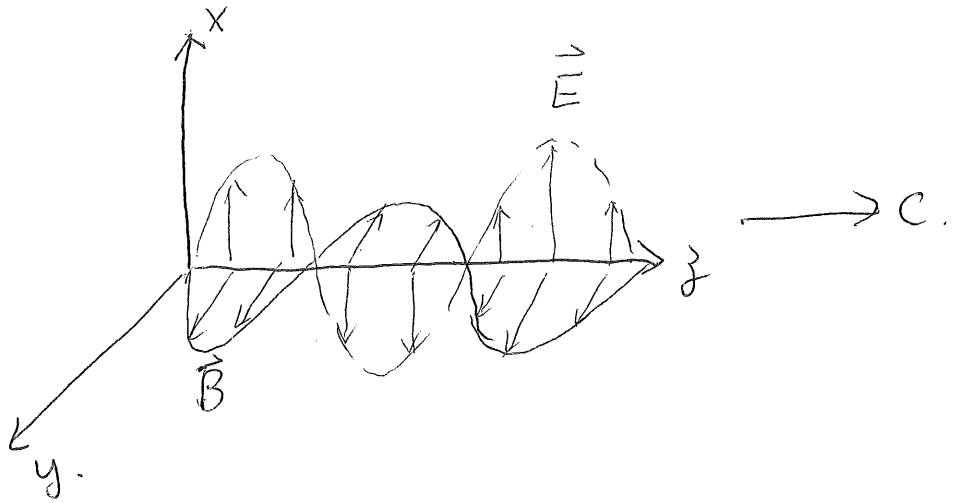
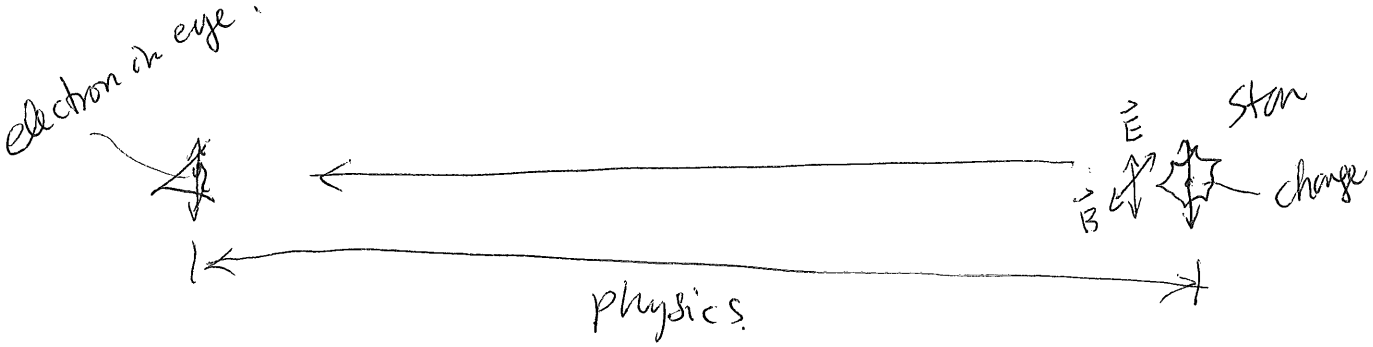


$$E = E_0 \cos(kx - \omega t).$$

$$B = B_0 \cos(kx - \omega t).$$

$$\omega = 2\pi f \qquad k = \frac{2\pi}{\lambda}.$$



$$E = E_{max} \cos(\omega t + kx).$$

$$u_E = \frac{1}{2}\varepsilon_0 E^2$$

$$\langle u_E \rangle = \frac{1}{2}\varepsilon_0 \langle E^2 \rangle$$

$$E^2 = E_{max}^2 \cos^2(\omega t + kx) \quad (x=0)$$

$$\langle E^2 \rangle = E_{max}^2 \frac{\int_0^T \cos^2(\omega t + kx)\, dt}{T} \quad (x=0)$$

$\cos^2\theta = \frac{1+\cos 2\theta}{2}$.

$$= E_{max}^2 \frac{\left[\frac{1+\cos 2(\omega t+kx)}{2}\right]_0^T}{T}$$

$$= E_{max}^2 \frac{\left[\frac{T}{2}\right]}{T} \qquad \left(\left[\cos 2(\omega t+kx)\right]_0^T = 0\right).$$

$$= \frac{1}{2} E_{max}^2. \quad \therefore \langle u_E \rangle = \frac{1}{4}\varepsilon_0 E_{max}^2.$$

* Energy.

$$E = mc^2.$$

$$E^2 = p^2c^2 + m^2c^4.$$

For photon (light), $m = 0$.

$$E^2 = p^2c^2 \Rightarrow p = \frac{E}{c}.$$