Abstract Submitted
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Edge magnetoplasmons in graphene: determination of carrier drift velocity in Quantum Hall regime[1] IVANA PETKOVIC, F.I.B. WILLIAMS, KEYAN BENNACEUR, FABIEN PORTIER, PATRICE ROCHE, D.C. GLATTLI, Service de Physique de l'Etat Condense/IRAMIS/DSM (CNRS URA 2464), CEA Saclay, F-91191 Gif-sur-Yvette — Edge Magneto-Plasmons (EMP) are gapless quasi 1D elementary excitations which are split off from the bulk magneto-plasmon modes by the sample boundary, and are a tool of choice to investigate the structure of the edge of a 2D electron gas. We give a first experimental demonstration of their presence in graphene in the quantum Hall regime and use our results to evaluate the carrier drift velocity along the edge [1]. The group velocity of these modes is a sum of the Hall conductivity contribution and the carrier drift velocity at the edge. In graphene, due to its particular dynamics and an abrupt edge, the drift velocity is expected to be of the order of the Fermi velocity, thus becoming experimentally accessible. We show EMP to exist by timing the travel of narrow wave-packets on picosecond time scales around exfoliated samples. They show chiral propagation with low attenuation at a velocity which is quantized on Hall plateaus. We extract the carrier drift contribution and find it to be slightly less than the Fermi velocity, as expected for an abrupt edge. We also extract the spatial spread of edge accumulated charge and find it to be narrower than for soft edge systems.

[1] I. Petkovic, F.I.B. Williams, K. Bennaceur, F. Portier, P. Roche and D.C. Glattli, Phys. Rev. Lett.(2012).

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