The Journal Club of Condensed Matter Physics

Physikalisches Institut
Raum 3.014

UNI BONN

This Week:

Speaker:
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Superfluid transport through a dissipative quantum point contact

Abstract: We study theoretically and experimentally the superfluid transport of ultracold fermionic atoms through a quantum point contact with a local particle loss. In the absence of losses, superconducting contacts are known to exhibit multiple Andreev reflections - a high-order cotunneling of a quasiparticle together with multiple Cooper pairs - which gives rise to a current at chemical potential biases below the energy gap. We develop a model the lossy quantum point contact where the superfluid reservoirs are connected via tunneling to a dissipative site, and interactions are taken into account in a mean-field approximation. We compute nonequilibrium observables using the Keldysh formalism and find that the current generated by the seemingly delicate high-order tunneling process is surprisingly robust to particle losses. This result agrees with experimental data: we apply a pair-breaking, spin-dependent dissipation at the contact and observe that the characteristic non-Ohmic superfluid transport survives even at dissipation strength larger than the superfluid gap.

[1]. M.-Z. Huang et al., arXiv:2210.03371

Web: https://sagnikiiser.github.io/CondMat-Bonn

Wednesday 3 PM
02.11.2022