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Electron supercollimation in graphene using one-dimensional disorder potentials SANGKOOK CHOI, Dept. of Physics UC Berkeley and Lawrence Berkeley National Lab, CHEOL-HWAN PARK, Dept. of Physics Seoul National Univ., STEVEN G. LOUIE, Dept. of Physics UC Berkeley and Lawrence Berkeley National Lab — Due to its unique electronic structure, electrons in graphene interact with external potential in a counter-intuitive way, manifesting various different interesting characteristics Here we present another surprising, counter-intuitive electron transport phenomenon in graphene. We discovered that electron supercollimation can be induced by 1D disorder potentials. An electron wave packet is guided to propagate undistorted along the fluctuating direction of the external disorder potential, independent of its initial motion. The more disorder, the better is the supercollimation. This robust novel phenomenon is expected to have significant implications in the fundamental understanding of transport in graphene, as well as other materials with Dirac cone physics, and the potential to be exploited in the design of devices based on these materials. This work was supported by NSF grant No. DMR10-1006184 and U.S. DOE under Contract No. DE-AC02-05CH11231. Computational resources have been provided by NERSC.

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