

Abstract Submitted  
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**Thermodynamics of ultracold Bose gases at a dimensional crossover** RALF LABOUVIE, ANDREAS VOGLER, VERA GUARRERA, HERWIG OTT, Technische Universität Kaiserslautern — We have studied the thermodynamics of ultracold Bose gases in the crossover from a three-dimensional to a one-dimensional regime. In our experiment, we use a focused electron-beam to probe in situ atomic density distributions with high temporal and spatial resolution. Starting with a Bose-Einstein-Condensate in a single beam optical dipole trap we can create one-dimensional systems by loading the atoms in a two-dimensional blue-detuned optical lattice. With increasing strength of the lattices we go from a three-dimensional into a one-dimensional system. Furthermore we tune the interaction strengths of the one-dimensional quantum-gases from weak (quasi-condensate) to strong (Tonks-Girardeau). By measuring the density profiles and applying an inverse Abel-Transformation we extract the equation of states of these systems and characterize the crossover from the three-dimensional to the one-dimensional regime.

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