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Aharonov-Bohm interference in gate-defined ring of high-mobility graphene MINSOO KIM, HU-JONG LEE, Department of Physics, Pohang University of Science and Technology — Recent progress in preparing a high-quality graphene layer enables one to investigate the intrinsic carrier transport nature in the material. Here, we report the signature of conservation of the Berry's phase with preserved valley symmetry in Aharonov-Bohm (AB) interferometers fabricated on monolayer graphene with high carrier mobility, where the graphene was sandwiched between two thin hexagonal boron nitride (h-BN) layers. In measurements, charge carriers were confined in an AB ring-shaped potential well formed by the dual-gate operation of the bottom and top gates and the four-terminal magnetoconductance (MC) was measured with varying charge carrier density and temperature. Graphene in the device was in the ballistic regime as confirmed by the conductance quantization in steps of $\Delta G = 4e^2/h$ in a constricted conducting channel of separate measurements. We observed h/e periodic modulation of MC and the zero-field conductance minimum with a negative MC background. The phase information of AB interference strongly suggests that carriers in the graphene in our devices preserve the intrinsic Dirac transport nature, which would be conveniently utilized for valleytronics in graphene.

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