

PHY2054 Summer 2018 Extra Credit Assignment

Prof. Douglas H. Laurence

Department of Physical Sciences, Broward College, Davie, FL 33314

Recall that one of the classical predictions of the photoelectric effect is that it would take time for a current to appear when light is shined on a metal plate. The brightness of a light source, known as the **intensity**, is a measure of power per unit area (W/m^2), where power is, of course, energy per unit time (J/s).

1. If light of intensity $I = 1 \times 10^{-7} \text{ W}/\text{m}^2$ was shined on an atom in a metal plate, which we'll say has an area of $3 \times 10^{-20} \text{ m}^2$, how long would it take for the atom to absorb an energy of $5 \times 10^{-10} \text{ J}$?
2. Using the same idea as above, if the metal plate that this atom is a part of has a work function of $W_0 = 3.65 \times 10^{-19} \text{ J}$, how long would it take for current to start flowing? That is, how long would it take for electrons to gain enough energy to break away from the metal plate?