Physics 8.03
Vibrations and Waves

Lecture 14
Dipole Radiation

Last time: polarization

- Components of E_0
- $E_{0x} = E_{0y}\, e^{j\phi}$
  - E_{0x} 🕐 E_{0y} and $\phi = \pm n\pi$ → linearly polarized
  - $E_{0x} = E_{0y}$ and $\phi = \pm n\pi/2$ → circularly polarized
  - E_{0x} 🕐 E_{0y} and ϕ 🕐 $\pm\ n\pi/2$ → elliptically polarized
- Energy carried by EM waves
  - Intensity → Poynting vector

- Polarizers, waveplates and all that
- Radiation pressure
  - Energy density
  - Flux
  - Momentum

$$U(\vec{r},t) = \frac{1}{2}\varepsilon_0 \vec{E}\cdot\vec{E} + \frac{1}{2\mu_0}\vec{B}\cdot\vec{B}$$

$$\vec{S}(\vec{r},t) = \frac{1}{\mu_0}\vec{E}\times\vec{B}$$

$$\vec{g}(\vec{r},t) = \frac{1}{c}\vec{S}$$

- Radiation from accelerating charges
  - Dipole approximation