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Gate-tuned Fraunhofer-type Conductance Modulation in Graphene-based Andreev Interferometers MINSOO KIM, DONGCHAN JEONG, GIL-HO LEE, YUN-SOK SHIN, HYUN-WOO LEE, HU-JONG LEE, Pohang Univ of Sci & Tech — The interplay between superconductivity and the Dirac-fermionic nature of electronic states of graphene leads to unique phase-coherent transport, when graphene is in proximity contact with superconducting electrodes. In this study, we report gate-tuned phase-coherent nonlocal magnetoconductance oscillations in Andreev interferometers consisting of a superconducting Al loop in contact with two ends of a T-shaped mono-layer graphene bar. The conductance oscillations arise from the flux change through the superconducting Al loop, with a gate-dependent Fraunhofer-type modulation of the envelope, which is independent of the sample-specific impurity configuration in the graphene sheet. We confirm that the modulation of envelope is caused by the gate-dependent nonlocal pair coherence along with the change of flux threading the phase-coherent region of graphene between the Al electrodes. The finite-bias effect on the conductance oscillations is also examined in terms of the Onsager-Büttiker relation and the BTK-type Andreev reflection probability.

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