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**Graphene multilayers in the crossed in-plane magnetic and out-of-plane electric fields** SERGEY PERSHOGUBA, VICTOR YAKOVENKO, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, Maryland 20742-4111, USA, YU. LATYSHEV, A. ORLOV, Kotelnikov Institute of Radio-Engineering and Electronics, 125009, Moscow, Russia, P. MONCEAU, Neel Institute, 38042, Grenoble, France, D. VIGNOLLES, National Laboratory of High Magnetic Fields, 31400, Toulouse, France — We report an experimental study of the out-of-plane differential conductivity $dI/dV$ in graphite mesas as a function of applied out-of-plane voltage $V$ in the in-plane magnetic fields $B_y$ up to 55 T. The spectrum $dI/dV$ vs $V$ has a pronounced peak at the critical voltage $V_0$, which grows linearly with the magnetic field $V_0 \propto B_y$. The experimental results are consistent with a theoretical model. The electronic energy spectrum on each graphene layer is given by the two-dimensional (2D) Dirac cone $\varepsilon = v|p|$, where $v$ and $p = (p_x, p_y)$ are the velocity and 2D momentum. As a result of magnetic field $B_y$, the Dirac cones of the consecutive layers are shifted in the momentum space by $\Delta p_x = eB_y d$, where $d$ is a distance between the layers. Whereas electric field $E_z$ shifts the energy by $\Delta\varepsilon = E_z d$. For generic $E_z$ and $B_y$, the wave functions are localized on a finite number of layers in the $z$ direction. However, when the resonant condition $\Delta\varepsilon = v\Delta p_x$ is achieved, i.e. when $E_z = vB_y$, the Dirac cones align, and wave functions become delocalized in the $z$ direction. We believe that the resonant delocalization of the wave functions corresponds to the peak in differential conductance.

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