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A Homogeneous 2D Fermi Gas NICLAS LUICK, KLAUS HUECK, LENNART SOBIREY, JONAS SIEGL, THOMAS LOMPE, HENNING MORITZ, Institut für Laserphysik, Universität Hamburg — Ultracold 2D Fermi gases allow to precisely characterize the interplay of reduced dimensionality and strong interactions in a quantum many-body system. So far, ultracold 2D Fermi gases have been studied in harmonic trapping potentials, which gives rise to an inhomogeneous density distribution. This complicates the interpretation of non-local quantities like correlation functions and the momentum distribution, which can only be extracted as trap-averaged quantities. In addition, the inhomogeneous density distribution reduces the chance of creating quantum phases which are predicted to exist in only small regions of the phase diagram.
Here, we present our realization of an ultracold 2D Fermi gas trapped in a homogeneous disk-shaped potential. The radial confinement is realized by a ring-shaped blue-detuned beam with steep walls. Additionally, a digital micro mirror device can be used to remove residual inhomogeneities and to imprint arbitrary repulsive potentials onto the system.

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