

Short Homework #8: Photons and Conservation

1. You perform a photoelectric effect experiment in which you shine light of different frequencies on a certain material, and you measure the kinetic energies of the electrons emitted by the material. Table 1 gives the frequencies of the light you use, as well as the kinetic energies you measure. Generate a plot that lets you test Einstein's photon model for this interaction.

a) Verify that Einstein's model is not wrong. (That is, show that your data are not different from a straight line with a slope not different from Planck's constant, and a y-intercept less than zero.)

b) Predict the maximum wavelength of photons that will eject electrons from the material.

c) Given the work functions of four materials (Sodium 2.3 eV, Cesium 2.1 eV, Copper 4.7 eV, and Iron 4.5 eV) can these data say anything about what metal have been used as the target in the experiment?

2. Ford, E4.14, p. 87

Due: Friday, October 30, 2:30 pm

Frequency (10^{14} Hz)	Kinetic Energy (eV)
5.4	0.12
7.3	0.76
7.9	1.01
8.5	1.46
10.2	2.15
12.1	2.83

Table 1: Kinetic Energy of electrons ejected from a certain material when light with the given frequency was shined upon it.