Lecture 11 (2/11/05)

3. Radiation from moving charge (Jackson 14.1-14.3).

$$\vec{B} = [\vec{n} \times \vec{E}]_{ret}$$

$$\vec{E} = \frac{e}{4\pi}[\frac{\vec{n} - \vec{v}}{\gamma^2(1 - \vec{v} \cdot \vec{n})^3 R^2}]_{ret} + \frac{e}{4\pi}[\frac{\vec{n} \times \{(\vec{n} - \vec{v}) \times \dot{\vec{v}}\}}{(1 - \vec{v} \cdot \vec{n})^3 R}]_{ret}$$

$$\vec{n} \equiv \frac{\vec{x} - \vec{r}(\tau)}{|\vec{x} - \vec{r}(\tau)|}$$

$$\frac{dP(t_{ret})}{d\Omega}|_{far\ away} \approx \frac{e^2}{16\pi^2} \frac{|\vec{n} \times \{(\vec{n} - \vec{v}) \times \dot{\vec{v}}\}|^2}{(1 - \vec{n} \cdot \vec{v})^5}$$

$$\frac{dP}{d\Omega}|_{nonrelativistic} \approx \frac{e^2}{16\pi^2} \dot{\vec{v}}^2 \sin^2\theta$$

4. Centerfed Antenna (Jackson 9.4 A)

$$\langle \frac{dP}{d\Omega} \rangle_t = \frac{I^2}{8\pi^2} |\frac{\cos(\frac{kd}{2}\cos\theta) - \cos(\frac{kd}{2})}{\sin\theta}|^2$$