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Quantum oscillations of the magnetic moment of graphene and graphite. IVANA PETKOVIC, ANTHONY LOLLO, Yale University, KE WANG, PHILIP KIM , Harvard University, JACK HARRIS, Yale University — Quantum oscillations of the magnetic moment, so called de Haas - van Alphen (dHvA) oscillations, are a powerful tool for the investigation of the Fermi surface. In graphene with a fixed carrier density, the magnetic moment is predicted to oscillate as function of increasing perpendicular field B every time the uppermost Landau level empties out, yielding the characteristic 1/B dependence. To date, it has been challenging to measure the equilibrium magnetic moment of isolated samples of graphene. In graphite a more complex oscillation sequence is observed, due to its complicated Fermi surface with both electron and hole carriers. Historically graphite was one of the first materials in which dHvA oscillations were studied, but recently interest was revived due to an observation of carriers with relativistic dynamics. We have used cantilever torque magnetometry to study diamagnetism and dHvA oscillations of isolated samples of graphene and graphite between 400 mK and 20 K. For graphite, we observe dHvA oscillations which are used to study the composition and nature of carriers. For graphene, we discuss the results in relation to relativistic dispersion and disorder.

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