

Rigorous mean-field dynamics of lattice bosons: quenches from the Mott insulator

Abstract:

I will provide a rigorous derivation of Gutzwiller mean-field dynamics for lattice bosons, showing that it is exact on fully connected lattices. This formalism is applied to quenches in the interaction parameter from the Mott insulator to the superfluid state. Although within mean-field the Mott insulator is a steady state, I will show that a dynamical critical interaction U_d exists, such that for final interaction parameter $U_f > U_d$ the Mott insulator is exponentially unstable towards emerging long-range superfluid order, whereas for $U_f < U_d$ the Mott insulating state is stable.