

Renormalization group for metals

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Abstract: Metal such as Fermi liquid is one of the most prevalent phases of matter that we encountered in many quantum materials as well as our daily life. One important feature of Fermi liquid (and metal more generally) is the infinite number of zero modes on the Fermi surface, which causes a tension with the powerful theoretical tool--renormalization group (RG). In this talk I will introduce our recent work that develops the RG framework for metals. Specifically, we consider the RG flow of coupling functions, and applied it to study the complete low energy dynamics of Fermi liquid. Using this new framework, we can understand how Fermi liquid emerges or gets destroyed, e.g. by Pomeranchuk instability. Our work provides a general way to study the low energy physics of metals, and opens a new route to the system with an intrinsic scale from the perspective of RG.