The extreme strange metal $YbRh_2Si_2$

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Heavy fermion compounds are a versatile platform to explore quantum phases and fluctuations in the regime of extreme correlation strength, with bandwidths renormalized by several orders of magnitude compared to the free electron case [1]. A prominent example for this physics is $YbRh_2Si_2$. Its best-known characteristic is a fan of linear-in-temperature electrical resistivity emerging from a magnetic-field induced quantum critical point (QCP), in a background of strongly renormalized Fermi liquid behavior. Across this QCP, the Fermi volume jumps [2]. More recently, THz conductivity measurements have revealed that this jump is associated with a dynamical electron localization–delocalization transition featuring energy-over-temperature scaling [3] and that, at ultralow temperatures, unconventional superconductivity condenses out of the material's "extreme strange metal" state—now with linear resistivity over 3.5 orders of magnitude in temperature [4]. I will discuss how these findings may relate to strange metal superconductors in other materials classes, and describe challenges encountered in assessing whether or not Planckian scattering is of pertinence in $YbRh_2Si_2$ and other heavy fermion compounds [5,6].

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