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Theoretical study of graphene transport regimes SHAFFIQUE ADAM, S. DAS SARMA, Condensed Matter Theory Center, University of Maryland, College Park, MD 20742-4111, USA — In recent work [Adam et al. Proc. Natl. Acad. Sci. 104, 18392 (2007); Y.-W. Tan et al. arXiv:0707.1807, Phys. Rev. Lett., in press (2007)], we argued that the transport properties of currently available experimental graphene samples are dominated by diffusive carriers scattering off Coulomb impurity centers typically located in the substrate. In the current paper we study graphene monolayers, bilayers and nanoribbons and show theoretically that by tuning external parameters, one can access several different transport regimes ranging from the aforementioned diffusive Boltzmann transport to phase-coherent ballistic transport to classical percolation through puddles of electrons and holes. This work is supported by U.S. ONR and NRI-NSF.

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