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Supercurrent in the quantum Hall regime MING-TSO WEI, Duke Univ, FRANOIS AMET, Appalachian State University, CHUNG-TING KE, Duke Univ, IVAN BORZENETS, University of Tokyo, JIYINGMEI WANG, Duke Univ, 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 Univ, SEIGO TARUCHA, University of Tokyo, GLEB FINKELSTEIN, Duke Univ — Combining superconductivity and the quantum Hall (QH) effect is a promising route for creating new types of topological excitations. Despite this potential, signatures of superconductivity in the quantum Hall regime remain scarce, and a superconducting current through a QH weak link has so far eluded experimental observation. Here we demonstrate the existence of a novel type of Josephson coupling through a QH region at magnetic fields as high as 2 Tesla. The supercurrent is mediated by states encompassing QH edge channels, which are flowing on opposite sides of the sample. The edges are coupled together by the hybrid electron-hole modes at the interfaces between the QH region and the superconducting contacts. These chiral modes, which share some features with Majorana modes, are formed when electron and hole edge states are mixed by the superconductor.

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