MATTER WAVE TRANSPORT IN MULTIPLE-COMPONENT OPTICAL LATTICES

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Abstract

Bose–Einstein condensate (BEC) consists of coherent assembles of bosonic particles. Experimentally realized BECs allow for studying fundamentals of quantum mechanics, and many-body physics, as well as ultra cold atomic physics.

The two-component Bose-Einstein condensates are the systems of two different spin states of atoms. Due to its additional interspecies interactions some interesting ground state structures could be studied. More generally, spinor condensates are multi-component Bose-Einstein condensates obtained in optical traps where the spin degree of freedom becomes unfrozen. Recently, such multiple-component condensates are trapped in periodic optical potentials so called optical lattices.

In this presentation, quantum transport properties of two component and spinor Bose condensates are discussed. The system is treated within a Bose-Hubbard tight-binding Hamiltonian. The particle current subjected to constant force is evaluated by using Green’s functions. As a result, the transmittivity versus constant force graphics are discussed.