Explaining how and why the muon neutrinos flow faster than the speed of light in the OPERA neutrino Experiment

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Abstract

In this paper an attempt is made to explain how and why the muon neutrinos flow faster than the speed of light in the OPERA neutrino experiment by using the theory of quantized space and time and internal structure of elementary particles derived from a new model of mine [1]. Also this paper shows that:

1-This motion is achieved by two velocities. The first is a speed of $v = (c - \delta)$

in the time and length quanta. Then there is a velocity greater than that of light in the super dimension.

2-In these tests, muon neutrinos move with a velocity

$$\frac{v-c}{c} = (2.48 \pm 0.28(stat) \pm 0.3(sys)) \times 10^{-5}.$$

Only 23.98 m of this happens in the super dimension [2].

Key words: moton, neutrino, length quanta, time quanta, relativity

Introduction:

On the basis of quantized space- time theory, neutrinos consist of some motons whose mass is less than the minimum amount for energy radiation and charge production. If the mass of the moton of the electron neutrino is considered as fundamental, then by dividing the mass ν_{τ} and ν_{μ} by it, the number of motons of each particle will be obtained. By using this number we can understand that the energy of the neutrino's moton is less than the energy of the electron's moton.

$$p_{\max.\min} = \frac{h\sqrt{1-\frac{{v_{\max}}^2}{c^2}}}{l_0\sqrt{1-\frac{v^2}{c^2}}} \qquad (1) \qquad [1]$$

$$E_{\nu} \prec E_{\min.\max} = \frac{p_{\max}c^2}{v} \qquad (2) \qquad [1]$$

This formula gives the energy of each moton as a gauge. The energy of motons at any speed up to the maximum speed is a specific gauge. The energy of the neutrino's motons at each speed is less than this gauge, so their active mass is zero, and then their charge is zero.

This equation shows that, although the speed of neutrinos increases, their energy radiation remains zero.

$$q = \frac{\sqrt{8\pi\varepsilon_0 m_{activ} c^2 l_0}}{\sqrt[4]{1-\frac{v^2}{c^2}}}C = \frac{0}{\sqrt[4]{1-\frac{v^2}{c^2}}}C \qquad (3) \qquad [1]$$

There is another thing in equations 1, 2; that is speed limitation. (The maximum speed of an electron is equal to $V_{\max electron} = 299792407 m/s$)[1].The maximum speed of neutrinos in time and length quanta is equal to $V_{\max.\nu} = (c-\delta)$. If neutrinos get more energy, on the de Broglie assumption $\lambda = \frac{h}{mv}$, their wavelength will be less than the length quanta, but this impossible. Therefore, neutrinos cannot transfer the additional energy. They also cannot radiate the energy like the other charged particles (electrons), so the only solution is transferring this energy through the super dimension.

Until the speed is less than $V_{\max.\nu} = (c-\delta)$ the super-dimension separates the end and the beginning of the time and length quanta. But when there is additional energy which cannot be transferred by the time and length quanta gauges, then the super-dimension in addition to separating the time and length quanta, makes a distance by the type of super-dimension between the time and length quanta.

Super-dimension is one of the physics' dimensions, which is too condensed in low energies but it appears in high energies.

1-Range of relativity:

Relativity theory was based on the assumption that the maximum speed of particles is the speed of light. But the neutrinos of muons fly faster than the speed of light. At first it seems that relativity has collapsed, but it is not true. Actually the range of the rules of relativity is limited. There is something in relativity which has been ignored and that is the infinities in special relativity. The cause of these infinities is not considering the maximum speed of massive particles. The maximum speed of electron, positron, and proton… is equal to $V_{\max} = 299792407 m/s$.

The maximum speed of neutrinos in time and length quanta is $V_{\max.\nu} = (c-\delta)$.

This limit of speed saves us from the infinities in special relativity. In other words because the time and length are quantized, particles' wavelengths cannot be shorter than length quanta. So the infinities do not occur.

The neutrino follows relativity till this limit of speed and after that, because it cannot radiate its additional energy, uses the super dimension for its movement. In other words the major part of the neutrino's movement is done under relativity rules and the other part is performed through the super dimension.

In the $V_{\max.\nu} = (c-\delta)$ equation the amount of δ should be something that makes the Lorentz coefficient as following:

$$\gamma \equiv \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = z \cdot 441002081 \qquad (4)$$

z:the number of motons of a neutrino

Up to this speed, the wavelength of the muon's neutrino is not shorter than length the quanta so the motion can be followed in the time and length quanta, and by passing this speed the motion should be performed through the super-dimension.

