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Dynamic Universe Model solves "Faster than Light Neutrinos" riddle.

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Abstract:

There are many instances that reported Superluminal neutrinos. Dynamic Universe Model explains the how and why of "Faster than Light Neutrinos" without any modification in its theory. Various instances like Astronomical jets, Gravitational catapult, MINOS experiment and Fermilab1979 in particle experiments and supernova SN1987A and Gamma Ray Bursts (GRBs) in astronomy Neutrinos travelling faster than speed of light were recorded. There were 76 theoretical experiments conducted and their results are reported in this paper. These experiments were done between 2009 to 2011. Dynamic Universe Model theory was tested in explaining many anomalies in Physics. Dynamic Universe Model's many predictions came true.

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Key words
Dynamic universe Model; SITA programming; Micro particle world; VLBI Very Long Baseline Interferometry; Gravitational Bending: PPN formulations; Faster than light neutrinos; Super luminous neutrinos;

1. Introduction:

"Faster than Light Neutrinos" were observed in Dynamic Universe Model while working with VLBI papers in 2008 or so. That time no further work was done on this front. Now the earlier work was dug-up again for the theoretical evidences after seeing many observational reports of faster than light (or super luminal) neutrinos. The output graphs of all the cases of these 76 different situations were presented in Table 4. Two typical Graphs were presented in the paper where super luminal neutrinos are seen. It can be said that the SITA calculation methods of Dynamic Universe Model can be used without any modifications for explaining "Faster than Light Neutrinos" There are many experimental verifications, astronomical observations and news items supporting "Faster than light neutrinos" in the literature. There are some which are against. I am not discussing many of them

1.1. Astronomical jets,
In January 1999, John Biretta[1] reported HUBBLE DETECTS FASTER-THAN-LIGHT MOTION IN GALAXY M87. They found clouds which appear to move many times faster than the speed of light, shooting out from the Galaxy center region of the M87 galaxy.

1.2. MINOS experiment

Autiero of OPERA experiment realized that the same equipment of OPERA can be used for measuring speed of neutrinos and worked out the MINOS experiment . First he published results in 2011[2] later this result was contradicted by OPERA director in 2012, and said neutrinos are travelling at the velocity of light.

1.3. Fermilab1979 particle experiments
Zhe Chang, Xin Li, and Sai Wang from Institute of High Energy Physics, China confirmed "superluminal speed formula is consistent with data of OPERA, MINOS and Fermilab-1979 neutrino experiments as well as observations on neutrinos from SN1987a [3]

1.4. Neutrinos from Supernova SN1987A

Arnett, W.D. et al. (1989) [4] and Nomoto [5] et al (1987) found that the neutrinos emitted from this Supernova explosion reached earth 3hours earlier than the light. This Supernova was at a distance of 168 kLy. Here the assumption is that the neutrinos and the light were released simultaneously from the explosion of SN1987A and the produced neutrinos arrived few hours earlier.

1.5. Gamma Ray Bursts (GRBs) in astronomy

Katsuaki Asano of Japan and Kohta Murase of USA [6] said about EeV Neutrinos in the Afterglow Phase that they have experienced about the relativistic shock often becomes superluminal in 2015.

2. Applying Dynamic Universe Model:

Dynamic Universe model can calculate the simultaneous gravitational effect of many gravitating bodies like Sun, planets, local stars etc., while considering their dynamic movements. For this purpose, the original mathematical background of Dynamic Universe Model was extended into micro world about 10 years back. SITA programming was used in this case, for doing so, we will take the setup of solar system as on 01.01.2000@00.00:00 hrs using Helio centric ecliptic xyz values and try sending the neutrino from different directions i.e., in different solar elongation angle Φmin and trace the path of neutrino. I took 76 different xyz coordinates and different directions for neutrinos with the same status of solar system as on 01.01.2000@00.00:00 hrs. The only change from experiment to experiment is the initial position and direction the neutrino. All these theoretical experiments were designed in such a way, the neutrino goes grazingly near Sun or at the minimum distance from the centre of Sun at the moment of time as on 01.01.2000@00.00:00 hrs precisely. taking into account all the dynamic movements of planets and the their gravitational fields on the fast moving neutrino. Each of these computationally intensive theoretical experiments took a time 15 min at the lowest to 24 hours at the highest, on a recent HP Laptop, depending on the number of iterations. Now let us see what Dynamic Universe Model of Cosmology is…

Dynamic Universe Model explains reason behind such variations. General Relativistic Bending depends on the mass and radius of Sun or the main gravitating body only. Whereas Dynamic Universe Model considers Gravitational effect Sun, Planets, Globular clusters, Milky-way, Local systems etc., and finds the Universal gravitational force vector at that instant of time for that configuration of the Universe.

