Josephson current through a quantum dot attached to time-reversal topological superconducting wires

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One of the most remarkable consequences of many-body interactions in mesoscopic transport is the emergence of the Kondo regime. Typically, it takes place in quantum dots attached to metallic wires at temperatures below the Kondo temperature TK and consists in the generation of a screening cloud in the wires, which couples with an electron confined in the quantum dot to form a singlet. A particularly interesting scenario takes place when the wires are superconducting. In this case, the superconducting gap Δ conspires against this screening and different regimes result depending on the ratio Δ/TK. This has an impact in the transport properties like the Josephson effect, originating the so call pi-transition.

In this talk I'll discuss the Josephson current through a quantum dot attached to time-reversal topological superconducting wires. The isolated wires are characterized by the existence of Kramers pairs of Majorana states in the superconducting gap. These states hybridize with the quantum dot leading to the formation of Andreev states that govern the behavior of the Josephson current.