

Abstract Submitted  
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**How quickly can anyons be braided?** CHRISTINA KNAPP, Univ of California - Santa Barbara, DONG LIU, MENG CHENG, MICHAEL ZALETEL, PARSA BONDERSON, Microsoft Station Q, CHETAN NAYAK, Microsoft Station Q, Univ of California- Santa Barbara — Topological phases of matter are a potential platform for the storage and processing of quantum information with intrinsic error rates that decrease exponentially with inverse temperature. However, it is less well-understood how error rates depend on the speed with which anyons are braided. In general, diabatic corrections to the Berry phase vanish inversely with the length of time for the braid, with faster decay occurring as the time-dependence is made smoother. Here, we show that such corrections will not affect quantum information encoded in a topological state unless topologically non-trivial quasiparticles are created. Moreover, we show how measurements that detect unintentionally created quasiparticles can be used to control this source of error.

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