The threshold energy of using the super-dimension by neutrinos with 2ev mass is:

$E_1 = 0.88Gev \times z$ *z: the number of motons of a neutrino*

3-The quantized model of a neutrino:

By using the mass formula the minimum mass of an electron neutrino can be obtained.

$$\left|\overrightarrow{m_{\nu^-}}\right| = X.\frac{c^2}{\pi}\cdot\left|\overrightarrow{\Delta T_{n-1}}\right|.\left|\overrightarrow{\Delta T_n}\right|\cdot Sin\delta^\circ \qquad (5) \qquad [1]$$

the mass of the electron anti neutrino ν_e is equal to:

$$\left|\overrightarrow{m_\nu^{\,+}}\right| = X \cdot \frac{c^2}{\pi} \cdot \left|\overrightarrow{\Delta T_{n+1}}\right| \cdot \left|\overrightarrow{\Delta T_n}\right| \cdot \left|Sin - \delta^\circ\right| \qquad (6) \quad [1]$$

On the basis of dimensional matrix model, until the speed of the neutrino is less than the $V_{\max.\nu} = (c-\delta)$ the dimensional matrix of the neutrino is:

$$\begin{pmatrix} \overrightarrow{\Delta T_1} & \overrightarrow{l_m} & \overrightarrow{m_1} \\ \overrightarrow{\Delta T_2} & \overrightarrow{l_{m-1}} & \overrightarrow{E_1} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\nu 1}}} \begin{pmatrix} \overrightarrow{\Delta T_2} & \overrightarrow{l_{m-1}} & \overrightarrow{m_2} \\ \overrightarrow{\Delta T_3} & \overrightarrow{l_{m-2}} & \overrightarrow{E_2} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\nu 2}}}, \ldots \begin{pmatrix} \overrightarrow{\Delta T_{m-1}} & \overrightarrow{l_2} & \overrightarrow{m_{m-1}} \\ \overrightarrow{\Delta T_m} & \overrightarrow{l_1} & \overrightarrow{E_{m-1}} \end{pmatrix} \qquad (7) \quad [1]$$

$\begin{pmatrix} \overrightarrow{\Delta T_1} & \overrightarrow{l_m} & \overrightarrow{m_1} \\ \overrightarrow{\Delta T_2} & \overrightarrow{l_{m-1}} & \overrightarrow{E_1} \end{pmatrix}$: First dimensional matrix of a neutrino (First basic matrix)

$\begin{pmatrix} \overrightarrow{\Delta T_2} & \overrightarrow{l_{m-1}} & \overrightarrow{m_2} \\ \overrightarrow{\Delta T_3} & \overrightarrow{l_{m-2}} & \overrightarrow{E_2} \end{pmatrix}$: Second dimensional matrix of a neutrino (Second basic matrix)

$\begin{pmatrix} \overrightarrow{\Delta T_{m-1}} & \overrightarrow{l_2} & \overrightarrow{m_{m-1}} \\ \overrightarrow{\Delta T_m} & \overrightarrow{l_1} & \overrightarrow{E_{m-1}} \end{pmatrix}$: The last dimensional matrix.

$\overrightarrow{m_n}$ *:* The mass of time-length sequences, n= (1, 2…m)

$\overrightarrow{E_n}$ *:* The energy of time-length sequences, n= (1, 2…m)

The neutrino matrix with negative spin is given by:

$$\begin{pmatrix} \overrightarrow{\Delta T_1} & \overrightarrow{l_m} & \overrightarrow{m_1} \\ \overrightarrow{\Delta T_2} & \overrightarrow{l_{m-1}} & \overrightarrow{E_1} \end{pmatrix} \xrightarrow{\overrightarrow{S'_\nu}} \begin{pmatrix} \overrightarrow{\Delta T_1} & \overrightarrow{l_{m-1}} & \overrightarrow{m_2} \\ \overrightarrow{\Delta T_3} & \overrightarrow{l_{m-2}} & \overrightarrow{E_2} \end{pmatrix} \xrightarrow{\overrightarrow{S'_\nu}}, \ldots \qquad (8) \quad [1]$$

The matrix of the electron anti neutrino with negative spin angular momentum

$$\begin{pmatrix} \frac{\overrightarrow{\Delta T_m}}{\overrightarrow{\Delta T_{m-1}}} & \frac{\overrightarrow{l_m}}{\overrightarrow{l_{m-1}}} & \frac{\overrightarrow{m_m}}{\overrightarrow{E_m}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\bar{\nu}1}}} \begin{pmatrix} \frac{\overrightarrow{\Delta T_{m-1}}}{\overrightarrow{\Delta T_{m-2}}} & \frac{\overrightarrow{l_{m-1}}}{\overrightarrow{l_{m-2}}} & \frac{\overrightarrow{m_{m-1}}}{\overrightarrow{E_{m-1}}} \end{pmatrix} \longrightarrow ,\ldots \qquad (9) \qquad [1]$$

