
Seminar

Phases and collective modes of Rydberg atoms in an optical lattice

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We chart out the possible phases of laser driven Rydberg atoms in the presence of a hypercubic optical lattice. We define a pseudospin degree of freedom whose up(down) components correspond to the excited (ground) states of the Rydberg atoms and use them to demonstrate the realization of a canted Ising antiferromagnetic (CIAF) Mott phase of the atoms in these systems. We also show that on lowering the lattice depth, the quantum melting of the CIAF and density-wave (DW) Mott states (which are also realized in these systems) leads to supersolid (SS) phases of the atoms. We provide analytical expressions for the phase boundaries and collective excitations of these phases in the hardcore limit within mean-field theory and discuss possible experiments to test our theory.

Thursday, Jan 8th 2015

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS