Chiral transport of hot carriers in graphene in the quantum Hall regime

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Quantum Hall systems traditionally study 2D electrons in a perpendicular magnetic field using near-equilibrium transport measurements as a characterisation tool. The field is of broad interest as it covers low-dimensional quantum systems, strong charge correlations, and topological physics.

An interesting special case is the integer quantum Hall effect in graphene, where the gapless, relativistic band structure has unique consequences, such as anharmonic Landau level (LLs) energy spacing and the simultaneous presence of both carrier types. Here [1], we photo-excited electrons and holes to high LLs and use photocurrent measurements to measure the relaxation dynamics of the carriers in a regime important for carrier multiplication. Our results lead to a unified understanding of the relaxation processes in graphene over different magnetic field strength regimes, and provides clear indications of a sizable carrier multiplication.

[1] B. Cao, T. Grass, *et al.*, *Chiral transport of hot carriers in graphene in the quantum Hall regime*, Accepted for publication in ACS Nano (2022).