This new type of Mathematics is different from earlier Newtonian two body problem that used differential equations and Einstein's general theory of relativity that used tensors which in turn unwrap into differential equations. This new Math approach was presented as an invited talk in Conference on “Emerging Areas in Pure & Applied Mathematics” [17]. This Dynamic Universe Model approach solves many unsolved problems like…

1. Galaxy Disk formation using Dynamic Universe Model (Dense mass) Equations
2. Solution to Missing mass in Galaxies: It proves that there is no missing mass in Galaxy due to circular velocity curves
3. Explains gravity disturbances like Pioneer anomaly, etc.
4. Non-collapsing Large scale mass structures formed when non-uniform density distributions of masses were used
5. Offers Singularity free solutions.
6. Non- collapsing Galaxy structures
7. Solving Missing mass in Galaxies, and it finds reason for Galaxy circular velocity curves….
8. Blue shifted and red shifted Galaxies co-existence…
9. Explains the force behind expansion of universe.
10. Explains the large voids and non-uniform matter densities.
11. Predicts the trajectory of New Horizons satellite.
12. Withstands 10^5 (One Hundred Thousand) times the Normal Jeans swindle test
13. Explaining the Pioneer Anomaly
14. Explaining the formation of Astronomical jets
15. Explaining the high velocities in Astronomical Jets
16. Prediction of “No-dark” matter proved experimentally
17. Near light velocities in Astronomical jets
18. Prediction of Blue shifted Galaxies came true
19. Explaining VLBI (Very long Baseline Interferometry)

20. Energy to mass conversion
21. Explaining super luminal neutrinos
Etc…

Only differences used between the various simulations are in the initial values & the time steps. The structure of masses is different. In the first 2 cases, approximate values of masses and distances were used. In the third and fourth case, real values of masses and distances for a close approximation were used.

Dynamic universe model is different from Newtonian static model, Einstein's Special & General theories of Relativity, Hoyle's Steady state theory, MOND, M-theory & String theories or any of the Unified field theories. It is basically computationally intensive real observational data based theoretical system. It is based on non-uniform densities of matter distribution in space. There is no space time continuum. It uses the fact that mass of moon is different to that of a Galaxy. No negative time. No singularity of any kind. No divide by zero error in any computation/ calculation till today. No black holes, No Bigbang or no many minute Bigbangs. All real numbers are used with no imaginary number. Geometry is in Euclidian space. Some of its earlier results are non-collapsing, non-symmetric mass distributions. It proves that there is no missing mass in Galaxy due to circular velocity curves. It is single closed Universe model. **Today we are presenting the results of theoretical experiments conducted 7 years back.**

Our universe is not a Newtonian type static universe. There is no Big bang singularity, so the question "What happened before Big bang?" does not arise. Ours is neither an expanding nor contracting universe. It is not infinite but it is a closed finite universe. Our universe is neither isotropic nor homogeneous. It is LUMPY. But it is not empty. It may not hold an infinite sink at the infinity to hold all the energy that is escaped. This is closed universe and no energy will go out of it. Ours is not a steady state universe in the sense, it does not require matter generation through empty spaces. No starting point of time is required. Time and spatial coordinates can be chosen as required. No imaginary time, perpendicular to normal time axis, is required. No baby universes, black holes or warm holes were built in.

This universe exists now in the present state, it existed earlier, and it will continue to exist in future also in a similar way. All physical laws will work at any time and at any place. Evidences for the three dimensional rotations or the dynamism of the universe can be seen in the streaming motions of local group and local cluster. Here in this dynamic universe, both the red shifted and blue shifted Galaxies co-exist simultaneously.

A point to be noted here is that the Dynamic Universe Model never reduces to General relativity on any condition. It uses a different type of mathematics based on Newtonian physics. This mathematics used here is simple and straightforward. As there are no differential equations present in Dynamic Universe Model, the set of equations give single solution in x y z Cartesian coordinates for every point mass for every time step. All the mathematics and the Excel based software details are explained in the three books published by the author [14, 15, 16] In the first book, the solution to N-body problem-called Dynamic Universe Model (SITA) is presented; which is singularity-free, inter-body collision free and dynamically stable. This is the Basic Theory of Dynamic Universe Model published in 2010 [14]. The second book in the series describes the SITA software in EXCEL emphasizing the singularity free portions. It explains more than 21,000 different equations (2011)[15]. The third book describes the SITA software in EXCEL in the accompanying CD / DVD emphasizing mainly HANDS ON usage of a simplified version in an easy way. The third book contains explanation for 3000 equations instead of earlier 21000 (2011)[16].

