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Novel phase transitions in disordered quantum systems

Wednesday, 13 September 2023 22:40 (20 minutes)

I will discuss the presence of non-ergodic extended states in many-body interacting systems in disorder. Our preliminary calculations indicate that these novel states can be present in the one-dimensional Hubbard model with on-site disorder for two-component fermions. These calculations rely on exact diagonalization and are able to provide results only for fairly small systems, namely up to 24 lattice sites. They also show a possibility of novel phase transitions between extended ergodic and extended non-ergodic states, as well as between extended non-ergodic and localized states. We now considered low-energy states in this model and used the DMRG method, which allows one to consider the number of lattice sites at about 100. These calculations indicate the presence of novel phase transitions, namely the ones between extended non-ergodic and extended ergodic states and transitions between extended non-ergodic and localized states.

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