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Directed Transport of Bose-Einstein Condensate with kicked Interactions

We study the response of a Bose-Einstein condensate (BEC) in a δ-kicked optical lattice ratchet potential with δ-kicked interactions, at quantum resonances. Solving the Gross-Pitaevskii Equation (GPE) and its associated Classical map, we found that our results strongly depend on the kicking strength K and the interaction parameter ˜g. A critical curve emerging from the (K, ˜g)-space, separating quasi-periodicity from full chaos, shows that the system can easily be driven into full chaos for stronger interactions. In the full chaos regime, the transport experiences large currents including current reversals, and the symmetry of the current spectrum can be destroyed. Remarkably, directed transport's property is lost after 50-kicks outside the stability window $|\tilde{g}| \leq 1$. These results are expected to be crucial for experimental purposes.

Abstract Category

Atomic & Molecular Physics

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