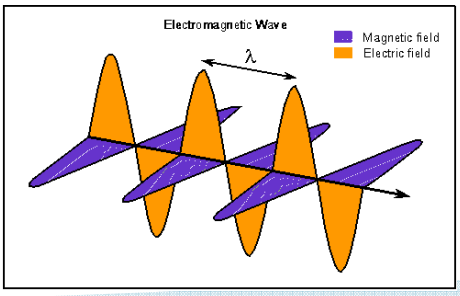
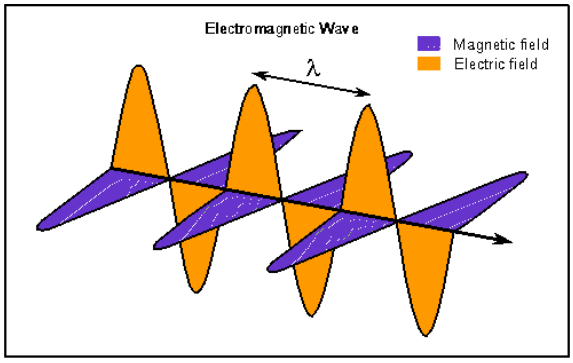
Radiação electromagnética

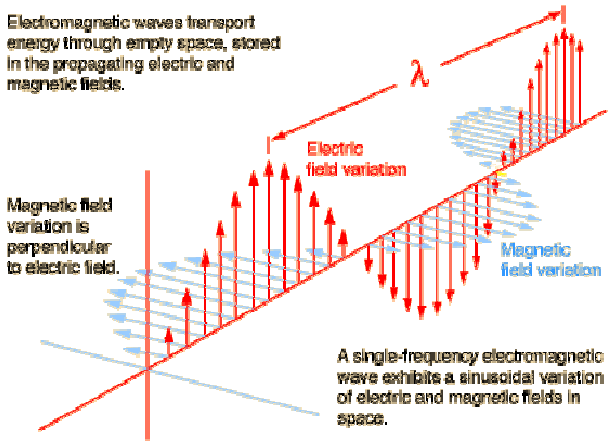


Onda electromagnética



$\vec{E} \perp \vec{B} \perp \overrightarrow{v_{propagação}}$

Onda electromagnética

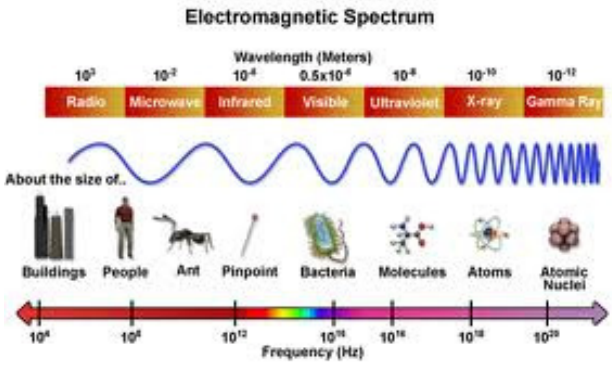


Espectro electromagnético

$$v = \frac{\lambda}{T} = \lambda f$$

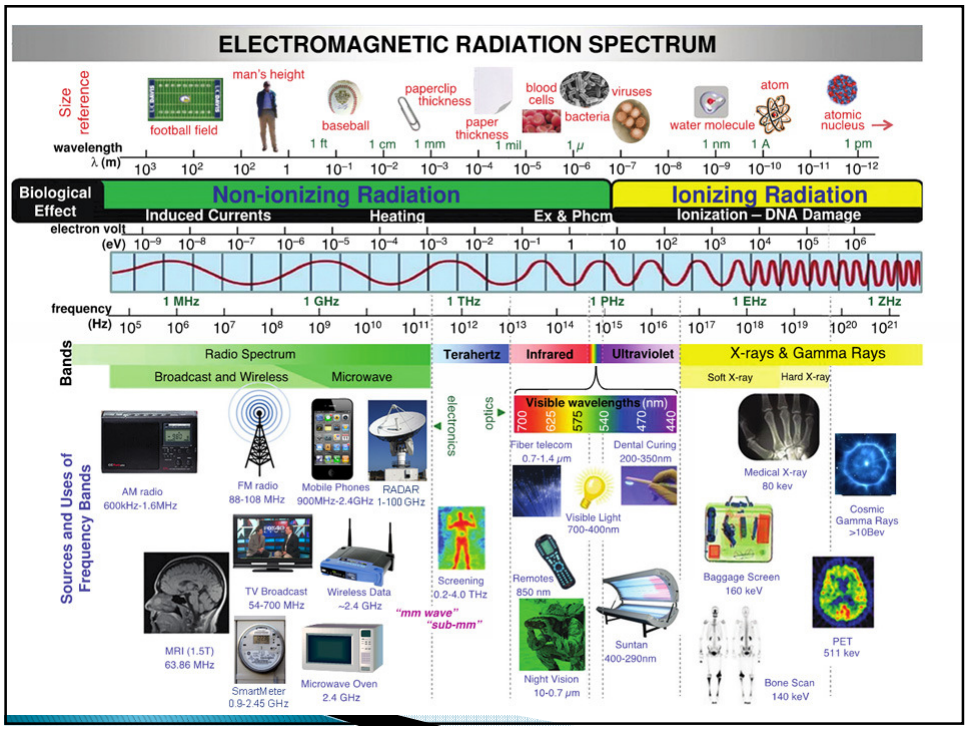
$$f = \frac{1}{T}$$

$$Energia = hf$$



Constante de Planck

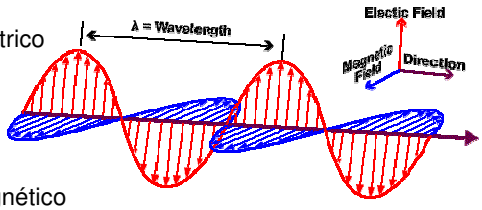
$h = 6{,}63 \times 10^{-34}\ J$



Onda electromagnética

Equação de onda do campo eléctrico

$$\frac{\partial^2 E}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2}$$



Equação de onda do campo magnético

$$\frac{\partial^2 B}{\partial y^2} = \frac{1}{c^2}\frac{\partial^2 B}{\partial t^2}$$

$$c = 299\,792\,458 \quad m/s$$

Soluções das equações de onda:

$$E = E_0 sen(kx - \omega t)$$

$$B = B_0 sen(kx - \omega t)$$

$$k = \frac{2\pi}{\lambda}$$

$$\omega = 2\pi f$$

$$\frac{E_0}{B_0} = c$$

$$c = \frac{1}{\sqrt{\varepsilon_0 \mu_0}}$$

Vector de Poynting

Vector de Poynting

Densidade de energia associada aos campos eléctrico e magnético

$$\vec{S} = \frac{1}{\mu_0}\vec{E} \wedge \vec{B}$$

$$\vec{S} \perp \vec{E} \perp \vec{B}$$

$$\overline{S} = \frac{1}{\mu_0}\overline{EB} = \frac{1}{\mu_0}\overline{E_0 sen(kx-\omega t)\, B_0 sen(kx-\omega t)}$$

$$\overline{S} = \frac{1}{\mu_0}\overline{E_0 [sen(kx-\omega t)]^2 \frac{E_0}{c}}$$

$$\overline{S} = \frac{1}{\mu_0}\overline{\frac{E_0^{\,2}}{c}[sen(kx-\omega t)]^2}$$

$$\overline{S} = \frac{E_0^{\,2}}{2\mu_0 c}$$