SITA solution can be used in many places like currently unsolved applications like Pioneer anomaly at the Solar system level, Missing mass due to Star circular velocities and Galaxy disk formation at Galaxy level etc. Here we are using it for prediction of blue shifted Galaxies.

Dynamic Universe model does NOT depend on speculation. It is based on hard observed facts. I am writing these sentences especially as cosmology is becoming more and more speculative today.

The following table gives basic differences between Bigbang based cosmologies and Dynamic Universe Model

	General question answered by any theory (Cosmology condition) ………	***Bigbang based cosmology***	***Dynamic Universe Model***
1	It should say something about the creation of Universe / matter.	Required, In the form of Bigbang Singularity.	Not required, NO Bigbang Singularity, No SINGULARITY
2	It should explain about the expansion of Universe.	Says Universe is expanding, But keeps mum about explaining the force behind expansion.	**Says Universe is expanding, But explains the force behind expansion.**
3	It should say about the universe closed-ness,	Due to Space-time continuum and curvature.	**Due to Classical Physics**
4	It should explain Large scale structures etc.	Explained Using General relativity	**Explained Using Total Universal Gravitational Force on Bodies**

5	**Dark matter**	**Cannot explain missing mass, Concept of UNKNOWN dark matter required to explain many things**	**Explains missing mass, dark matter NOT required**
6	**Dark energy**	**Concept of UNKNOWN dark energy required to explain many things**	**NOT required**
7	**It should tell about existence of Blue shifted Galaxies**	**Keeps mum No answer**	**Blue and red-shifted Galaxies can co-exist**
8	**It should explain about universe starting assumptions like uniform density of matter**	**Uniform density of matter required**	**Can explain large VOIDs, Based on NON uniform mass densities........**
9	**It should deal correctly with celestial mechanics Like pioneer anomaly**	**Predicts away from SUN Observed is TOWARDS SUN**	**Predicts towards SUN as Observed (Important)**
10	**It should calculate correctly the Trajectory of New horizons satellite to Pluto.**	**At present trajectory predictions done using thumb-rules not from any model**	**Theoretically Calculates Trajectory accurately**

3 Mathematical formulation: Into the Micro world

3.a. Original Theoretical formation (Tensor):

Let us assume an inhomogeneous and anisotropic set of N point masses moving under mutual gravitation as a system and these point masses are also under the gravitational influence of other additional systems with a different number of point masses in these different. For a broader perspective, let us call this set of all the systems of point masses as an Ensemble. Let us further assume that there are many Ensembles each consisting of a different number of systems with different number of point masses. Similarly, let us further call a group of Ensembles as Aggregate. Let us further define a

Conglomeration as a set of Aggregates and let a further higher system have a number of conglomerations and so on and so forth.

Initially, let us assume a set of N mutually gravitating point masses in a system under Newtonian Gravitation. Let the α^{th}point mass has mass m_α, and is in position x_α. In addition to the mutual gravitational force, there exists an external ϕ_{ext}, due to other systems, ensembles, aggregates, and conglomerations etc., which also influence the total force F_α acting on the point mass α. In this case, the ϕ_{ext} is not a constant universal Gravitational field but it is the total vectorial sum of fields at $x_\alpha$due to all the external to its system bodies and with that configuration at that moment of time, external to its system of N point masses.

Total Mass of system = $M = \sum_{\alpha=1}^{N} m_\alpha$ (1)

Total force on the point massα is Fα, Let $F_{\alpha\beta}$ is the gravitational force on the α^{th}point mass due to β^{th}point mass.

$$F_\alpha = \sum_{\substack{\alpha=1 \\ \alpha\neq\beta}}^{N} F_{\alpha\beta} - m_\alpha \nabla_\alpha \Phi_{ext}(\alpha) \tag{2}$$

Moment of inertia tensor

Consider a system of N point masses with mass m_α, at positions X_α, α=1, 2,…N; The moment of inertia tensor is in external back ground field ϕ_{ext}.

