Gate-defined electron interferometer in bilayer graphene

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Abstract

We present the fabrication of an electron interferometer in encapsulated bilayer graphene defined purely by electrostatic gating, minimizing the sample degradation which is introduced by conventional etching methods [1,2]. The device quality is demonstrated by observing Aharonov-Bohm (AB) oscillations with a period of h/e, $h/2e$, $h/3e$, and $h/4e$. The AB oscillations are tunable with gating; one can seamlessly tune the device geometry from the bulk transport to ring transport. The carrier type can also be changed from electron to hole, allowing us to perform an ambipolar operation of the ring. The temperature and magnetic field dependence of the oscillations indicate that ballistic electron transport is realized in the ring. Our gate-defined ring geometry is a first step to exploring novel quantum states in ring geometries for example superconductivity in twisted bilayer graphene [3].

References

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Figures

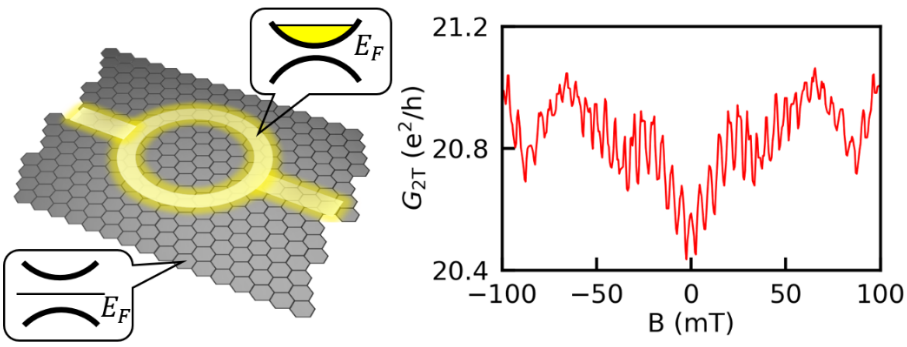

Figure 1: Left: Schematic image of the gate-defined ring in bilayer graphene. The ring-shaped area is conductive while the rest of the sample is tuned into the insulating state. Right: Magneto-conductance trace through the ring showing Aharonov-Bohm oscillations.