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Fractional Chern Insulator of Hard-Core Bosons in Topological Flat Bands[1] CHENG-CHIEN CHEN, Argonne National Laboratory, HONG-CHEN JIANG, SLAC National Accelerator Laboratory, HONG YAO, Tsinghua University — We study a two-dimensional lattice model of hard-core bosons by density matrix renormalization group and exact diagonalization methods. At low filling $\nu = 1/2$, Abelian fractional quantum Hall (FQH) states emerge with signatures of a two-fold ground-state degeneracy on a torus and a nonzero topological entanglement entropy (TEE) $\gamma = -\ln\sqrt{2}$. At filling $\nu = 2/3$, more exotic non-Abelian FQH states may emerge with a three-fold ground-state degeneracy and a TEE $\gamma = -\ln 2$. The $(C{+}1)$-fold degenerate ground states are found to exhibit a nonzero Chern number C at filling $\nu = C/(C+1)$. The system is topologically trivial at filling $\nu = 1$, characterized by a symmetry-breaking density-wave order in the thermodynamic limit.

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