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Chirality-dependent phonon-limited resistivity in graphenes[1]
HONGKI MIN, EUYHEON HWANG, SANKAR DAS SARMA, Condensed Matter Theory Center, Department of Physics, University of Maryland — We develop a theory for the temperature and density dependence of phonon-limited resistivity $\rho(T)$ in bilayer and multilayer graphene, and compare with the corresponding monolayer result. For the unscreened case, we find $\rho \approx CT$ with $C \propto v_{\rm F}^{-2}$ in the high-temperature limit, and $\rho \approx AT^4$ with $A \propto v_{\rm F}^{-2} k_{\rm F}^{-3}$ in the low-temperature Bloch-Grüneisen limit, where $v_{\rm F}$ and $k_{\rm F}$ are Fermi velocity and Fermi wavevector, respectively. If screening effects are taken into account, $\rho \approx CT$ in the high-temperature limit with a renormalized C which is a function of the screening length, and $\rho \approx AT^6$ in the low-temperature limit with $A \propto k_{\rm F}^{-5}$ but independent of $v_{\rm F}$. These relations hold in general with $v_{\rm F}$ and a chiral factor in C determined by the specific chiral band structure for a given density.

Reference: Hongki Min, E. H. Hwang, and S. Das Sarma, arXiv:1011.0741 (unpublished).

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