

Unusual Metals Near Ferromagnetic Quantum Critical Point

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Abstract

Metals near quantum critical points display a variety of novel properties including non-Fermi liquid scalings in transport and thermodynamic properties, and unusual ground states, including, for example, unconventional superconductivity. These materials also pose challenges to theory. In particular, energetically low lying fluctuations associated with the quantum critical point are not included in standard first principles calculations based on density functional theory. Thus the comparison between experiment and theory is particularly important for these materials in order to characterize the nature of the spin fluctuations and their role in determining materials properties. Here, these materials are reviewed and specific examples, including layered cobalt oxides and ruthenates are discussed in detail from the point of view of their electronic structures. Finally, some new materials that may display properties related to strong quantum critical fluctuations are pointed out.