Equation of state of ultracold fermions in the 2D BEC-BCS crossover IGOR BOETTCHER, Department of Physics, Simon Fraser University, Burnaby, British Columbia V5A 1S6, Canada, LUCA BAYHA, DHRUV KEDAR, PUNEET MURTHY, MATHIAS NEIDIG, MARTIN RIES, ANDRE WENZ, GERHARD ZUERN, SELIM JOCHIM, Physikalisches Institut, Heidelberg University, D-69120 Heidelberg, Germany, TILMAN ENSS, Institute for Theoretical Physics, Heidelberg University, D-69120 Heidelberg, Germany — We report the experimental measurement of the equation of state of a two-dimensional Fermi gas with attractive s-wave interactions throughout the crossover from a weakly coupled Fermi gas to a Bose gas of tightly bound dimers as the interaction strength is varied. We demonstrate that interactions lead to a renormalization of the density of the Fermi gas by several orders of magnitude. We compare our data near the ground state and at finite temperature to predictions for both fermions and bosons from Quantum Monte Carlo simulations and Luttinger-Ward theory. Our results serve as input for investigations of close-to-equilibrium dynamics and transport in the two-dimensional system.

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