



CONDENSED MATTER THEORY SEMINAR

Superfluid - Mott insulator transition in a cavity - boson gas system

Lin Rui, ETH Zrich

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Abstract:

The interplay between optical cavities and matter has recently drawn lots of attention. We study a weakly-interacting, harmonically trapped boson gas coupled to a high-finesse optical cavity. Apart from a well-known transition from an unordered normal phase to a self-organised phase that can be mapped to the Hepp-Lieb-Dicke transition, the system also undergoes a transition between self-organised superfluid and self-organised Mott insulator phases. We investigate the second transition and the related behaviours of correlations and momentum space distribution. Switching between two lattice configurations associated to a broken Z_2 symmetry is also observed. All these phenomena can be explained by mapping the system to the Bose-Hubbard model.