

HNPS Advances in Nuclear Physics

Vol 11 (2002)

HNPS2000 and HNPS2002



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doi: [10.12681/hnps.2219](https://doi.org/10.12681/hnps.2219)

To cite this article:

Moustakidis, C. C., & Massen, S. E. (2019). Bose-Einstein condensation of correlated atoms in a trap. *HNPS Advances in Nuclear Physics*, 11. <https://doi.org/10.12681/hnps.2219>

Bose-Einstein condensation of correlated atoms in a trap

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The Bose-Einstein condensation of correlated atoms in a trap is studied by examining the effect of inter-particle correlations to one-body properties of atomic systems at zero temperature using a simplified formula for the correlated two body density distribution. Analytical expressions for the density distribution and rms radius of the atomic systems are derived using four different expressions of Jastrow type correlation function. In one case, in addition, the one-body density matrix, momentum distribution and kinetic energy are calculated analytically, while the natural orbitals and natural occupation numbers are also predicted in this case. Simple approximate expressions for the mean square radius and kinetic energy are also given.