TFY 4240

Øving 13 2006

Problem 1

Start with Larmours formula

$$P = \frac{\mu_0 q^2 a^2}{6\pi c} = \frac{\mu_0 q^2}{6\pi c m^2}\left(\frac{d\overline{p}}{dt}\right)^2$$

and its realistic generalisation

$$P = \frac{\mu_0 q^2}{6\pi c m^2}\left(\frac{dp_\mu}{d\tau}\frac{dp^\mu}{d\tau}\right)$$

where the relativistic four vector has the components

$$\left(p^0, p^1, p^2, p^3\right) = \left(E/c, p_{x.} p_y, p_z\right)$$

and with $d\tau = dt/\gamma \;\; and \;\; \gamma = \frac{1}{\sqrt{1 - v^2/c^2}}$

$E = \gamma m c^2 \;\; and \;\; \overline{p} = \gamma m \overline{v}$

Show that the relativistic generalisation leads to the socalled Lienard result

$$P = \frac{\mu_0 q^2 c}{6\pi}\gamma^6\left(\dot{\beta}^2 - (\overline{\beta}\times\dot{\overline{\beta}})^2\right)$$

Problem 2

Problem 12.52 in Griffiths

Problem 3

Problem 12.53 in Griffiths

Problem 4

Problem 12.54 in Griffiths