Quantum Mechanics 2022

SC1.203

Quiz-II

18/08/2022 || Time 40 Mins

1) Obtain the relation between k_F (the wave vector of the Fermi surface) and the electron density in the electron gas model. [5]
2) Assume three noninteracting electrons are in a one-dimensional infinite square well in the (one-particle) states ψ_2, ψ_5, ψ_7. Write the three-particle wave function. What is the total energy in the unit of $\pi^2\hbar^2/2m_e a^2$? [4+1=5]
3) How many ways can N identical bosons be put in a potential so that there are N_i particles in d_i (one-particle) states of energy E_i (where $i = 1, 2, 3, ...$)? [5]
4) Obtain the most probable occupation number for the case above. [5]
5) What is meant by the statement — *all electrons are identical*? Argue that it leads to the Pauli exclusion principle. [5]