

Turkish Journal of Physics

Turkish Journal

of


Physics

Effective Width and Expansion Energy of the Interacting Condensed ^{87}Rb Bose Gas with Finite Size Effects

Ahmed S. HASSAN, Azza M. EL-BADRY

Department of Physics, Faculty of Science, El Minia University, El Minia, EGYPT

e-mail: ahmedhassan117@yahoo.com

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



phys@tubitak.gov.tr

[Scientific Journals Home](#)
[Page](#)

Abstract: This work is devoted to study the temperature dependence of the effective width and expansion energy on the finite size and interaction effects (repulsive interactions). It is found that the effective size $\langle r^2 \rangle$, and expansion energy in the radial direction E_y of a Bose gas follow a characteristic temperature dependence, i.e. $\langle r^2 \rangle, E_y \propto (T/T_0)^4$ if $T_0 < T$ and $\langle r^2 \rangle, E_y \propto (T/T_0)$ if $T_0 > T$. Our results show that these two parameters increases with the number of atoms, and with increasing repulsive interaction strength at temperature less than the transition temperature, ($T < T_0$); yet it has little effect at temperatures higher than the transition temperature ($T > T_0$). The obtained results are compared with the available experimental data for ^{87}Rb directly, full agreement is obtained.

Key Words: Interacting Bose gas; Thermodynamical properties for BEC; Semiclassical approach.

Turk. J. Phys., **33**, (2009), 21-30.

Full text: [pdf](#)

Other articles published in the same issue: [Turk. J. Phys., vol.33, iss.1.](#)