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Two-dimensional Fermi gases ENRICO VOGT, MICHAEL FELD, BERND FRÖHLICH, DANIEL PERTOT, MARKO KOSCHORRECK, MICHAEL KÖHL, University of Cambridge, UK — We report on our latest investigations on two-dimensional Fermi gases. We present the studies on collective excitations of a harmonically trapped two-dimensional Fermi gas from the collisionless to the hydrodynamic regime in order to investigate scale invariance and viscosity. We additionally investigate balanced and imbalanced Fermi mixtures in optical lattices using momentum-resolved photoemission spectroscopy. Those measurements include the observation of a many-body pairing gap above the superfluid transition temperature in a harmonically trapped, two-dimensional atomic Fermi gas in the regime of strong coupling. Furthermore we report the creation and experimental investigation of both attractive and repulsive Fermi polaron quasiparticles in two dimensions, which result when a small number of spin-down ^{40}K atoms are immersed in a two-dimensional Fermi sea of spin-up ^{40}K atoms. The single-particle spectral function $A(k, E)$ of the Fermi polarons, which directly reveals the quasi-particle properties like the energy and effective mass, is measured giving access to the full (momentum-resolved) quasiparticle dispersion.

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