Answer on Question #75367, Physics / Quantum Mechanics

A beam of white light incident normally on a plane surface absorbing 70% of the light and reflecting the rest. If the incident beam carries 10W of power, find the force exerted by it on the surface. (1) 4.3×10^{-5} N. (2) 4.3×10^{-6} N. (3) 4.3×10^{-7} N. (4) 4.3×10^{-8} N

Solution: P = 10 W, $P = \frac{h\nu}{\Delta t} = \frac{hc}{\lambda \Delta t}$.

The force

$$F = \frac{\Delta p}{\Delta t} = \frac{0.7\frac{h}{\lambda} + 0.6\frac{h}{\lambda}}{\Delta t} = \frac{1.3h}{\lambda \Delta t} = \frac{P}{c} = \frac{1.3 \cdot 10}{3 \cdot 10^8} = 4.3 \cdot 10^{-8} N.$$

Answer: (4) 4.3×10^{-8} N