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Andreev reflection at a graphene-superconductor interface in the quantum Hall regime. DA WANG, EVAN TELFORD, AVISHAI BENYAMINI, JAMES HONE, CORY DEAN, ABHAY PASUPATHY, Columbia Univ — At metal-superconductor interfaces Andreev processes occur where an electron tunneling into the superconductor carries with it a second electron, effectively reflecting a hole with opposite momentum back into the metal. This is due to the superconducting gap, which, at low energies, only allows the formation of cooper pairs inside the superconductor, representing an accessible way to measure Cooper-pair tunneling phenomena. An important requirement for strong Andreev processes is a clean interface with a high transmission probability. Graphene is a promising candidate for achieving an extremely clean interface to superconductors, however recent results show achieving a transparent interface is non-trivial. Graphene also has a remarkably large mean free path, which allows accurate measurement of reflected and transmitted currents. In the quantum hall regime, chiral edge states open new possibilities to measure novel Andreev processes. In this work, we use controlled assembly in an inert atmosphere to create high-quality grapheme-superconductor interface. Due to the high critical field of these superconductors, we are able to reach the quantum hall regime in graphene while preserving superconductivity, we will describe the resultant Andreev processes observed at such interfaces.

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