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Approaching Collimation with a Graphene-based Quantum Point Contact GRACE PAN, Department of Physics, Yale University, MENYOUNG LEE, Department of Physics, Stanford University, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, Japan, DAVID GOLDHABER-GORDON, Department of Physics, Stanford University — Quantum point contacts (QPCs) are narrow constrictions on the order of the Fermi wavelength that bridge together two electrically conducting regions. QPCs display sensitive conductance quantization and are a classic playing field to illustrate clean, ballistic transport in low-dimensional materials. However, graphene-based QPCs are challenging to fabricate, in part due to two reasons: edge disorder that suppresses conductance quantization and imperfect gate depletion leading to charge puddles. Using graphene-boron nitride heterostructures, we demonstrate improvements over a simple etch and Au-gating method by introducing a protective alumina dielectric layer. We use this method to create two QPCs in series and explore potential electron-beam collimation at low magnetic field, in the spirit of Molenkamp (1990).

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