Topological behaviors of ultracold atoms in the momentum space

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Abstract:

By introducing the Raman couplings, Bose Einstein condensate can be coupled into different momentum states. A lattice in the momentum space can be created by introducing multi-frequency Raman couplings. By engineering the tunneling rates, the detunings, and the relative phase of the couplings in different sites, topological models can be realized and studied experimentally. By switching the couplings on and off, we realize a topological quantum walk of ultracold atoms in the momentum space. The topological phase transition is mapped out and the interaction induced localization effect is observed. By introducing the effective loss, a non-Hermitian AB ring is realized and the non-reciprocal transport behavior is observed.

Reference:

1, Topological quantum walks in momentum space with a Bose-Einstein condensate，Dizhou Xie, et. al, arXiv:1906.12016 (Accepted by Physical Review Letter)

2, Tunable non-reciprocal quantum transport through a dissipative Aharonov-Bohm ring in ultracold atoms, Wei Gou, et. al., ArXiv:2001.01859

Biography:

Bo Yan, 2000-2004 graduated from Zhejiang University, 2004-2009 Chinese Academy of Sciences, Shanghai Institute of Optics and Fine Mechanics, 2009-2011, University of Science and Technology, postdoctoral, 2011-2015, JILA, University of Colorado, postdoctoral, 2015, national "1000-young " plan, back to Zhejiang University to setup a new lab.

Professor Bo Yan’s research are mainly focused on experiment study of the ultra-cold atoms, cold molecules, including strongly correlated ultra-cold atomic systems and laser cooling of polar molecules. Prof. Bo Yan have published more than 20 papers, including Nature, Science, Phys. Rev. Lett, the total citation is more than 1300.