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Room Temperature Quantum Hall Effect in Graphene ANDRE GEIM, University of Manchester, PHILIP KIM, Columbia University, KOSTYA NOVOSELOV, ZHIGANG JIANG, HORST STORMER, YUANBO ZHANG, SERGEY MOROZOV, ULI ZEITLER — The quantum Hall effect (QHE) is an example of those few quantum phenomena that occur on a truly macroscopic scale, and it has been attracting intense interest since its discovery in 1980. As many other quantum phenomena, the observation of the QHE requires temperatures T typically below 4K. Efforts to extend the QHE temperature range by using semiconductors with small effective masses of charge carriers have so far failed to reach temperatures above 30K. We show that in graphene – a single layer of carbon atoms densely packed in a honeycomb crystal lattice – the QHE can be observed even at room temperature. This is due to the highly unusual nature of charge carriers in graphene, which behave as massless relativistic particles (Dirac fermions) and move with little scattering under ambient conditions.

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