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Metallic quantum critical points with finite BCS couplings[1]

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The problem of superconductivity near quantum critical points (QCPs) remains a central topic of modern condensed matter physics. In such systems, there is a competition between the enhanced pairing tendency due to the presence of long-range attractive interactions near criticality, and the suppression of superconductivity due to the destruction of Landau quasiparticles. I will describe some recent work that addresses these competing effects in the context of a solvable model of a metallic quantum critical point. I will show that the two effects - namely the enhanced pairing and the destruction of Landau quasiparticles - can offset one another, resulting in stable "naked" quantum critical points without superconductivity. However, the resulting quantum critical metal exhibits strong superconducting fluctuations on all length scales.

[1]Reference: S.R., Gonzalo Torroba, and Huajia Wang, arXiv1507.06652, PRB(2015).