SFB 767
Seminar

Universität Konstanz

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P1138

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Albert-Ludwigs Universität Freiburg

Spectral Structures of the 2D Bose-Hubbard Model with Infinite-Range Cavity-Mediated Interactions

We examine the spectral structures of strongly interacting bosons trapped in a 2D optical lattice, amended by a high-finesse optical cavity. We analyze the entire spectrum of a small system at unit filling by using exact diagonalization and symmetry considerations. In particular, when varying short- and long-range interaction Hamiltonian parameters in the strong coupling limit, we show that the energy gradient can be used to characterize the structural properties of the respective eigenstates. The reorganization of the states at anticrossing points in the spectrum is associated with a matter-light resonance. The transition lines observed for small systems are expected to be robust in the thermodynamic limit and therefore relevant for the understanding of excited state quantum phase transitions.

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