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Mach-Zehnder interferometry using broken symmetry quantum Hall edges in graphene DI WEI, TOENO VAN DER SAR, JAVIER SANCHEZ-YAMAGISHI, Harvard University, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, PABLO JARILLO-HERRERO, Massachusetts Institute of Technology, BERTRAND HALPERIN, AMIR YACOBY, Harvard University — Graphene has emerged as a unique platform for studying electron optics, particularly in the presence of a magnetic field. Here, we engineer a Mach-Zehnder interferometer using quantum Hall edge states that co-propagate along a single gate-defined NP interface. We use encapsulated monolayer graphene, clean enough to lift the four-fold spin and valley degeneracy. In order to create two separate co-propagating paths, we exploit the suppression of edge state scattering along gate defined edges, and use scattering sites at the ends of the NP interface to form our beam splitters. We observe conductance oscillations as a function of magnetic and electric field indicative of coherent transport, and measure values consistent with spin-selective scattering. We can tune our interferometer to regimes of high visibility (>98%), surpassing the values reported for GaAs quantum-well Mach-Zehnder interferometers. These results demonstrate a promising method to observe interference between fractional charges in graphene.

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