

Abstract Submitted  
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**Coulomb stability of the  $4\pi$ -periodic Josephson effect of Majorana fermions** FABIAN HASSLER, Institute for Quantum Information, RWTH Aachen University, D-52056 Aachen, Germany, BERNARD VAN HECK, ANTON R. AKHMEROV, C.W.J BEENAKKER, Instituut-Lorentz, Universiteit Leiden, P.O. Box 9506, 2300 RA Leiden, The Netherlands — The Josephson energy of two superconducting islands containing Majorana fermions is a  $4\pi$ -periodic function of the superconducting phase difference. If the islands have a small capacitance, their ground state energy is governed by the competition of Josephson and charging energies. We calculate this ground state energy in a ring geometry, as a function of the flux  $\Phi$  enclosed by the ring, and show that the dependence on the Aharonov-Bohm phase  $2e\Phi/\hbar$  remains  $4\pi$ -periodic regardless of the ratio of charging and Josephson energies—provided that the entire ring is in a topologically nontrivial state. If part of the ring is topologically trivial, then the charging energy induces quantum phase slips that restore the usual  $2\pi$ -periodicity [B. van Heck, F. Hassler, A. R. Akhmerov, and C. W. J. Beenakker, Phys. Rev. B **84**, 180502(R) (2011)].

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