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Non-Abelian fermion parity interferometry of Majorana bound states in a Fermi sea[1] DANIEL DAHAN, Ben Gurion University of the Negev, MOSTAFA TANHAYI AHARI, GERARDO ORTIZ, BABAK SERADJEH, Indiana University, Bloomington, EYTAN GROSFELD, Ben Gurion University of the Negev
— We study the quantum dynamics of Majorana and regular fermion bound states coupled to a one-dimensional lead. The dynamics following the quench in the coupling to the lead exhibits a series of dynamical revivals as the bound state propagates in the lead and reflects from the boundaries. We show that the nature of revivals for a single Majorana bound state depends uniquely on the presence of a resonant level in the lead. When two spatially separated Majorana modes are coupled to the lead, the revivals depend only on the phase difference between their host superconductors. Remarkably, the quench in this case effectively performs a fermion-parity interferometry between Majorana bound states, revealing their unique non-Abelian braiding. Using both analytical and numerical techniques, we find the pattern of fermion parity transfers following the quench, study its evolution in the presence of disorder and interactions, and thus, ascertain the fate of Majorana in a rough Fermi sea.

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