

Problem 4

i) Determine a degree of degeneracy of the energy levels for a three dimensional (3D) and two dimensional (2D) quantum oscillator (a particle in a field $U(r) = m\omega^2 r^2/2$).

ii) Determine a temperature dependence of the number of particles in a Bose-Einstein Condensate (BEC) for 3D and 2D non-interacting cold atoms in a harmonic trap $U(r) = m\omega^2 r^2/2$ using semi-classical approximation ($\hbar\omega \ll T$).