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Specular Interband Andreev Reflections in Graphene KONSTANTIN B. EFETOV, Ruhr-Universitaet Bochum, DMITRI EFETOV, Massachusetts Institute of Technology, LEI WANG, Columbia University, GIL-HO LEE, Harvard University, JIA SHUANG, ROBERT CAVA, Princeton University, TAKASHI TANIGUCHI, KENJI WATANABE, NIMS Japan, JAMES HONE, CORY DEAN, Columbia University, PHILIP KIM, Harvard University — Electrons incident from a normal metal onto a superconductor are reflected back as holes – a process called Andreev reflection. In a normal metal where the Fermi energy is much larger than a typical superconducting gap, the reflected hole retraces the path taken by the incident electron. In graphene with ultra- low disorder, however, the Fermi energy can be tuned to be smaller than the superconducting gap. In this unusual limit, the holes are expected to be reflected specularly at the superconductor-graphene interface due to the onset of interband Andreev processes, where the effective mass of the reflected holes change sign. Here we present measurements of gate modulated Andreev reflections across the low disorder van der Waals interface formed between graphene and the superconducting $NbSe_2$. We find that the conductance across the graphene/superconductor interface exhibits a characteristic suppression when the Fermi energy is tuned to values smaller than the superconducting gap, a hallmark for the transition between intraband retro and interband specular- Andreev reflections.

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