$$I_{jk} = \sum_{\alpha=1}^{N} m_\alpha x_j^\alpha x_k^\alpha \tag{3}$$

Its second derivative is

$$\frac{d^2 I_{jk}}{dt^2} = \sum_{\alpha=1}^{N} m_\alpha \left(\overset{\circ\circ}{x_j^\alpha}\, x_k^\alpha + \overset{\circ}{x_j^\alpha}\, \overset{\circ}{x_k^\alpha} + x_j^\alpha\, \overset{\circ\circ}{x_k^\alpha} \right) \tag{4}$$

The total force acting on the point massα is and $\hat{F}$ is the unit vector of force at that place of that component.

$$F_j^\alpha = m_\alpha \overset{\circ\circ}{x_j^\alpha} = \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\alpha m_\beta \left(x_j^\beta - x_j^\alpha\right)\hat{F}}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext,j} m_\alpha \tag{5}$$

Writing a similar formula for F^α_k

$$F_k^\alpha = m_\alpha \overset{\circ\circ}{x_k^\alpha} = \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\alpha m_\beta \left(x_k^\beta - x_k^\alpha\right)\hat{F}}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext,k} m_\alpha \tag{6}$$

$$\overset{\circ\circ}{x}{}_j^{\alpha} = \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{Gm_\beta \left(x_j^\beta - x_j^\alpha\right)\hat{F}}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext}$$

OR => (7)

$$\overset{\circ\circ}{x}{}_k^{\alpha} = \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{Gm_\beta \left(x_k^\beta - x_k^\alpha\right)}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext}$$

And => (8)

Lets define Energy tensor (in the external field ϕ_{ext})

$$\frac{d^2 I_{jk}}{dt^2} = 2\sum_{\alpha=1}^{N} m_\alpha \left(\overset{\circ}{x}{}_j^{\alpha}\, \overset{\circ}{x}{}_k^{\alpha} \right) + \sum_{\substack{\alpha=1\\ \alpha\neq\beta}}^{N} \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{Gm_\alpha m_\beta \left\{ \left(x_k^\beta - x_k^\alpha\right)x_j^\alpha + \left(x_j^\beta - x_j^\alpha\right)x_k^\alpha \right\}}{\left|x^\beta - x^\alpha\right|^3}$$

$$- \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_j^\alpha - \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_k^\alpha$$

(9)

Lets denote Potential energy tensor = Wjk =

$$\sum_{\substack{\alpha=1\\ \alpha\neq\beta}}^{N} \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{Gm_\alpha m_\beta \left\{ \left(x_k^\beta - x_k^\alpha\right)x_j^\alpha + \left(x_j^\beta - x_j^\alpha\right)x_k^\alpha \right\}}{\left|x^\beta - x^\alpha\right|^3}$$

(10)

Lets denote Kinetic energy tensor = 2 K_{jk} = $2\sum_{\alpha=1}^{N} m_\alpha \left(\overset{\circ}{x}{}_j^{\alpha}\, \overset{\circ}{x}{}_k^{\alpha} \right)$ (11)

Lets denote External potential energy tensor = 2 Φ_{jk}

$$= \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_j^\alpha + \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_k^\alpha$$ (12)

Hence $\frac{d^2 I_{jk}}{dt^2} = W_{jk} + 2K_{jk} - 2\Phi_{jk}$ (13)

Here in this case

$$F(\alpha) = \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} F_{\alpha\beta} - \nabla_\alpha \Phi_{ext}(\alpha) m_\alpha$$

$$= \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{Gm_\alpha m_\beta \left(x^\beta - x^\alpha\right)}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext} m_\alpha$$

(14)

$$= \left\{ \overset{\circ\circ}{x}{}^{\alpha}(\mathrm{int}) - \nabla_\alpha \Phi_{ext}(\alpha) \right\} m_\alpha$$

(15)

$$\overset{\circ\circ}{x}(\alpha)=\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N}\frac{Gm_{\beta}\left(x^{\beta}-x^{\alpha}\right)}{\left|x^{\beta}-x^{\alpha}\right|^{3}}-\nabla\Phi_{ext} \qquad (16)$$

We know that the total force at $x(\alpha)=F_{tot}(\alpha)=-\nabla_{\alpha}\Phi_{tot}(\alpha)m_{\alpha}$

