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Coherence of strongly interacting 2D quantum gases LENNART SOBIREY, JONAS SIEGL, NICLAS LUICK, KLAUS HUECK, THOMAS LOMPE, HENNING MORITZ, Univ Hamburg — The dimensionality of a quantum system has a profound impact on its coherence and superfluid properties. In 2D systems true long-range coherence is precluded by thermal fluctuations, nevertheless they can still become superfluid as predicted by Berezinskii, Kosterlitz and Thouless. In this superfluid regime the first order coherence decays algebraically, free of any characteristic length scale. Here, we show coherence measurements in a strongly interacting 2D gas of diatomic ^{6}Li molecules. A self-interference technique allows us to locally extract the algebraic decay exponent, which is directly linked to the superfluid density. Furthermore, we present our realization of a homogeneous ultracold 2D Fermi gas. It should enable the direct measurement of non-local quantities such as the momentum distribution, without the complication of averaging over the different densities present in a harmonic trap.

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