

# Stability of FCI states on kagome lattice

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We investigate Fractional Chern Insulator (FCI) phases on kagome lattice. FCI are quantum phases related to partially filled Chern Insulators - insulators with nontrivial bands topology exhibiting a nonzero Hall conductance and preserving lattice translational symmetry. [1] While FCI phases were observed for several lattice models and different filling fractions, [3] factors responsible for their stability are not fully determined. In this work we focus on FCI phases on kagome lattice. [2] We consider states with filling factors  $1/3$ ,  $1/5$ ,  $1/7$ ,  $2/5$ ,  $3/7$ . Exact diagonalization is performed and phase stability maps are analyzed to show a set of parameters for FCI phase existence in a thermodynamic limit. FCI phases are confirmed by looking at many-body ground state degeneracy and spectral flow upon flux insertion. A correlation between large many-body energy gap separating the ground state manifold with low energy excitations and constant berry curvature is shown. [4]

## References:

- [1] F. D. M. Haldane, *Phys. Rev. Lett.*, **61**, 2015 (1998)
- [2] Evelyn Tang, Jia-Wei Mei, and Xiao-Gang Wen, *Phys. Rev. Lett.*, **106**, 236802 (2011)
- [3] A. M. Lauchli, Zhao Liu, E. J. Bergholtz, and R. Moessner *Phys. Rev. Lett.*, **111**, 126802 (2013)
- [4] B. Jaworowski, A. Manolescu, and P. Potasz, *Phys. Rev. B*, **92**, 245119 (2015)