators.

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