Total PE at $\alpha=m_{\alpha}\Phi_{tot}(\alpha)=-\int F_{tot}(\alpha)dx$

$$=-\int\left\{\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N}\overset{\circ\circ\alpha}{x}_{\text{int}}m_{\alpha}-\nabla_{\alpha}\Phi_{ext}(\alpha)m_{\alpha}-\right\}dx$$

$$=\int\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N}\frac{Gm_{\beta}m_{\alpha}\left(x^{\beta}-x^{\alpha}\right)}{\left|x^{\beta}-x^{\alpha}\right|^{3}}dx-\int\nabla\Phi_{ext}m_{\alpha}dx \qquad (17)$$

Therefore total Gravitational potential ϕ_{tot} (α) at x (α) per unit mass

$$\Phi_{tot}(\alpha)=\Phi_{ext}-\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N}\frac{Gm_{\beta}}{\left|x^{\beta}-x^{\alpha}\right|} \qquad (18\text{-s})$$

Lets discuss the properties of ϕ_{ext} :-

ϕ_{ext} can be subdivided into 3 parts mainly

ϕ_{ext} due to higher level system, ϕ_{ext} -due to lower level system, ϕ_{ext} due to present level. [Level : when we are considering point mass in the same system (Galaxy) it is same level, higher level is cluster of galaxies, and lower level is planets & asteroids].

ϕ_{ext} due to lower levels : If the lower level is existing, at the lower level of the system under consideration, then its own level was considered by system equations. If this lower level exists anywhere outside of the system, center of (mass) gravity outside systems (Galaxies) will act as unit its own internal lower level practically will be considered into calculations. Hence consideration of any lower level is not necessary.

SYSTEM – ENSEMBLE:

Until now we have considered the system level equations and the meaning of $\phi_{ext.}$ Now let's consider an ENSEMBLE of system consisting of N_1, N_2 … Njpoint masses in each. These systems are moving in the ensemble due to mutual gravitation between them. For example, each system is a Galaxy, and then ensemble represents a local group. Suppose number of Galaxies is j, Galaxies are systems with point masss N1, N2 ….NJ, we will consider ϕ_{ext} as discussed above. That is we will consider the effect of only higher level system like external Galaxies as a whole, or external local groups as a whole.

Ensemble Equations (Ensemble consists of many systems)

$$\frac{d^2 I^{\gamma}{}_{jk}}{dt^2} = W^{\gamma}_{jk} + 2K^{\gamma}_{jk} - 2\Phi^{\gamma}_{jk} \qquad (18\text{-E})$$

Here γ denotes Ensemble.

This $\Phi^{\gamma}jk$ is the external field produced at system level. And for system

$$\frac{d^2 I_{jk}}{dt^2} = W_{jk} + 2K_{jk} - 2\Phi_{jk} \qquad (13)$$

Assume ensemble in a isolated place. Gravitational potential $\phi_{ext}(\alpha)$produced at system level is produced by Ensemble and $\phi^{\gamma}_{ext}(\alpha) = 0$ as ensemble is in a isolated place.

$$\Phi^{\gamma}_{tot}(\alpha) = \Phi^{\gamma}_{ext} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\gamma}} \frac{Gm^{\gamma}_{\beta}}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} \qquad (19)$$

As Ensemble situated in an isolated place, Gravitational potential $\phi^{\gamma}_{ext}(\alpha) = 0$

There fore

$$\Phi^{\gamma}_{tot} = \Phi_{ext}(\alpha) = -\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\gamma}} \frac{Gm^{\gamma}_{\beta}}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} \qquad (20)$$

And $$2\Phi_{jk} = -\frac{d^2 I_{jk}}{dt^2} + W_{jk} + 2K_{jk} \qquad (13)$$

$$= \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_{\alpha} x^{\alpha}_{j} + \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_{\alpha} x^{\alpha}_{k} \qquad (21)$$

AGGREGATE Equations(Aggregate consists of many Ensembles)

$$\frac{d^2 I^{\delta\gamma}_{jk}}{dt^2} = W^{\delta\gamma}_{jk} + 2K^{\delta\gamma}_{jk} - 2\Phi^{\delta\gamma}_{jk} \qquad (18\text{-A})$$

Here δ denotes Aggregate.

