

Abstract Submitted
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Superconducting proximity effect in graphene: Injecting Cooper pairs in quantum Hall edge states KATSUYOSHI KOMATSU, CHUAN LI, SANDRINE AUTIER-LAURENT, ALIK KASUMOV, HELENE BOUCHIAT, SOPHIE GUERON, Laboratoire de Physique des Solides, Universite Paris Sud, 91405 Orsay, France — A superconductor-graphene(SG) hybrid system, such as an SGS junction or an SG interface, provides an ideal platform to investigate the relativistic nature of Dirac fermions combined with superconductivity. Instead of the retro-reflection of carriers in an ordinary superconductor-normal metal interface, an SG interface is theoretically predicted to show the specular reflection of quasiparticle carriers. We show that a supercurrent flows through a SGS junction with Nb electrodes even through a very long graphene distance of $1.2\mu\text{m}$, more than 3 times the length previously reported. This supercurrent disappears in the vicinity of the Dirac point, indicating a strong sensitivity of the transmission of Andreev pairs to the formation of charge puddles with size greater than the superconducting coherence length. We also present data on similar size graphene samples with superconducting electrodes with a high critical field (more than 7Tesla) for which the properties of the normal state are dominated by quantum Hall physics. Whereas the behavior of the supercurrent is similar to the Nb/Graphene/Nb system in zero field, new features are observed in the high field quantum Hall regime.

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