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Parity blocking in quenching dynamics of Majorana wires SURAJ HEGDE, Univ of Illinois, Urbana-Champiagn, VASUDHA SHIVAMOGGI, Northrop Grumman Electronic Systems, SMITHA VISHVESHWARA, Univ of Illinois,Urbana-Champaign, DIPTIMAN SEN, Centre for High Energy Physics, Indian Institute of Science — We study the non-equilibrium dynamics of the Kitaev Hamiltonian for a one-dimensional p-wave superconductor, which in its topological phase harbors Majorana fermions at the edges. We vary one of the parameters of the Hamiltonian linearly in time within the topological phase and across the quantum critical point into the topologically trivial phase. By starting in the ground state of the initial Hamiltonian, we find that the time evolved state fails to track the instantaneous ground state and flips back and forth between the ground state and an excited state, even when the quenching is very slow. Termed as "parity-blocking," this happens when the fermion parity of the ground state is changing with time. This change in parity is related to the oscillation of near zero energy mid-gap states of the end Majorana modes. Using exact Majorana wave functions and transfer matrix techniques, we track the points where the ground state changes parity. We develop a real-space formalism for calculating the dynamics of quantities such as the many-body wavefunction overlap and residual energy. Using these techniques for numerical calculations, we demonstrate parity blocking and other scaling effects with the quench rate and length of the chain.

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