This $\Phi^{\delta\gamma}jk$ is the external field produced at Ensemble level. And for Ensemble

$$\frac{d^2 I^{\gamma}{}_{jk}}{dt^2} = W^{\gamma}_{jk} + 2K^{\gamma}_{jk} - 2\Phi^{\gamma}_{jk} \qquad (18\text{-E})$$

Assume Aggregate in an isolated place. Gravitational potential $\phi_{ext}(\alpha)$ produced at Ensemble level is produced by Aggregate and $\phi^{\delta\gamma}_{ext}(\alpha) = 0$ as Aggregate is in a isolated place.

$$\Phi_{tot}^{\delta\gamma}(\alpha) = \Phi_{ext}^{\delta\gamma} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left| x^{\delta\gamma\beta} - x^{\delta\gamma\alpha} \right|}$$

(22)

$$\Phi_{tot}^{\delta\gamma}(_{Aggregate}) = \Phi_{ext}^{\gamma}(\alpha)(_{Ensemble}) = -\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left| x^{\delta\gamma\beta} - x^{\delta\gamma\alpha} \right|}$$

Therefore (23)

And
$$\Phi_{jk}^{\gamma} = \sum_{\alpha=1}^{N^{\gamma}} \nabla\Phi_{ext}^{\delta} m_{\alpha} x_j^{\delta\alpha} + \sum_{\alpha=1}^{N} \nabla\Phi_{ext}^{\delta} m_{\alpha} x_k^{\delta\alpha}$$
(24)

Total AGGREGATE Equations :(Aggregate consists of many Ensembles and systems)

Assuming these forces are conservative, we can find the resultant force by adding separate forces vectorially from equations (20) and (23).

$$\Phi_{ext}(\alpha) = -\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\gamma}} \frac{Gm_{\beta}^{\gamma}}{\left| x^{\gamma\beta} - x^{\gamma\alpha} \right|} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left| x^{\delta\gamma\beta} - x^{\delta\gamma\alpha} \right|}$$

(25)

This concept can be extended to still higher levels in a similar way.

Corollary 1:

$$\frac{d^2 I_{jk}}{dt^2} = W_{jk} + 2K_{jk} - 2\Phi_{jk}$$
(13)

The above equation becomes scalar Virial theorem in the absence of external field, that is ϕ=0 and in steady state,

i.e. $\frac{d^2 I_{jk}}{dt^2}$ =0 (27)

2K+ W = 0 (28)

But when the N-bodies are moving under the influence of mutual gravitation without external field then only the above equation (28) is applicable.

Corollary 2:

Ensemble achieved a steady state,

i.e. $\frac{d^2 I_{jk}^{\gamma}}{dt^2} = 0$ (29)

$$W^{\gamma}_{jk} + 2K^{\gamma}_{jk} = 2\Phi^{\gamma}_{jk}$$ (30)

This Φjk external field produced at system level. Ensemble achieved a steady state; means system also reached steady state.

i.e. $\frac{d^2 I_{jk}}{dt^2} = 0$ (27)

$$W_{jk} + 2K_{jk} = 2\Phi^{\gamma}_{jk}$$ (31)

Equation (20) gives $\phi^{\gamma}_{tot}(\alpha)$, that is external potential field present at the system level . Combining Eqn (31) and eqn (9).

$$2\Phi_{ext}\, jk = \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_{\alpha} x_j^{\alpha} + \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_{\alpha} x_k^{\alpha}$$ (31-A)

The Equation 25 is the main powerful equation, which gives many results that are not possible otherwise today. This tensor can be subdivided into 21000 small equations without any differential equations or integral equations. Hence, this set up gives a unique solution of Cartesian X, Y, Z components of coordinates, velocities and accelerations of each point mass in the setup for that particular instant of time. A point to be noted here is that the Dynamic Universe Model never reduces to General relativity on any condition. It uses a different type of mathematics based on Newtonian physics. This mathematics used here is simple and straightforward. All the mathematics and the Excel based software details are explained in the three books published by the author[14, 15, 16]

Now let's see how the Dynamic Universe Model extends into Micro world mathematically.

3.b. Additional mathematical formulation allowing for the Micro world:

In addition to previously published mathematical formulation (viz. eqn 1 to 31) for Dynamic Universe Model, as cited in section 3, the following new equations are added to enable this model for operating into Micro world.
Combining both 3 and 25 (Newly introduced in this paper)

$$F_{\alpha} = \sum_{\substack{\alpha=1 \\ \alpha\neq\beta}}^{N} F_{\alpha\beta} - m_{\alpha}\nabla_{\alpha}\left[-\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\gamma}} \frac{Gm^{\gamma}_{\beta}}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm^{\delta\gamma}_{\beta}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \right]$$ (32)

So …

$$F_\alpha = \sum_{\substack{\alpha=1\\ \alpha\neq\beta}}^{N} F_{\alpha\beta} + m_\alpha \nabla_\alpha \left[\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^\gamma} \frac{Gm_\beta^\gamma}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} + \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_\beta^{\delta\gamma}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \right] \tag{33}$$

