Arthur H. Compton (1892～1962), while at Washington University at St. Louis found that x-rays increase in wave length when scattered, which he explained in 1923 on the basis of the quantum theory of light.

$$\lambda' - \lambda = \frac{h}{m_o C}\{1 - \cos(\theta)\}$$

地球一周の距離 (外周)はおよそ4万Km

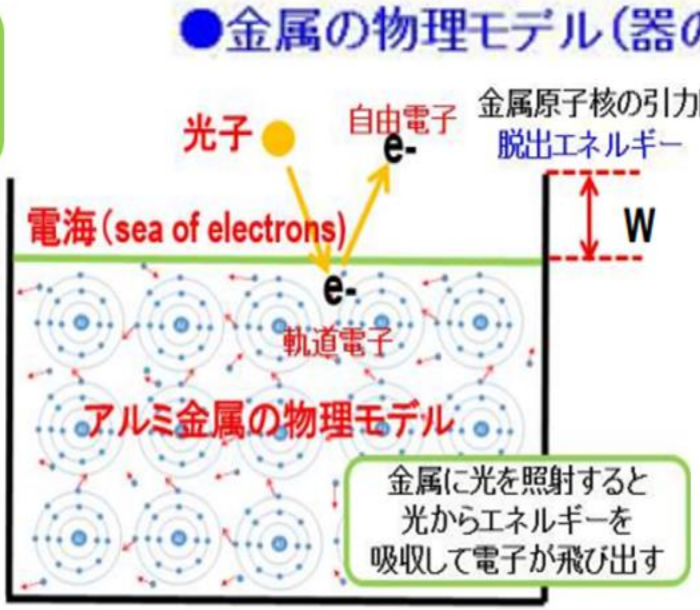
光の速度 $C = 2.99792458 \times 10^{10}$ cm/sec

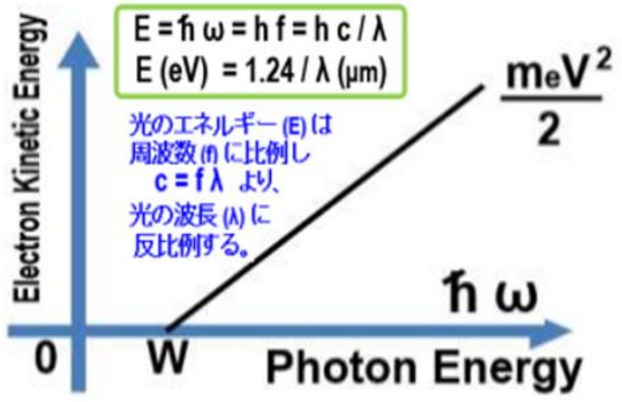
Plank 定数 $h = 6.62606957 \times 10^{-34}$ Joule・sec

電子の質量 $m_e = 9.10938291 \times 10^{-31}$ kg

Joule = Newton・m = (Kg・m ・sec^{-2})・m

$$\frac{h}{m_o C} = 0.02426310241 \text{ Å} (10^{-8} \text{ cm})$$

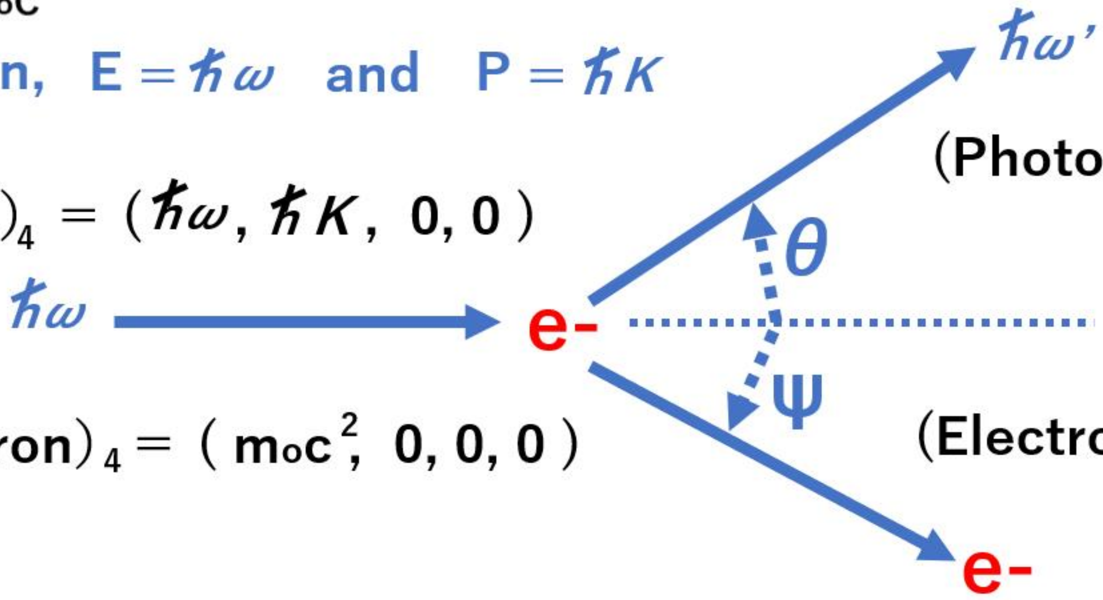




For photon, $E = \hbar\omega$ and $P = \hbar K$

$(\text{Photon})_4 = (\hbar\omega, \hbar K, 0, 0)$

$(\text{Photon})'_4 = (\hbar\omega', \hbar K' \cos(\theta), \hbar K \sin(\theta), 0)$



$(\text{Electron})_4 = (m_o c^2, 0, 0, 0)$

$(\text{Electron})'_4 = (mc^2, P\cos(\psi), -P\sin(\psi), 0)$