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Detecting different correlation regimes in a 1D Bose gas using in-situ absorption imaging FRANCISCO SALCES-CARCOBA, SEIJI SUGAWA, YUCHEN YUE, ANDIKA PUTRA, IAN SPIELMAN, NIST - Joint Quantum Institute - Univ of Maryland-College Park — We present the realization of a single 1D Bose gas (1DBG) using a tightly focused Laguerre-Gauss beam as a waveguide for a 87Rb cloud. Axial confinement is provided by a weak trap that also sets the final density profile. A homogeneous 1DBG at T = 0 can be fully described by the dimensionless interaction parameter $\gamma \propto 1/n$, where n is the linear density; at sufficiently low densities the system becomes strongly interacting. An inhomogeneous (trapped) system can enter this description within the local density approximation (LDA) where the interaction parameter becomes position dependent $\gamma(x) \propto 1/n(x)$. The system then displays different correlation regimes over its extension which can be detected by measuring its equation of state (EoS) or the density density correlations in real space using in-situ absorption imaging.

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