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Scale invariance and viscosity of a two-dimensional Fermi gas ENRICO VOGT, MICHAEL FELD, BERND FRÖHLICH, DANIEL PERTOT, MARKO KOSCHORRECK, MICHAEL KÖHL, University of Cambridge, UK — We investigate the collective excitations of a harmonically trapped two-dimensional Fermi gas from the collisionless to the hydrodynamic regime. In the experiment we create two-dimensional Fermi gases of ^{40}K atoms by using an optical lattice. Interactions are tuned by applying a magnetic field close to the Feshbach resonance. We observe the existence of a breathing mode at twice the trap frequency, which is invariant against interaction strength, amplitude of the excitation, and temperature. Moreover, this breathing mode is undamped as compared to the dipole mode, which provides evidence for a SO(2,1) scaling symmetry of the two-dimensional Fermi gas. In addition, we investigate the quadrupole mode to measure the shear viscosity of the two-dimensional gas and study its temperature dependence.

Enrico Vogt
University of Cambridge, UK

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