Contribution ID: **362** Type: **Poster**

【469】Mott transition in a cavity-boson system: A quantitative comparison between theory and experiment

Tuesday, 31 August 2021 19:23 (1 minute)

The competition between short-range and cavity-mediated infinite-range interactions in a cavity-boson system leads to the existence of a superfluid and a Mott-insulator phase within the self-organized regime. We quantitatively compare the steady-state phase boundaries of this transition measured in experiments and simulated using the Multiconfigurational Time-Dependent Hartree Method for Indistinguishable Particles. We reduce the computational cost by reducing the full system to a 2D four-well potential. We argue that the validity of this representation comes from the nature of both the cavity-atomic system and the Bose-Hubbard physics. The experimentally measured and theoretically predicted phase boundaries agree reasonably. We propose a new approach for the quantitative determination of the superfluid–Mott-insulator boundary.

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Session Classification: Poster Session

Track Classification: Atomic Physics and Quantum Optics