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Carrier velocity reduction in magnetic graphene superlattices LIANG ZHENG TAN, CHEOL-HWAN PARK, STEVEN LOUIE, Department of Physics, University of California, Berkeley — We investigate the effects of a periodic magnetic field modulation (superlattice) on the electronic structure of graphene using the effective (Dirac-Weyl) Hamiltonian approach, as well as tight-banding calculations. Using a Lorentz transformation of complex rapidity, we show that the low-energy electronic structure of graphene under a one-dimensional inhomogeneous magnetic field can be mapped into that of graphene under an electric field. The isotropic velocity reduction in magnetic graphene superlattices of zero average flux follows as a result of this transformation. The changes in the electronic structure introduced by the magnetic superlattice have important implications for the transport properties of this system. This work was supported by the NSF under Grant No. DMR07-05941, and the U.S. DOE under Contract No. DE-AC02-05CH11231. Computer time was provided by NERSC and NPACI.

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