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Thermal and high current bias study of the quantum Hall effect in Graphene KEYAN BENNACEUR, FABIEN PORTIER, PATRICE ROCHE, CHRISTIAN GLATTLI, CEA — What is the underlying mechanism responsible for the smooth breakdown of the Quantum Hall Effect in graphene at finite energy? For that purpose we study the longitudinal resistance ρ_{xx} as a function of temperature and bias current of Hall bars on exfoliated graphene in magnetic field up to 17 Tesla. Temperature ranges from 1.4K to 300Kand current from 10nA to 100μA. Similarly to conventional 2DEGs, our measurements show Efros Shklovskii Variable Range Hopping transport followed by thermal activation. On the Hall plateaus $\rho_{xx} \sim 1/\mathrm{T}^*\exp[(-\mathrm{T}_0/\mathrm{T})^{1/2}]$, where T_0 is the characteristic VRH temperature linked to the localisation length ξ. A similar relation is observed as a function of the bias current. It leads to an effective temperature. Comparison of the characteristic VRH temperature and current can give information on the decay of Hall voltage over the localization length. At higher energy we observe activated behaviour of ρ_{xx} from which we can obtain the Energy gaps of the quantum Hall effect, comparing these values to theoretical values gives information on the Broadening of Landau Levels by disorder.

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