Investigation of graphene-based multiterminal Josephson junctions

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The Andreev spectrum of an N-terminal Josephson junction is expected to host Weyl singularities in the (N-1)-dimensional space of the individual superconducting phases, thus mimicking the band structure of topological materials [1]. Here, we investigate a 3-terminal Josephson junction containing hBN-encapsulated graphene as the weak link connecting the terminals. We characterize the junction by DC transport measurements and apply RCSJ simulations to understand the multi-terminal behaviour. We find a behaviour qualitatively similar to previous observations on different multiterminal systems [2,3,4,5]. By applying current bias to 2 different leads, we obtain a differential resistance map with several complex features and observe the coexistence of normal and superconducting current paths in the graphene region. Furthermore, we perform switching current distribution measurements to probe the switching mechanism in this multiterminal system and investigate the interplay between current biases.

References

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Figures

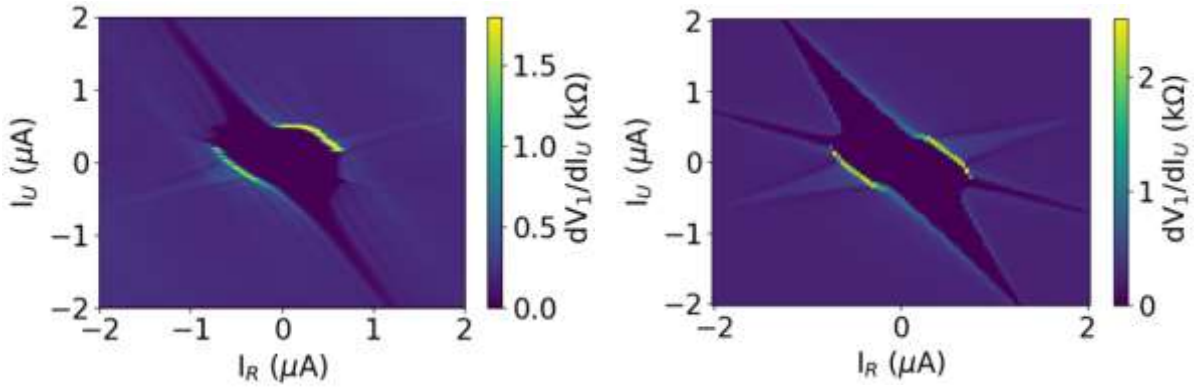

Figure 1: Differential resistance of a 3-terminal Josephson junction (measurement – left – and simulation – right).