Question # 82054

A stellar object is emitting radiation at 1420 nm. A detector is capturing 7 107 photons per second at this wavelength. h = 6.63 x 10-34 J-s. c = 2.998 x 108 m/s.

(a) What is the total energy of the photons detected in one second?

(b) What is the total energy of the photons detected in one hour?

Answer:

   (a) The total energy detected by a stellar object in one second is equal to:

$$E_s = \frac{n*h*c}{\lambda} = \frac{7107 * 6.63 * 10^{-34} * 2.998 * 10^8}{1420 * 10^{-9}} = 9.948 * 10^{-16} \, J$$

   (b) The total energy detected by a stellar object in one hour is equal to:

$$E_h = E_s * 60 * 60 = 3.581 * 10^{-12} J$$