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Fields and Particles

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Abstract **Original Research Article**

The all moving substances in the universe have momentum and energy.

Keywords: Mass, Momentum, Energy.

Preface

Mass, momentum and energy have been equated by using quantum right – angled triangles. These quantum right – angled triangles are like down

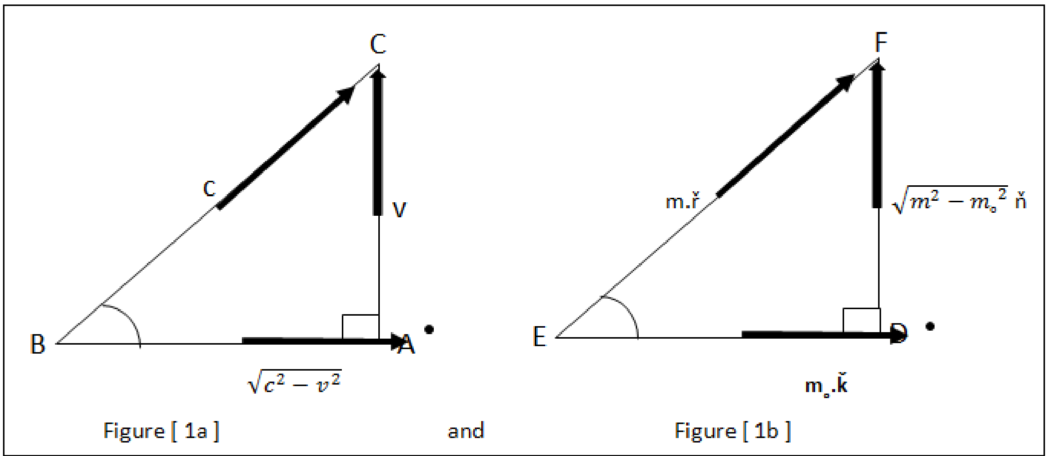

Figure [1a] and Figure [1b]

c : the speed of light , v : the speed of tardyon

Momentum and Energy

For the tardyon : v < c and hence the tardyons have nonzero mass and the speed is lower than the speed of light. According to figure [1a] and [1b]

$sin^2(2\alpha) + cos^2(2\alpha) = 1$ [1]
$(1)\ (2\alpha) = 2\ sin\ \alpha.\ cos\ \alpha$ [2]
$(2)\ (2\alpha) = cos^2\alpha - sin^2\alpha$ [3]
$sin\ \alpha = v / c$ and $cos\ \alpha = m_{\circ}.\hat{k} / m.\hat{r}$ [4]
We have found as bellow by using equation [1]
$m_{\circ}2 / m2 + v\ 2 / c\ 2 = \pm 1$ [5]

We can write momentum and energy equations as follows

$F = m.a$ [6]
$F = m.\triangle v / \triangle t$ [7]
$F.\triangle t = m.\triangle v$ [8]
$dp = mdv$ [9]

$$p = \int m\,(v).dv \qquad [\,10\,]$$

$$p = \int m_o.c.\frac{dv}{\sqrt{c^2 - v^2}} = \int m_o.c.d\alpha \qquad [\,11\,]$$

$$p = m_o.c.\alpha = m_o.c.arc\sin\left(\frac{v}{c}\right) \qquad [\,12\,]$$

Has been found. This equation is momentum for tardyon. Energy for tardyon can be calculated as follows

$$\Delta E = h.\Delta f = \Delta m.c2 \qquad [\,13\,]$$

f: frequency

$$\int dE = \int h.df = \int dm.c^2 \qquad [\,14\,]$$

$$E = \int h.df = c^2 \int dm \qquad [\,15\,]$$

$$c = \lambda.f \qquad [\,16\,]$$

$$\int h.df = \int \lambda^2.f^2.dm \qquad [\,17\,]$$

$$\lambda = \frac{h}{m.v} \qquad [\,18\,]$$

Let's solve all of these and we can calculate , it has been found as below

$$In\left|\frac{m_o + m}{m_o - m}\right| = \frac{2m_o}{m} = \frac{2E_o}{E} \qquad [\,19\,]$$

Quantum Probability State for momentum and energy

Tardyons have velocity less than [c] . The real and imaginary masses of tardyons combine to form a total mass.

$m_{total} = m_{real} + m_{imaginary}$ [20]

$$Tardyons : v \ < c \rightarrow m_{total} = \frac{m_0}{\sqrt{1-v^2/c^2}} + i\frac{m_0}{\sqrt{1+v^2/c^2}}$$ [21]

$p = m\ total * \ v$ and $E = m\ total * \ c2$ [22]

Hence ,

$$P = \frac{m_0.V}{\sqrt{1-v^2/c^2}} + i\frac{m_0.V}{\sqrt{1+v^2/c^2}}$$ and [23]

$$E = \frac{m_0.c^2}{\sqrt{1-v^2/c^2}} + i\frac{m_0.c^2}{\sqrt{1+v^2/c^2}}$$ [24]

For this , we would multiply [p] and [E] by the conjugate of [p] and [E] .

$$\left[\frac{m_0.V}{\sqrt{1-v^2/c^2}} + i\frac{m_0.V}{\sqrt{1+v^2/c^2}}\right] . \left[\frac{m_0.V}{\sqrt{1-v^2/c^2}} - i\frac{m_0.V}{\sqrt{1+v^2/c^2}}\right]$$ [25]

$$= \frac{2m_0^2\ .V^2}{1-(v^2/c^2)^2} = \frac{2.p_0^2}{1-(v^2/c^2)^2}$$ [26]

And in the energy of the tardyon we would have

$$\left[\frac{m_0.c^2}{\sqrt{1-v^2/c^2}} + i\frac{m_0.c^2}{\sqrt{1+v^2/c^2}}\right] . \left[\frac{m_0.c^2}{\sqrt{1-v^2/c^2}} - i\frac{m_0.c^2}{\sqrt{1+v^2/c^2}}\right]$$ [27]

$$= \frac{2m_0^2.c^4}{1-(v^2/c^2)^2} = \frac{2.E_0^2}{1-(v^2/c^2)^2}$$ [28]

All of these are quantum probability state for momentum and energy

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