HW 8 P.1

Sunday, March 7, 2021 2:34 PM

$$\frac{dP}{d\Omega} = \frac{e^2}{16\pi^2 c}\frac{1}{(1-\hat{n}\cdot\vec{\beta})^5}\left|\hat{n}\times\left((\hat{n}-\vec{\beta})\times\frac{d\vec{\beta}}{dt}\right)\right|^2\Bigg|_{ret}$$

i] $1-\hat{n}\cdot\vec{\beta}\simeq 1 \quad (\hat{n}-\vec{\beta})\times\frac{d\vec{\beta}}{dt} = \hat{n}\times\frac{d\vec{\beta}}{dt}$

$$\frac{dP}{d\Omega} = \frac{e^2}{16\pi^2 c}\left|\hat{n}\times\left(\hat{n}\times\frac{d\vec{\beta}}{dt}\right)\right|^2$$

$$= \frac{e^2}{16\pi^2 c}|\dot{\beta}|^2\sin^2\theta$$

ii] $$\int dP = \frac{e^2}{16\pi^2 c}|\dot{\beta}|^2\int\sin^2\theta\, d\Omega$$

$$P = \frac{e^2}{16\pi^2 c}|\dot{\beta}|^2\frac{2}{3} = \frac{e^2|\dot{\beta}|^2}{24\pi^2 c}$$