Chapter 10

Identical Particles

5. The Bose-Einstein Energy Distribution

The Bose Einstein distribution of the particle among various states $n_i = \frac{g_i}{e^{(\alpha+\beta E)} - 1}$

$$f(E) = \frac{n_i}{g_i} = f(E) = \frac{1}{e^{(\alpha+\beta E)} - 1} = \frac{1}{Ae^{\beta E} - 1}$$

where $\beta = \frac{1}{k_B T}$ and $A = e^{\alpha} = e^{-\mu/k_B T} = \frac{V}{N}\left(\frac{2\pi m k_B T}{h^2}\right)^{3/2}$

Here, μ is chemical potential which is general a function of T. when $A >> 1$, Bose-Einstein gas reduces to the Maxwell-Boltzmann gas. The chemical potential for Bose gas is negative, but for photon gas is zero.