

PHYS 2303 Homework 12

Fletcher Gornick

April 18, 2022

Chapter 6 Problem 93

What is the frequency of the photon absorbed when the hydrogen atom makes the transition from the ground state to the $n = 4$ state?

Chapter 6 Problem 136

- (a) Calculate the number of photoelectrons per second that are ejected from a 1.0-mm^2 area of sodium metal by a 500-nm radiation with intensity 1.30kW/m^2 (the intensity of sunlight above Earth's atmosphere).
- (b) Given the work function of the metal as 2.28 eV , what power is carried away by these photoelectrons?

Chapter 6 Problem 141

The momentum of light, as it is for particles, is exactly reversed when a photon is reflected straight back from a mirror, assuming negligible recoil of the mirror. The change in momentum is twice the photon's incident momentum, as it is for the particles. Suppose that a beam of light has an intensity 1.0 kW/m^2 and falls on a 2.0 m^2 area of a mirror and reflects from it.

- (a) Calculate the energy reflected in 1.00 s .
- (b) What is the momentum imparted to the mirror?
- (c) Use Newton's second law to find the force on the mirror.
- (d) Does the assumption of no-recoil for the mirror seem reasonable?

Chapter 6 Problem 142

A photon of energy 5.0 keV collides with a stationary electron and is scattered at an angle of 60° . What is the energy acquired by the electron in the collision?