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Abstract for an Invited Paper
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Universal scaling of density and momentum distributions in Lieb-Liniger gases[1]

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We present numerically exact results for the scaling of density and momentum distribution functions of harmonically trapped one-dimensional bosons with repulsive contact interactions. We consider systems in the continuum [1], and in the presence of a lattice [2,3], both in the ground state [1,2] and at finite temperature [1,3]. We use path integral quantum Monte Carlo with worm updates in calculations at finite interaction strengths, and the Bose-Fermi mapping in the Tonks-Girardeau limit. We first discuss the homogeneous case and, within the local density approximation, use it to motivate the scaling in the presence of a harmonic trap. For the momentum distribution function, we pay special attention to the high momentum tails and their k^{-4} asymptotic behavior. When available, we compare our results to experimental measurements of the momentum distribution function of ultracold bosonic gases in two-dimensional optical lattices.

References:

[1] W. Xu and M. Rigol. Universal scaling of density and momentum distributions in Lieb-Liniger gases. arXiv:1508.07011.

[2] M. Rigol and A. Muramatsu. Universal properties of hard-core bosons confined on one-dimensional lattices. Phys. Rev. A **70**, 031603(R) (2004).

[3] M. Rigol. Finite-temperature properties of hard-core bosons confined on one-dimensional optical lattices. Phys. Rev. A **72**, 063607 (2005).

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