Josephson-Current Signatures of Unpaired Floquet Majorana Bound States

Rekha Kumari

International Centre for Theoretical Sciences (ICTS), INDIA

We theoretically study the transport signatures of unpaired Floquet Majorana bound states in the Josephson current of weakly linked, periodically driven topological superconductors. We obtain the occupation of the Floquet Majorana modes in the presence of weak coupling to thermal leads analytically, and show that, similar to static superconductors, the Josephson current involving Floquet Majorana bound states is also 4π-periodic in the phase difference across the junction, and also depends linearly on the coupling between superconductors. Moreover, unlike the static case, the amplitude of the Josephson current can be tuned by setting the unbiased chemical potential of the driven superconductors at multiple harmonics of the drive frequency. As a result, we uncover a Josephson Floquet sum rule for driven superconductors. We confirm our analytical expressions for Josephson current, the occupation of Floquet bands, and a perturbative analysis of the quasienergies with numerically exact results.