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Odd frequency pairing of interacting Majorana fermions¹

ZHOUSHEN HUANG, Los Alamos National Laboratory, USA, PETER WOELFLE, Karlsruhe Institute of Technology, Germany, ALEXANDAR BALATSKY, Los Alamos National Laboratory, USA — Majorana fermions are rising as a promising key component in quantum computation. While the prevalent approach is to use a quadratic (i.e. non-interacting) Majorana Hamiltonian, when expressed in terms of Dirac fermions, generically the Hamiltonian involves interaction terms. Here we focus on the possible pair correlations in a simple model system. We study a model of Majorana fermions coupled to a boson mode and show that the anomalous correlator between different Majorana fermions, located at opposite ends of a topological wire, exhibits odd frequency behavior. It is stabilized when the coupling strength g is above a critical value g_c . We use both, conventional diagrammatic theory and a functional integral approach, to derive the gap equation, the critical temperature, the gap function, the critical coupling, and a Ginzburg-Landau theory allowing to discuss a possible subleading admixture of even-frequency pairing.

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