Interchanging $\sum$ $and \nabla$ operations:

$$F_\alpha = \sum_{\substack{\alpha=1\\ \alpha\neq\beta}}^{N} F_{\alpha\beta} + m_\alpha \left[\sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^\gamma} \nabla_\alpha \frac{Gm_\beta^\gamma}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} + \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^{\delta\gamma}} \nabla_\alpha \frac{Gm_\beta^{\delta\gamma}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \right] \tag{34}$$

Or

$$F_\alpha = \sum_{\substack{\alpha=1\\ \alpha\neq\beta}}^{N} F_{\alpha\beta} + \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^\gamma} \nabla_\alpha \frac{Gm_\alpha m_\beta^\gamma}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} + \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N^{\delta\gamma}} \nabla_\alpha \frac{Gm_\alpha m_\beta^{\delta\gamma}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \tag{35}$$

The above equation 35 means the force on α^{th}point mass will be a sum of three components i.e., the summation of attraction forces due to point masses from its own system, ensemble and aggregate. This is the key result that can be applied to point masses or subatomic particles or can be combined in any fashion together. The equations 34 & 35 are important, simple & straightforward results.

Let us apply the above equations to some practical situations like radio waves that are going grazingly near Sun from an artificial satellite and are coming to Earth (VLBI). Let us use SITA algorithm for calculation.

4. Initial Values

Initial value of Mass of neutrino

The basic behavior that a neutrino can oscillate from one flavor to another requires that it must have a mass by Super-Kamiokande (1998) [52] [53] and by KamLAND (2005) [54] [55] . The present neutrino mass estimates are between 0.2 eV and 2 eV. Conversion from eV to kg was done using the equation : (1 *eV*)/c^2 = x *kg* x = {e/c^2}. Value of conversion factor: x = 1.782 661 907(11) x 10^{-36}.

Here in this paper the particle mass was taken as 1.1 e-52 kg which is much smaller than Neutrino mass = 1.5 ev / c2 = 2.685 e -36 kg or Radio wave photon mass = 9.019 e -46 kg etc. The behaviour shown by such a mass will be experienced by higher mass also. Every mass behave in the similar way in Dynamic Universe Model.

Initial Values table and other tables

Full set of initial values are shown in Table 1 at the end of this paper. This Table 1 gives the initial values of all the point masses, their respective masses in Kg, and their x y z

Cartesian positions. The summary of all the 76 experiments conducted & reported in Table 2, which is also at the end of this paper and can be seen in 13 columns. The various filenames, Time step values, Number of iterations, initial position, and final position of the Neutrino, General relativistic deflection (bending) angle, Calculated Solar elongation angle in degrees, and SITA Deflection are mentioned there in 13 columns. But it was condensed from the Table 3. There are 71 columns from where these 13 columns were taken. So the summary and finer differences between each experiment can be found from main Table 3 easily. This Table 3 is uploaded into web along with main file. **[**The name of the file is '***Vak Table 3 Results 71 columns.xls'****;*** brief description of material**:** There are 76 data records of final data for each file in 71 columns in a single Excel sheet. The header rows for all the data is in the 3rd and 4th rows. **]."**

As a result of SITA calculations, there is an assortment of xyz positions, velocities and accelerations in all iterations at each time step for every one of the 133 point masses. It is possible to track any one of these values for every time step throughout the experiment as needed. This data is in an XLS file and uploaded in Web. The Table 4 contains all the individual iteration outputs for each of the 76 experiments are in an XLS file and uploaded along with the main paper for keeping in e-publication. The summary of each experiment is given in that Excel file web attachment because the large volume of data, which will be given in the web version of this paper. Name of the file is '***Vak Table 4 Consolidation Super luminal neutrino Results.xls'.*** **Brief description of material : Main Data file:** There are 19681 lines in this file in 55 columns. The file is subdivided into as many as 76 sections in a single sheet, instead of 76 separate files. It was thought handling separate 76 files will be very difficult, and the server also many not have provisions to hold that many additional files while uploading. The first file name will start in A2 cell, later the header row for the columns. The data is then follows after a blank row. There will be additional blank rows before the next file data. Each data set varies in number of data rows depending on number of iterations. Each row represents a set of data for that time step. Number of data rows from file to file varies from 40 to 3000. Any further additional details can be obtained by contacting the author. **]."** All these tables are available in the webpage [10] which can be down loaded.

