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Current-phase relations in epitaxial Al/InAs nanowire Josephson junctions ERIC SPANTON, Stanford Institute for Materials and Energy Sciences, MINGTANG DENG, PETER KROGSTRUP, THOMAS JESPERSEN, JESPER NYGRD, CHARLES MARCUS, University of Copenhagen, KATHRYN MOLER, Stanford Institute for Materials and Energy Sciences — Current-phase relations (CPRs) are a fundamental property of Josephson junctions, and in superconductor-normal-superconductor (SNS) junctions they can deviate from sinusoidal behavior at low temperatures. For short junctions, the shape and amplitude of the CPR is directly related to the properties of the Andreev bound states in the junction. Understanding the proximity effect, which is mediated by Andreev reflections, is particularly important in high spin-orbit and topological materials, where proximity-induced topological superconductivity is highly sought after. We used scanning superconducting quantum interference device microscopy to measure the CPR in many epitaxial Al/InAs nanowire junctions. We found CPRs that were very forward-skewed at low temperatures, indicating highly transmitting junctions. We will discuss the temperature, low magnetic field, and gate dependence of the CPRs, and the applicability of the short-junction theory to our junctions.

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