Minimal Kitaev-transmon qubit based on double quantum dots

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We propose a theoretical model of a superconducting qubit based on a Josephson junction between two double quantum dots. Such double quantum dot platform is the minimal realization of a 4π-Josephson Kitaev junction with four Majorana bound states. We show that the the presence of Majoranas in the junction results in distinct spectroscopic features in the microwave (MW) spectra of such hybrid qubit. This occurs as different parameters of the junction, such as double quantum dot level detunings, are varied.

References

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Figures

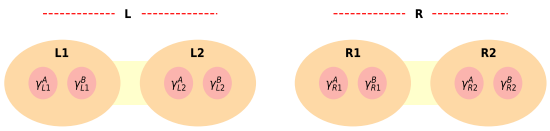

Figure 1: *Schematic illustration of the device. Each chain (α = L,R) is made of two quantum dots (β = 1,2) connected by a superconductor-semiconductor hybrid nanowire*. The two chains are coupled to each other through a tunneling junction.

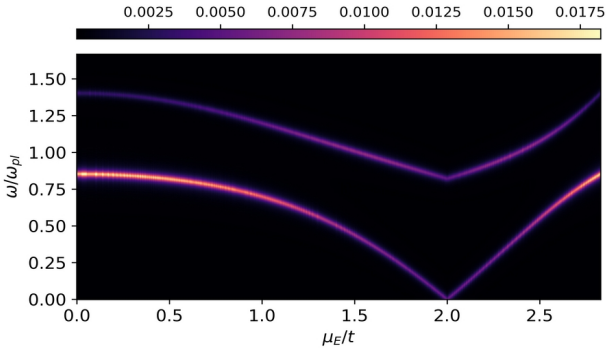

Figure 2: Microwave absorption spectrum of the hybrid qubit as a function of external chemical potentials ($\mu_{L1} = \mu_{R2} = \mu_E$), calculated at $n_g(2e) = 0.25$ and $E_J/E_C = 0.9$.