

Turkish Journal of Physics

Turkish Journal

of

Physics

Simultaneously Finite Size and Interaction Effects on a Harmonically Trapped ^{87}Rb Gas

Ahmed Sayed HASSAN, Hassab Eldyeam HADI
Department of Physics, Faculty of Science, El Minia University,
El Minia-EGYPT
e-mail: ahmedhassan117@yahoo.com

 [Keywords](#)
[Authors](#)



phys@tubitak.gov.tr

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Abstract: In the framework of the semiclassical approximation ($K_B T \gg \hbar\Omega$), an accurate ansatz formula for the density of states is suggested. This formula is able to include the finite size, interatomic interaction effects, and the role of dimensionality simultaneously. Condensed fraction, and average energy per particle for a condensed ^{87}Rb gas in anisotropic trap in 3D and 2D are calculated. The results for the above mentioned thermodynamic quantities show good agreement with the measured experimental results. Furthermore, full agreement is obtained with the other method used to calculate the same quantities.

Key Words: Bose-Einstein condensation; finite size and interaction effects; density of states approach

Turk. J. Phys., **32**, (2008), 31-38.

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