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Strange metals and the Wiedemann–Franz law

Strange metals are characterized by an unusual scaling of the resistivity on temperature. The key to understanding this anomalous behavior is revealing the dominant scattering mechanism. In particular, it is important to distinguish quasi-elastic scattering, e.g. due to coupling to a quasi-classical boson mode, and strongly inelastic electron-electron scattering (the latter is often associated with the breakdown of Fermi liquid behavior). It is well-known that a possible way to distinguish the two mechanisms is to examine the ratio between the thermal and electrical conductivities. I will show that a metal tuned to a Van Hove singularity (such as Sr2RuO4 under strain) should display a strong violation of the Wiedemann-Franz law, with the Lorenz ratio scaling as L~sqrt(T) log(1/T). I will review the Weidemann-Franz law in other strange metals, such as PdCrO2 and cuprates, and its implications for the scattering mechanism in these systems.