Generation and Exploration of Spin-orbit coupled Bose gas

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To generate an artificial gauge field with ultracold quantum gas becomes a very hot topic in last few years and will continue to be attractive for ultracold atomic and condensed matter physics in the coming future. Here we present our recent experimental progress of the spin-orbit coupled Bose-Einstein condensate (BEC) in optical dipole trap. Raman coupling technique and a bias magnetic field is applied to tune the structure and phase regime and spin-orbit coupling. Several fundamental properties of spin-orbit coupled BEC is experimentally studied by collective dipole oscillation and the stability of upper branch. By study the thermal dynamics of the spin-orbit coupled Bose gas, we construct the phase diagram according to Raman coupling strength with finite temperature experimentally. These studies enrich the knowledge of this field and further explorations are also in planning.