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Johnson noise thermometry reveals the Dirac fluid in graphene JESSE CROSSNO, JING SHI, KE WANG, XIAOMENG LIU, ACHIM HARZHEIM, ANDREW LUCAS, SUBIR SACHDEV, PHILIP KIM, Harvard University, TAKASHI TANIGUCHI, KENJI WATANABE, National Institute for Material Science, Japan, THOMAS OHKI, KIN CHUNG FONG, Raytheon BBN Technologies — Near the charge neutrality point in graphene, the Fermi surface vanishes leading to the formation of a strongly-interacting quasi-relativistic electron-hole plasma, known as a Dirac fluid. These non-Fermi liquids share many features with quantum critical systems including a fast electron-electron scattering rate which makes them well suited to hydrodynamic descriptions. A number of exotic properties have been predicted including a diverging thermal conductivity resulting in the breakdown of the Wiedemann-Franz (WF) law. I will discuss the experimental technique—based on Johnson noise thermometry—used to measure the electronic thermal conductivity of graphene and probe the unique transport dynamics of the Dirac fluid.

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