The dimensional matrix of the electron neutrino with a speed of more than $V_{\max.\nu} = (c-\delta)$ is:

$$\begin{pmatrix} \frac{\overrightarrow{\Delta T_1}}{\overrightarrow{\Delta T_2}} & \frac{\overrightarrow{l_m}}{\overrightarrow{l_{m-1}}} & \frac{\overrightarrow{m_1}}{\overrightarrow{E_1}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\nu 1}}} \xrightarrow{[\Delta t_{1s} \quad \Delta l_{1s} \quad \Delta m_{1s} \quad \Delta E_{1s}]} \begin{pmatrix} \frac{\overrightarrow{\Delta T_2}}{\overrightarrow{\Delta T_3}} & \frac{\overrightarrow{l_{m-1}}}{\overrightarrow{l_{m-2}}} & \frac{\overrightarrow{m_2}}{\overrightarrow{E_2}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\nu 2}}} \xrightarrow{[\Delta t_{2s} \quad \Delta l_{2s} \quad \Delta m_{2s} \quad \Delta E_{2s}]} ,\ldots$$

(10)

In this model, Δt_s represents the time during which the neutrino travels through the super-dimension. This time is equivalent in terms of time quanta.

In this model, Δl_s represents the length which is traveled by the neutrino in the super-dimension. This length is equivalent in terms of length quanta.

In this model, Δm_s represents the mass which is transferred by the neutrino in the super-dimension. This mass is equivalent in terms of the mass of the neutrino.

4-1:Dimensional matrix of the muon neutrino:

By knowing the mass of the electron neutrino and the muon neutrino, the number of motons of the muon neutrino will be obtained.

$$N_{moton\,\mu} = \frac{M_{\nu\mu}}{M_{\nu e}} = z \qquad (11)$$

By having the number of motons the dimensional matrix of ν_{μ} can be obtained.

Each two lines represent one moton.

The dimensional matrix of the muon neutrino with a velocity more than light speed is:

$$\nu_{\mu}: \begin{pmatrix} \overrightarrow{\Delta T_{1_{11}}} & \overrightarrow{l_{m_{12}}} & \overrightarrow{m_{1_{13}}} \\ \overrightarrow{\Delta T_{2_{21}}} & \overrightarrow{l_{m-1_{22}}} & \overrightarrow{E_{1_{23}}} \\ . & . & . \\ . & . & . \\ . & . & . \\ \overrightarrow{\Delta T_{1.2z}} & \overrightarrow{l_{m.2z}} & \overrightarrow{m_{1.2z}} \\ \overrightarrow{\Delta T_{2.2z}} & \overrightarrow{l_{m-1.2z}} & \overrightarrow{E_{1.2z}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{\nu 1}}} \xrightarrow{[\Delta t_{1s} \quad \Delta l_{1s} \quad \Delta m_{1s} \quad \Delta E_{1s}]} \begin{pmatrix} \overrightarrow{\Delta T_{2_{11}}} & \overrightarrow{l_{m-1_{12}}} & \overrightarrow{m_{2_{13}}} \\ \overrightarrow{\Delta T_{3_{21}}} & \overrightarrow{l_{m-2_{22}}} & \overrightarrow{E_{2_{23}}} \\ . & . & . \\ . & . & . \\ . & . & . \\ \overrightarrow{\Delta T_{2.2z}} & \overrightarrow{l_{m-1.2z}} & \overrightarrow{m_{2.2z}} \\ \overrightarrow{\Delta T_{3.2z}} & \overrightarrow{l_{m-2.2z}} & \overrightarrow{E_{2.2z}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{w}}} \longrightarrow$$

(12)

4-2:Dimensional matrix of ν_{τ} :

By knowing the mass of the electron neutrino and ν_{τ} neutrino, the number of motons of ν_{τ} can be obtained.

$$N_{moton\,\tau} = \frac{M_{\nu\tau}}{M_{\nu e}} = y \qquad (13)$$

By having the number of motons the dimensional matrix of ν_τ can be obtained.

Each two lines represent one moton.

