(G*) Transport of Majorana Zero Modes in 1D Topological Superconductors

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We consider the transport of Majorana zero modes across a 1D topological superconductor by applying local gate voltages across sections of the superconductor. This "piano key" method allows for sections of the superconductor to switch between the trivial and topological phases, thereby facilitating the motion of a Majorana zero mode. As a single section, or piano key, undergoes a phase transition, it is possible for the ground state to experience excitations, especially near criticality. The excitation probability has been studied for a large piano key in Ref. [1] which casts the problem in terms of a simple Landau-Zener transition. In our work, we consider the excitation probability when a Majorana zero mode is transported using a series of smaller piano keys. We calculate the excitation probability numerically by simulating a sequence of piano keys. Furthermore, we demonstrate an analytical calculation of the excitation probability and compare this to the numerical results.

[1] B. Bauer et al., SciPost Phys. 5, 004 (2018)

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