$$\frac{dP(t')}{d\Omega} =$$

$$\frac{dt}{dt'} = \quad + \quad \frac{}{c}\frac{d}{dt'} R(t')$$

recall $\quad R = |\vec{x} - \vec{r}(t')|$

$$\frac{dt}{dt'} = (1 - \vec{\beta}\cdot\hat{n})$$

so $$\frac{dP(t')}{d\Omega} = \frac{e^2}{4\pi c}$$

Since most of radiation is in the forward direction, eff carries over to total energy as well as angular distribution linear motion $\qquad \vec{\beta} \parallel \dot{\vec{\beta}}$ $\qquad \vec{\beta}\cdot\hat{n} \equiv \cos\theta$

θ angle between vecto

+ tion

we've seen this in NR se

$$\frac{dP(t')}{d\Omega} = \frac{e^2\beta}{4\pi c} \frac{\sin^2\theta}{(1-\beta\cos\theta)^5} \qquad \frac{dP}{d\phi\, d\cos\theta}$$

for $\cos\theta_{max}$ or u_{max}

i.e. $$-\frac{2u}{(1-\beta u)^5} \qquad = 0$$

or $$\frac{1}{(1-\beta u)^6}\left\{ 2u(-\beta u)+5(1-u^2)\beta \right\} = 0$$

$$3\beta u^2 + 2u - 5\beta = 0$$

$$u_{max} = \frac{1}{3\beta}\left(-1 + \left(1 + 5\beta^2\right)^{1/2}\right)$$

$\beta \to 0$ $\quad u_{max} \longrightarrow 0$ $\quad \theta_{max} \simeq \pi/2$

$\beta \to$ $\quad$ write

$1 + \quad 1 + 1$

$$= \frac{}{3}\left(1 + \frac{1}{2\gamma^2}\right)\left(- \quad + 4\left(1 - \frac{5}{32\gamma^2}\right)\right)$$

$$= \left(1 + \frac{1}{2\gamma^2}\right)\left(1 - \frac{5}{8\gamma}\right) = 1 - \frac{1}{8\gamma^2} = \cos\theta_{max}$$

$$= - \frac{\theta_{max}^2}{2}$$

$\Longrightarrow$

γ^2

$$\frac{dP}{d\Omega}$$

$\gamma\theta \longrightarrow$

$\pi^0 \to \gamma + \gamma$

θ

π^0

$$E_\pi = 2E_\gamma$$

$$p_\pi = 2p_\gamma \cos\theta$$

$$\frac{c}{E_\pi} = \beta_\pi = \frac{2c\ \gamma\ \ s\theta}{E} =$$

$$\beta \simeq 1 - \frac{1}{2\gamma^2} = 1 - \frac{\theta^2}{2}$$

$$\Rightarrow \theta \simeq \frac{1}{\gamma}$$

$\vec{\beta}$

ϕ

x

again forward peaked (factors of $1 \quad \beta\cos\theta$)

$\bar{2}\gamma$ $\bar{2}\gamma$

2

Path d

ΔL

$t - t_1$

$$\frac{\rho}{2\gamma^3 c}$$

$$\omega_c = \frac{3}{2}\gamma^3 \frac{c}{\rho}$$

characteristic frequency for spec distribution

$\frac{1}{2}$

$$\frac{dW}{d\Omega} = \int_{-\infty}^{\infty} |\vec{A}(t)|\, dt$$

$$\vec{A}(t) = \left(\frac{}{2\pi}\right)^{1/2} \int_{-\infty}^{\infty} \vec{A}(\vec{\omega})\, e^{-i\omega t} \quad \omega$$

$\sim$

Par

$$\text{—} \int^{\infty} | \, d$$