The pion decays into 2 gamma rays which must conserve momentum and energy. Assume that the photons are emitted along the direction of motion on the pion.

Energy Conservation

\[ E_{\pi} = E_1 + E_2 \]

Momentum Conservation

\[ p_\pi = p_1 \pm p_2 \]

The relativistic relation between energy and momentum gives:

\[ E_\pi^2 = (p_\pi c)^2 + (m_\pi c^2)^2 \]

\[ E_{1,2} = p_{1,2} c \]

Given \( p_\pi = 3/4 m_\pi c \) and solving the above equations one finds that

\[ E_1 = m_\pi c^2 \text{ and } E_2 = m_\pi c^2/4 \]

For uniform acceleration, the force, \( F \), is obtained from, \( \frac{d(\beta \gamma mc)}{dt} \). Integrate this to obtain \( \beta \) and then integrate \( \beta \) to obtain the position as a function of time.

\[ (x - x_0) = \frac{mc^2}{F} \sqrt{1 + \left( \frac{F_1}{mc} \right)^2} - 1]. \]

The photon travels as \( x = ct \). The distance between the positions of the person and the light cone for large \( t \) is \( \frac{mc^2}{F} \), so if \( x_0 \geq \frac{mc^2}{F} \), the light will never reach the person.
The electric field of a moving charge is

$$\vec{E} = \frac{1}{4\pi\epsilon} \frac{q[1 - \beta^2]}{[1 - \beta^2 \sin^2(\theta)]^{3/2}} \frac{\hat{r}}{r^2}$$

Integrate this to get the flux out of a spherical surface.

$$\oint \vec{E} \cdot d\vec{a} = \oint Er^2 \sin(\theta) d\theta d\phi$$

This integrates to \(q/\epsilon_0\)

The charge is moving so a magnetic field is produced. This obtained by a field transformation from the static electric field at rest.
\[ \vec{B} = \frac{\mu_0}{4\pi} q \frac{[1 - \beta^2] \sin(\theta)}{[1 - \beta^2 \sin^2(\theta)]^{3/2}} \hat{\phi} \]

The Poynting vector is \( \vec{S} = \vec{E} \times \vec{H} \) with \( B = \mu H \). Substitute to obtain;

\[ \vec{S} = -\frac{cq^2}{16\pi^2 \epsilon_0} \frac{[1 - beta^2]^2 \beta \sin(\theta)}{r^4[1 - beta^2 \sin^2(\theta)]^{3/2}} \hat{\theta} \]

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This problem requires matrix multiplication of the Field tensors \( \mathcal{F} \) and \( \mathcal{G} \). \[ \sum F^{ij} F_{ij} = 2[B^2 - (E/c)^2] \]
\[ \sum G_{ij} G_{ij} = -2[B^2 - (E/c)^2] \]
\[ \sum F^{ij} G_{ij} = -(4/c) \vec{E} \cdot \vec{B} \]