Abstract Submitted
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Superconductivity at the onset of spin-density-wave order in a metal[1] YUXUAN WANG, ANDREY CHUBUKOV, University of Wisconsin-Madison — We revisit the issue of superconductivity at the quantum-critical point between a 2D paramagnet and a spin-density-wave (SDW) metal with ordering momentum (π, π). This problem is highly non-trivial because the system at criticality displays a non-Fermi liquid behavior and because the effective coupling constant λ for the pairing is generally of order one, even when the actual interaction is smaller than fermionic bandwidth. Previous study [M. A. Metlitski, S. Sachdev, Phys.Rev.B 82, 075128 (2010)] has found that the leading renormalization of the pairing vertex contains $\log^2$, like in color superconductivity. We analyze the full gap equation and argue that summing up $\log^2$ term does not lead to a pairing instability. Yet, superconductivity has no threshold, even if λ is set to be small: the subleading log terms give rise to BCS-like $T_c \propto e^{-1/\lambda}$. We argue that the analogy with BCS is not accidental as superconductivity at a QCP is a Fermi liquid phenomenon – it comes from fermions which retain Fermi liquid behavior at criticality. We compute T_c for the actual λ and find consistency with the numerical results.

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