Poster 6

Bose-Hubbard triangular ladder in an artificial gauge field

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We consider interacting bosonic particles on a two-leg triangular ladder in the presence of an artificial gauge field. We employ density matrix renormalization group numerical simulations and analytical bosonization calculations to study the rich phase diagram of this system. We show that the interplay between the frustration induced by the triangular lattice geometry and the interactions gives rise to multiple chiral quantum phases. Phase transition between superfluid to Mott-insulating states occur, which can have Meissner or vortex character. Furthermore, a state that explicitly breaks the symmetry between the two legs of the ladder, the biased chiral superfluid, is found for large values of the flux. In the regime of hardcore bosons, we show that the extension of the bond order insulator beyond the case of the fully frustrated ladder exhibits Meissner-type chiral currents. We discuss the consequences of our findings for experiments in cold atomic systems.

[1] C.-M. Halati and T. Giamarchi, Phys. Rev. Research **5**, 013126 (2023).