Derivacion Ecuacion de Einstein

Saturday, October 17, 2020 3:12 AM

$$k = \int \frac{dP}{dt} dx \qquad p = \frac{m_0 v}{(1-\beta^2)} \frac{1}{2}.$$

$$k = \int_{6}^{A} \frac{dp}{dt} dx \quad \Big| \quad P = \gamma m_0 V$$

¿Que es que?

$$\gamma = (1-\beta^2)^{-1/2} \quad ; \beta = \frac{v}{c}$$

Idea

$$\frac{dp}{dt} dx = \frac{dx}{dt} dp = v\, dp \quad ; \quad \frac{dp}{dv} = f \;\Big\{\; dp = f\, dv \;\Big\} \int_0^{v_f} f\, v\, dv$$

¿Que es f?

$$\frac{dp}{dv} = \gamma m_0 (v)' + v m_0 (\gamma')$$

Calulacen la next page

Derivar gamma

Saturday, October 17, 2020 3:18 AM

$\gamma = (1-\beta^2)^{-1/2}$; $\beta = \frac{v}{c}$ $\left\{ \frac{d\gamma}{dv} = -\frac{1}{2}(1-\beta)^{-\frac{1}{2}-1} \cdot (1-\beta^2)' = -\frac{1}{2(1-\beta^2)^{3/2}} \cdot (-2\beta)\gamma' \right.$

$\gamma' = \beta'$

$\triangleright \frac{d\gamma}{dv} = \frac{\beta \frac{1}{c}}{(1-\beta^2)^{3/2}}$ $\therefore \frac{dp}{dv} = m_0\gamma + m_0 v \frac{v/c^2}{(1-\beta^2)^{3/2}} = m_0 \gamma \left(1 + \frac{\beta^2}{(1-\beta^2)}\right)$

$\frac{\beta}{c} = \frac{v}{c^2}$

$\frac{1}{(1-\beta^2)^{1/2}}$

$v \cdot \frac{v}{c^2} = \frac{v^2}{c^2} = \beta^2$

$\triangleright \frac{dp}{dv} = m_0\gamma\left(\frac{1-\beta^2+\beta^2}{1-\beta^2}\right) = m_0\gamma\left(\frac{1}{1-\beta^2}\right) \Rightarrow dp = \frac{m_0\, dv}{(1-\beta^2)^{3/2}} = f\, dv$

reemplazando en la integral

$K = \int \frac{m_0 v \quad dv}{(1-\beta^2)^{3/2}}$ $\left| \begin{array}{l} \frac{v}{c} = \beta \\ dv = c\, d\beta \end{array} \right\} = m_0 \int \frac{c^2 \beta}{(1-\beta^2)^{3/2}}$

Parte 3

Saturday, October 17, 2020 3:31 AM

$\beta_f = \frac{V_f}{c}$

$$K = m_0 \int_0^{\beta_f} \frac{c^2 \beta}{(1-\beta^2)^{3/2}}$$

sabemos que lo internos en la integral vino de una derivada

$\frac{d\beta}{dv}$

$\int \frac{\cdot}{\cdot} = d\_$

Podemos notar

$$\frac{d}{d\beta}\left[\frac{1}{(1-\beta^2)^{1/2}}\right] = \frac{-1}{2}\left(1-\beta^2\right)^{-3/2} \cdot (-2\beta) = \frac{\beta}{(1-\beta^2)^{3/2}}$$

$$\int \frac{d}{d\beta}[\gamma]\, d\beta = \int \frac{\beta}{(1-\beta^2)^{3/2}}\, d\beta = \int_0^{V_f} d\gamma = \frac{1}{\left(1-\frac{V^2}{c^2}\right)^{1/2}}\Bigg|_0^{V_f}$$

Se aplica cierre de iguales extremo

$$K = m_0 c^2 \int \frac{\beta}{(1-\beta^2)^{3/2}} d\beta = m_0 c^2 \left[\frac{1}{\left(1-\frac{V_f^2}{c^2}\right)^{1/2}} - \frac{1}{(1-0)^{1/2}}\right] \Bigg| //\ \cdot\overline{\cdot\cdot}$$

$$K = m_0 c^2 \gamma - \underbrace{m_0 c^2}$$

lo llamamos $E_0 = m_0 c^2$

$$\boxed{K = E - E_0} \rightarrow E = K + E_0$$