

PHYS 6350 - Computational Physics
FALL 2020

Solution to Assignment 1 and 2

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Answer to Question no. 7

If we express all physical quantities in terms of m_e , \hbar , and eV , then we are using *natural units*. using the basic conversion factors between natural and *MKS system*, we get-

$$\begin{aligned}1\ m_e &= 9.10938356 * 10^{-31}\ \text{kg} \\1\ \hbar &= 1.05457266 * 10^{-34}\ \text{kgm}^2\text{s}^{-1} \\1\ eV &= 1.60217733 * 10^{-19}\ \text{kgm}^2\text{s}^{-2}\end{aligned}$$

now,

$$\begin{aligned}\frac{1\hbar}{1eV} &= \frac{1.05457266 * 10^{-34}\text{kgm}^2\text{s}^{-1}}{1.60217733 * 10^{-19}\text{kgm}^2\text{s}^{-2}} \\ \Rightarrow 1\ s &= \mathbf{1.519266894 * 10^{15}\hbar eV^{-1}}\ (Ans.)\end{aligned}$$

Again,

$$\begin{aligned}\frac{1\hbar}{1m_e} &= \frac{1.05457266 * 10^{-34}\text{kgm}^2\text{s}^{-1}}{9.1038356 * 10^{-31}\text{kg}} \\ \Rightarrow 1\ s * 1\ \hbar m_e^{-1} &= 1.157677304 * 10^{-4}\text{m}^2 \\ \Rightarrow 1.519266894 * 10^{15}\hbar eV^{-1} * 1\ \hbar m_e^{-1} &= 1.157677304 * 10^{-4}\text{m}^2 \\ \Rightarrow 1\ m &= \mathbf{3.622624147 * 10^9\hbar(m_e eV)^{-1/2}}\ (Ans.)\end{aligned}$$