Interaction-Resistant Metals in Multicomponent Fermi Systems

A Richaud[1], M Ferraretto[1], and M Capone[1]

[1] *Condensed Matter Section, Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy*
Contact Email: arichaud@sissa.it

We analyze two different fermionic systems that defy Mott localization showing a metallic ground state at integer filling and very large Coulomb repulsion. The first is a multiorbital Hubbard model with a Hund's coupling (this physics has been widely studied, and the new metallic state is called a Hund's metal), and the second is a SU(3) Hubbard model with a patterned single-particle potential designed to display a similar interaction-resistant metal in a setup which can be implemented with SU(N) ultracold atoms. With simple analytical arguments and exact numerical diagonalization of the Hamiltonians for a minimal three-site system, we demonstrate that the interaction-resistant metal emerges in both cases as a compromise between two different insulating solutions, which are stabilized by different terms of the models. This provides strong evidence that Hund's metal is a specific realization of a more general phenomenon that can be realized in various strongly correlated systems.

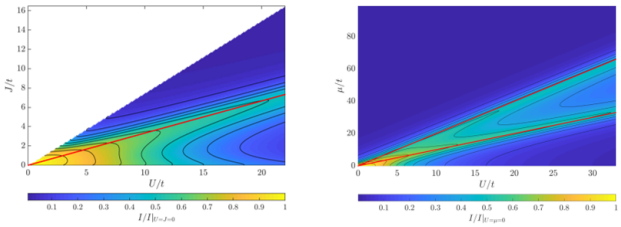

Figure 1: Degree of metallicity. Left panel: three-band Hubbard model with Kanamori interactions. Right panel SU(3) Hubbard model with patterned on-site potential. In both panels, red lines correspond to states featuring interaction-resistant metallicity