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Department of Physics
SEMINAR

Bosons in the Double-well Potential: from a Disordered Case to Novel Condensates in a Superlattice

by

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Place: Rm 128, Science Centre North Block, CUHK

ALL INTERESTED ARE WELCOME

Abstract

Current studies on cold atoms have been focusing on interacting particles in a single trap or a standard optical lattice. In this talk, I will show how the double-well potential introduces new many-body phenomena of cold atoms. I will first discuss the case that the energy level mismatch in a single double-well potential is randomly distributed. This simple system captures several striking features of a long-standing problem regarding the interplay between interaction and disorder in bosonic systems, and also reveals the underlying physics for these features transparently. On the other hand, when the double-well potential forms a superlattice, the single-particle band structure splits into two manifolds, with the lowest two bands very close to each other and well separated from the higher ones. Unlike standard optical lattices, inter-band coupling becomes crucial in this new type of optical lattices and induces novel macroscopic quantum phenomena that are absent in usual cases. Some results discussed in this talk have been observed in very recent experiments.

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