

$$\rho = \frac{82 \text{ kg/m}^3}{3m_p} = 1.64 \times 10^{28} \text{ m}^{-3}$$

For

$$\hbar = 1.05 \times 10^{-34} \text{ J s}$$

$$m = 9.11 \times 10^{-31} \text{ kg}$$

$$k_B = 1.38 \times 10^{-23} \text{ J/K}$$

we have

$$E_F = \frac{\hbar^2}{2m} (3\pi^2 \rho)^{2/3} = 7.80 \times 10^{-20} \text{ J}$$

and

$$T_F = \frac{E_F}{k_B} = 5653 \text{ K}$$