

Quantum Physics

1. A photosurface has a work function of 3.00 eV. What is the critical frequency?
2. A photosurface has a critical frequency of 2.25×10^{14} Hz. What is the voltage required to stop electrons emitted from a photosurface when radiation of frequency 3.87×10^{14} Hz falls on this surface?
3. Light of wavelength 5.4×10^{-7} m falls on a photosurface and causes the emission of electrons of maximum kinetic energy 2.1 eV at a rate of 10^{15} per second. The light is emitted by a 60 W light bulb.
 - a. Calculate the electric current that leaves the photosurface.
 - b. Find the work function of the surface.
4. Consider a brick of mass 0.250 kg moving at 10 ms^{-1} .
 - a. What is its de Broglie wavelength?
 - b. Does it make sense to treat the brick as a wave? Explain.
5. Assume that an electron can exist within a nucleus (size 10^{-15} m) such that its associated wave forms a fundamental mode standing wave with nodes at the edges of the nucleus.
 - a. Estimate the wavelength of this electron.
 - b. Calculate the kinetic energy of the electron in MeV.