Department of Physics

Indian Institute of Technology Kharagpur
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Subject No. PH41023(Statistical Physics-I) Sunday 2nd April, 2023
Assignment Due date : 3th April 2023 Total Marks: 10

Assignment # 9

§1. Calculate the magnitude of the Fermi wavevector and Fermi energy (in eV) for 4.5 X 10^{21} electrons confined in a box of volume $1cm^3$.

§2. Derive the density of states $D(\epsilon)$ as a function of energy E for a free electron gas in one-dimension. (Assume periodic boundary conditions or confine the linear chain to some length L.) Then calculate the Fermi energy E_F at zero temperature for an N electron system.

§3. The pressure of a non relativistic free Fermi gas in three-dimensions depends, at T = 0, on the density of fermions n as

§4. For an ideal Fermi gas in 3 dimensions, the electron velocity V_F at the Fermi surface is related to electron concentration n as

§5. At temperature T Kelvin (K); the value of the Fermi function at an energy 0.5eV above the Fermi energy is 0.01. Then find out T.