The dimensional matrix of ν_τ with a velocity more than light speed is:

$$\nu_\tau : \begin{pmatrix} \overrightarrow{\Delta T_{1_{11}}} & \overrightarrow{l_{m_{12}}} & \overrightarrow{m_{1_{13}}} \\ \overrightarrow{\Delta T_{2_{21}}} & \overrightarrow{l_{m-1_{22}}} & \overrightarrow{E_{1_{23}}} \\ . & . & . \\ . & . & . \\ . & . & . \\ \overrightarrow{\Delta T_{1.2y}} & \overrightarrow{l_{m.2y}} & \overrightarrow{m_{1.2y}} \\ \overrightarrow{\Delta T_{2.2y}} & \overrightarrow{l_{m-1.2y}} & \overrightarrow{E_{1.2y}} \end{pmatrix} \xrightarrow{\overrightarrow{S_{v1}}} \xrightarrow{[\Delta t_{1s} \quad \Delta l_{1s} \quad \Delta m_{1s} \quad \Delta E_{1s}]} \begin{pmatrix} \overrightarrow{\Delta T_{2_{11}}} & \overrightarrow{l_{m-1_{12}}} & \overrightarrow{m_{2_{13}}} \\ \overrightarrow{\Delta T_{3_{21}}} & \overrightarrow{l_{m-2._{22}}} & \overrightarrow{E_{2_{23}}} \\ . & . & . \\ . & . & . \\ . & . & . \\ \overrightarrow{\Delta T_{2.2y}} & \overrightarrow{l_{m-1.2y}} & \overrightarrow{m_{2.2y}} \\ \overrightarrow{\Delta T_{3.2y}} & \overrightarrow{l_{m-2.2y}} & \overrightarrow{E_{2.2y}} \end{pmatrix} \xrightarrow{\overrightarrow{S_w}} \longrightarrow$$

(14)

5-Equivalent length which is travelled by neutrinos in the super-dimension:

The equation of the speed of neutrinos in the OPERA test is:

$$\frac{v-c}{c} = (2.48 \pm 0.28(stat) \pm 0.3(sys)) \times 10^{-5}$$

(15) [2]

By using this formula, and by considering the maximum speed, we can calculate the travelled path by muon neutrinos in the super-dimension.

$$V_{\max s} = 299801631 m/s$$

V_s: The maximum speed in time and length quanta in addition to equivalent speed in the super-dimension

$$v = (c - \delta) \cong c \qquad (16)$$

v : The maximum speed in time and length quanta

$L = 730000m$

$T_1 = 2.43494^{-3}$: Time required to route rapidly than the speed of light

$T_{\max} = 2.43502 \times 10^{-3}$: Time required to route by maximum speed in time and length quanta

$\Delta T_{\max - s} = 8 \times 10^{-8}$

$$\Delta L = V_{\max} \times \Delta T_{\max - s} = 299792458 \times 8 \times 10^{-8} = 23.98m \qquad (17)$$

ΔL : Length traveled by neutrino in super-dimension

$$nl_0 = n\Delta T_0 = \frac{L - \Delta L}{l_0} = \frac{730000 - 23.98}{1.409 \times 10^{-15}} = 5.181 \times 10^{20} \qquad (18)$$

$$\Delta t_s = \frac{8 \times 10^{-8}}{5.1799 \times 10^{20}} = 1.544 \times 10^{-28} s \qquad (19)$$

Δt_s : The equivalent time that is added to each time quanta from super-dimension

$$\Delta l_s = \frac{23.98}{5.181\times 10^{20}} = 4.63\times 10^{-20}\,m \tag{20}$$

Δl_s : The equivalent length which is added to each length quanta from super-dimension

6-Obtaining the super-dimension function:

Doing more tests and statistical analysis can help us to get suitable facts to obtain the super-dimension function. But, as a first step, we can say that the range and domain of its function is as follows:

$$F(\Delta t_s, \Delta l_s, \Delta m_s) = \Delta E_s \tag{21}$$

$$\Delta E_s = E_\nu - \frac{E_{\nu 0}}{\sqrt{1-\frac{v^2{}_{\max.\nu}}{c^2}}} \tag{22}$$

ΔE_s :Equivalent additional energy which transferred by muon neutrinos in super-dimension

Δl_s :Equivalent length in super-dimension

Δt_s :Equivalent time in super-dimension

Δm_s :Equivalent additional mass transferred in super-dimension

7-Conclusion:

1-The OPERA test shows that the time and length are quantized. To avoid the wave length being smaller than the length quanta, neutrinos use an additional dimension for their travel.

2-This test shows that, there is a limitation for the speed of elementary particles in time and length quanta. This limit of speed is protected by the relativistic charge law. Because the neutrino's particles are not charged, they cannot radiate their additional energy on the basis of charge formula, so to transfer their additional energy, they use a super-dimension. Besides this is another proof for the limit of speed and relativistic charge law in the time and length quanta.

3-This test shows there is a super-dimension; otherwise relativity will collapse. Relativity is true for the particles which are equal or heavier than the electron up to the speed v=299792407m/s. Also it is true for neutrinos up to the velocity $V_{\max.\nu} = (c-\delta)$.

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