

# Simulation of Hubbard Models in the Era of Synthetic Gauge Field

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## Abstract:

Interacting fermions dressed by artificial gauge fields exhibit intriguing ground state phases due to the interplay of strong correlation, band topology and conventional long range orders. Using unbiased quantum Monte Carlo (QMC) simulations we address several questions relevant to the current experimental efforts: topological phase transition from a quantum-spin-Hall insulator to a superfluid state, phase diagram and fermionic quantum criticality of mass-imbalanced Hubbard models.

The last study is enabled by a remarkable recent advance in solving the fermion sign problem of QMC methods.