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Signatures of one-dimensional localization of magnetically quantized carriers in graphite: power-law hopping mechanism. ARTHUR HEBARD, University of Florida, XU DU, Rutgers University, DMITRI MASLOV, RONOJOY SAHA, University of Florida — We present results of a transport study on highly oriented pyrolytic graphite (HOPG) in ultra-quantum limit magnetic fields (B>8T) applied along the c-axis (z direction). For temperatures in the range 2K< T < 20K, the measured in-plane resistivity ρ_{xx} follows a metallic-like $T^{1/3}$ dependence while the c-axis **resistivity** ρ_{zz} exhibits an insulating-like linear temperature dependence. We show that the c-axis transport behavior can be explained within the context of a power-law hopping mechanism, in which phonons cause localized electrons to hop over distances on the order of the localization length with a frequency of $1/\tau_\phi \propto T$. The corresponding resistivity behaves as $\rho_{zz.} \propto \tau_\phi \propto T^{-1}$. The temperature range for this picture to hold is justified by the semimetal-like properties of HOPG. Both the in-plane and c-axis behavior agree well with the model of electrons almost localized by strong magnetic fields in the presence of long-range disorder, which predicts that $\rho_{xx} \propto \rho_{zz}^{1/3} \propto T^{1/3}$[1]

[1] S. S. Murzin, JETP Lett. **45**, 283 (1987).

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