Angular momentum fractionalization in ultracold atomic circuits

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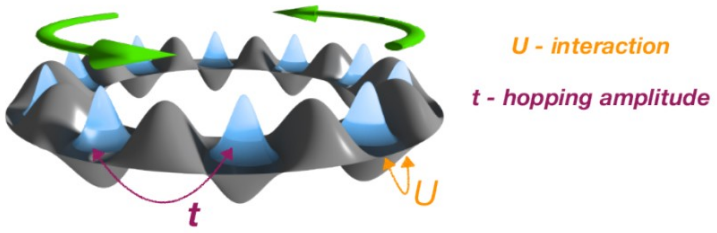
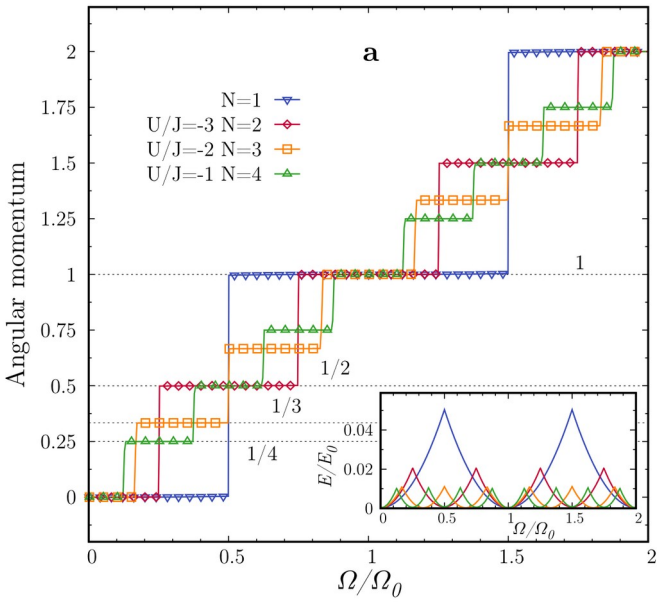
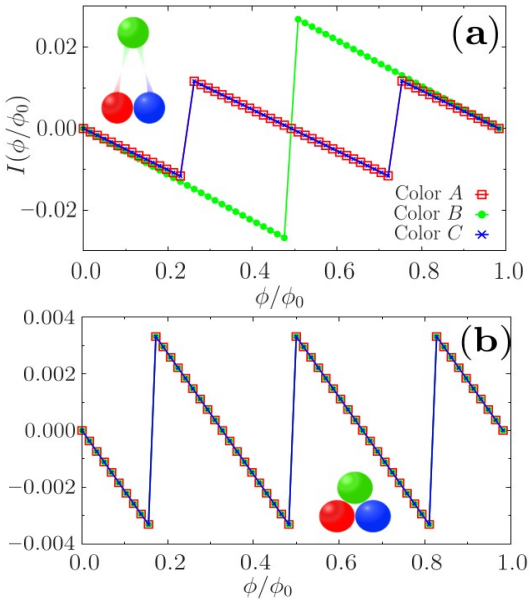
Atomtronics aims to develop original and advanced hardware for quantum technologies using the natural properties of ultracold atoms. Progress in cold atoms technology has recently made it possible to explore circuits in which the quantum fluid consists of multi-component bosonic/fermionic systems. In the talk, I will discuss one of the main building blocks of atomtronics, a quantum gas trapped in a ring shape geometry. I will focus on our recent studies on the behavior of persistent currents in multicomponent ultracold atomic systems. We primarily focus on the characterization of the persistent current behavior at different interaction regimes. In addition, we build a comprehensive understanding of the states that correspond to the fractionalized angular momenta per particle of the system. The readout of interference patterns is also analyzed through time-of-flight expansion to gain deeper insights into the inner mechanism behind fractionalization and its manifestation in these interferograms, focusing on the limits of zero and strong interactions. Our research findings are significant because they can provide valuable information about the phenomena of angular momentum fractionalization in multicomponent ultracold atomic systems. This study can bring new avenues in the field expanding the interests of current states beyond the single component Bose gases or the recently observed persistent current in two component fermionic systems.







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