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Few atoms in a trap: universal behavior at the Van der Waals length scale IMRAN KHAN, BO GAO[1], University of Toledo — We present results of variational Monte Carlo calculations for the universal equations of state at the Van der Waals length scale[2] for a N-atom system (N = 2 to 5) in a trap. The theory provides a systematic understanding of few atoms in a trap, including, in particular, the shape-dependence of interaction energy that becomes important at large scattering lengths. The theory also shows that atoms in a trap have significant long-range correlation for large scattering lengths, with the implication that any independent particle model, such as the Hartree-Fock approximation, is likely to fail for such systems.

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[2]B. Gao, J. Phys. B **37**, L227 (2004).

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