

Homework Assignment #6

Chapter 3 The Particlelike Properties of Electromagnetic Radiation

Modern Physics (3rd Edition) by Kenneth Krane

Due Date: Thursday, March 1, 2018

In these problems, when the problem asks for mass, energy, and momentum, please write your answers in units of:

Mass $\rightarrow MeV/c^2$ not kilograms !!

Momentum $\rightarrow MeV/c$ not kilograms·meters/sec !!

Energy $\rightarrow MeV$ not joules !!

unless otherwise specified.

When you are asked for velocities, always quote your answers in units of “c,” the speed of light.

$$\text{velocity} = \beta c$$

Problems:

- 3.1 A double-slit experiment is performed with sodium light
- 3.2 What angle of incidence will produce the second-order Bragg peak.
- 3.3 Monochromatic X-rays are incident on a crystal
- 3.5 Find the momentum of (a) a 10.0-MeV gamma ray; (b) a 25-keV X ray,
- 3.6 Radio waves have a frequency of the order of 1 to 100 MHz.
- 3.7 What is the wavelength of an X-ray photon of energy 10.0 keV?
- 3.8 What is the cutoff wavelength for the photoelectric effect using an aluminum surface?