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Robust Schemes for Quantum Error Correction and Information Processing with Majorana Zero Modes SAGAR VIJAY, LIANG FU, MIT — We present a measurement-based scheme for performing braiding operations on Majorana zero modes and for detecting their non-Abelian statistics. In our proposal, the topological qubit formed by well-separated Majoranas in a mesoscopic superconductor island is read out from the transmission phase shift in electron teleportation through the island in the Coulomb blockade regime, via a conductance measurement in an electron interferometer or persistent current measurement in a closed loop. Quasiparticle poisoning errors must be actively corrected in these systems in order for quantum information storage and longer computations to be feasible. To address this issue, we present families of error-correcting fermion codes that can correct for quasiparticle poisoning errors, and present a possible implementation of one such code. Certain codes may also be used to correct for de-phasing errors in systems with microscopic complex fermions. We discuss the important advantages for error-correction in Majorana platforms.

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