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Lifshitz-like transition and enhancement of correlations in a rotating bosonic ring lattice. ANA MARIA REY, ITAMP, KEITH BURNETT, Clarendon Laboratory, University of Oxford, INDUBALA SATIJA, George Mason University, CHARLES CLARK, NIST — We study the effects of rotation on one-dimensional ultra-cold bosons confined to a ring lattice. For commensurate systems, at a critical value of the rotation frequency, an infinitesimal interatomic interaction energy opens a gap in the excitation spectrum, fragments the ground state into a macroscopic superposition of two states with different circulation and generates a sudden change in the topology of the momentum distribution. These features are reminiscent of the topological changes in the Fermi surface that occurs in the Lifshitz transition in fermionic systems. The entangled nature of the ground state induces a strong enhancement of quantum correlations and decreases the threshold for the Mott insulator transition. In contrast to the commensurate case, the incommensurate lattice is rather insensitive to rotation. Our studies demonstrate the utility of noise correlations as a tool for identifying new physics in strongly correlated systems.

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