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Supercurrent in the quantum Hall regime: part I CHUNG-TING KE, Duke University, FRANCOIS AMET, Appalachian state university, IVAN BORZENETS, University of Tokyo, JIYINGMEI WANG, Duke University, KEJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, RUSSELL DEACON, Center for Emergent Matter Science, RIKEN, MICHIHISA YAMAMOTO, University of Tokyo, YURIY BOMZE, Duke University, SEIGO TARUCHA, University of Tokyo, GLEB FINKELSTEIN, Duke University — The remarkable electronic quality of graphene/boron nitride heterostructures makes them an ideal medium to study induced superconductivity. Our Josephson junctions are made of encapsulated graphene demonstrate ballistic superconducting transport at the micron scale. In the hole-doped regime, a Fabry-Perot resonator is formed by PN junctions close to superconducting contacts, which causes quantum interference of the critical current. We study variations of the Fraunhofer pattern (I_C vs. B) thought the gate voltage range. At higher magnetic fields, superconducting transport across the junctions becomes profoundly non-periodic. Despite demonstrating strong fluctuations as a function of density and magnetic field, we find that supercurrent persists in a wide range of parameters.

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