

Spin-Orbit Coupled Ultracold Atomic Gases

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In this talk, I will review several important effects of Spin-Orbit Coupling(SOC) to the properties of ultracold atomic gases. First, for the fundamental two-body scattering, SOC will lead to mixed scattering between different partial-wave channels, and could also dramatically enhance the low-energy density of state for scattering particles. As a result, SOC can greatly enhance the quantum fluctuation of a Bose condensate, and can even completely destroy a three-dimensional condensate and lead to a super-fragmented quantum state. Finally, I shall discuss the current difficulty for cold atom experiment to generate large SOC using alkalis atoms with Raman lasers, and our recent proposal of utilizing highly magnetic lanthanide atoms to conquer these difficulties. I will also briefly discuss the unique physics associated with spin-orbit coupled lanthanides.

Section: QG - Quantum gases

Keywords: spin-orbit coupling, scattering, condensate