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Gate-controlled tunneling of quantum Hall edge states in bilayer graphene JUN ZHU, JING LI, HUA WEN, Pennsylvania State University — Controlled tunneling of integer and fractional quantum Hall edge states provides a powerful tool to probe the physics of 1D systems and exotic particle statistics. Experiments in GaAs 2DEGs employ either a quantum point contact or a line junction tunnel barrier. It is generally difficult to independently control the filling factors ν_L and ν_R on the two sides of the barrier. Here we show that in bilayer graphene both ν_L and ν_R as well as their Landau level structures can be independently controlled using a dual-split-gate structure. In addition, the height of the line-junction tunnel barrier implemented in our experiments is tunable via a 5^{th} gate. By measuring the tunneling resistance across the junction R_T we examine the equilibration of the edge states in a variety of ν_L/ν_R scenarios and under different barrier heights. Edge states from both sides are fully mixed in the case of a low barrier. As the barrier height increases, we observe plateaus in R_T that correspond to sequential complete backscattering of edge states. Gate-controlled manipulation of edge states offers a new angle to the exploration of quantum Hall magnetism and fractional quantum Hall effect in bilayer graphene.

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