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2e-periodic switching current in nanowire-based single-Cooper-pair transistors JOHN WATSON, JASPER VAN VEEN, ALEX PROUTSKI, ATTILA GERESDI, QuTech and Kavli Institute of Nanoscience, Delft University of Technology, PETER KROGSTRUP, JESPER NYGARD, CHARLES MARCUS, Center for Quantum Devices, Copenhagen, LEO KOUWENHOVEN, QuTech and Kavli Institute of Nanoscience, Delft University of Technology — We report on measurements of the switching current of mesoscopic superconducting islands in hybrid InAs/Al core/shell nanowires. We find a switching current which is 2e periodic in the island gate charge in several devices for a wide range of temperatures and tunnel barrier conductances. Such 2e periodicity is evidence of a low quasiparticle poisoning rate and represents an important starting point for implementing theoretical proposals to investigate Majorana fusion channels in hybrid semiconductor-superconductor nanowires. In addition, our measurements demonstrate that the devices can be tuned between Coulomb-dominated and Josephson-dominated regimes. Taken together, our results indicate these systems are promising candidates for fusion experiments, and we discuss the path forward.

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