

Abstract Submitted
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Haldane-Hubbard Mott Insulator: From Tetrahedral Spin Crystal to Chiral Spin Liquid CIARAN HICKEY, University of Toronto, LUKASZ CINCIO, Perimeter Institute for Theoretical Physics, ZLATKO PAPIĆ, University of Leeds, ARUN PARAMAKANTI, University of Toronto — Motivated by recent experimental realizations of artificial gauge fields in ultracold atoms, we study the honeycomb lattice Haldane-Hubbard Mott insulator of spin-1/2 fermions using exact diagonalization and density matrix renormalization group methods. We show that this model exhibits various chiral magnetic orders including a wide regime of triple-Q tetrahedral order. Incorporating third-neighbor hopping frustrates and ultimately melts this tetrahedral spin crystal. From analyzing low energy spectra, many-body Chern numbers, entanglement spectra, and modular matrices, we identify the molten state as a chiral spin liquid with gapped semion excitations.

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