These experiments were originally designed to study the solar gravitational bending effects at the planetary positions as on 01.01.2000@00.00:00 hrs on a light neutrino positioned at various locations in solar system. Later the results were grouped to view the with respect to solar elongation angle.

4. Super Luminal Neutrinos:

There are 52 cases out of 76 experiments that gave Super luminal neutrinos. For every experiment the initial data like starting position and final position of the neutrino were available in Table 2. Additional details are available in table 3 & 4. A maximum of about 1200 m/s higher neutrinos velocities above velocity of light were observed. These results vary from case to case. Sometimes the peek came to as low as 0.1 meters higher velocity only.

5. Results

Two typical graphs are given below. For all the remaining graphs see the Table 4. All the graphs (both the Super Luminal neutrino and normal neutrino cases) are shown in Table 4. For this Fig 1 and 2 the initial conditions are given in the captions of the figures. Number of iterations are 80 for the case fig1, and 1200 for the case of fig 2. Remaining 50 cases of Super luminal 24 cases of normal neutrinos are documented in table 4 , which is a supplementary file for this paper.

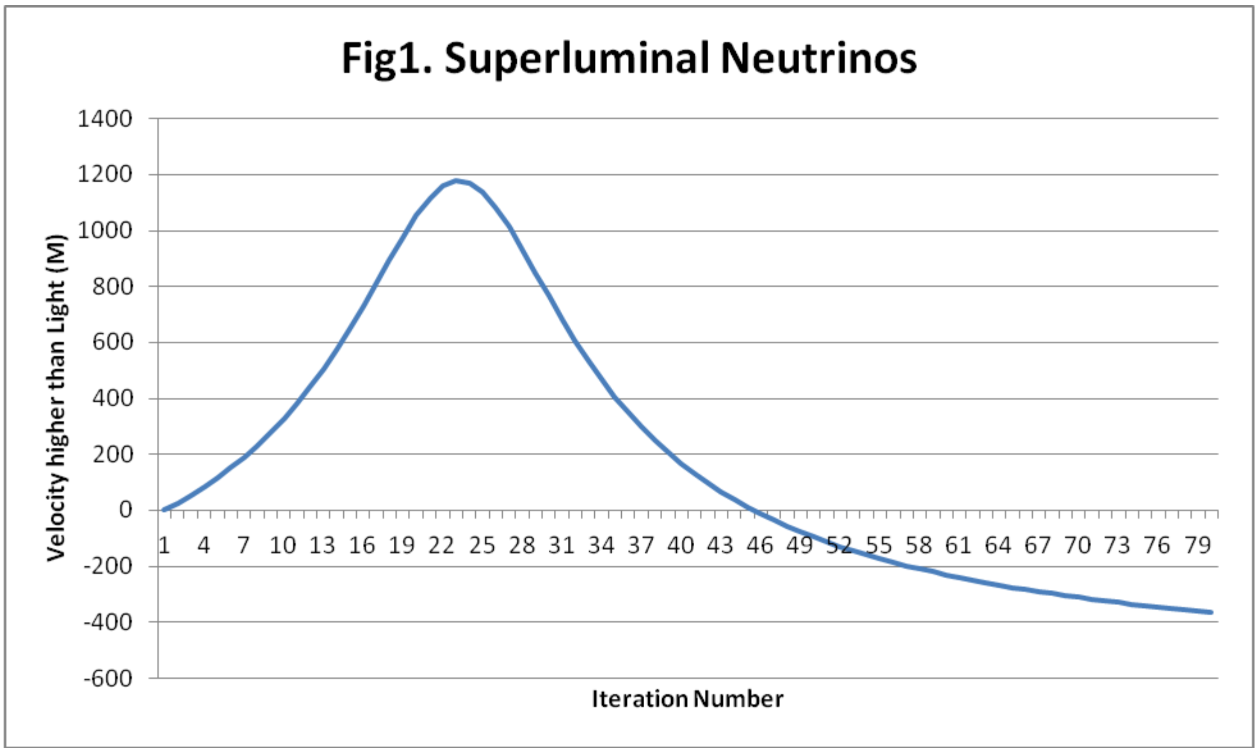

Fig1. Super luminal Neutrino initial conditions: Velocities in meters per second (vx, vy, vz) = (-74948114.5, -280430167.2, -74948114.5) and Positions in meters (sx, sy, sz) = (0, 696001492.1, 0). The maximum Neutrino velocity achieved in this case is about 1200 m/s higher than the velocity of light

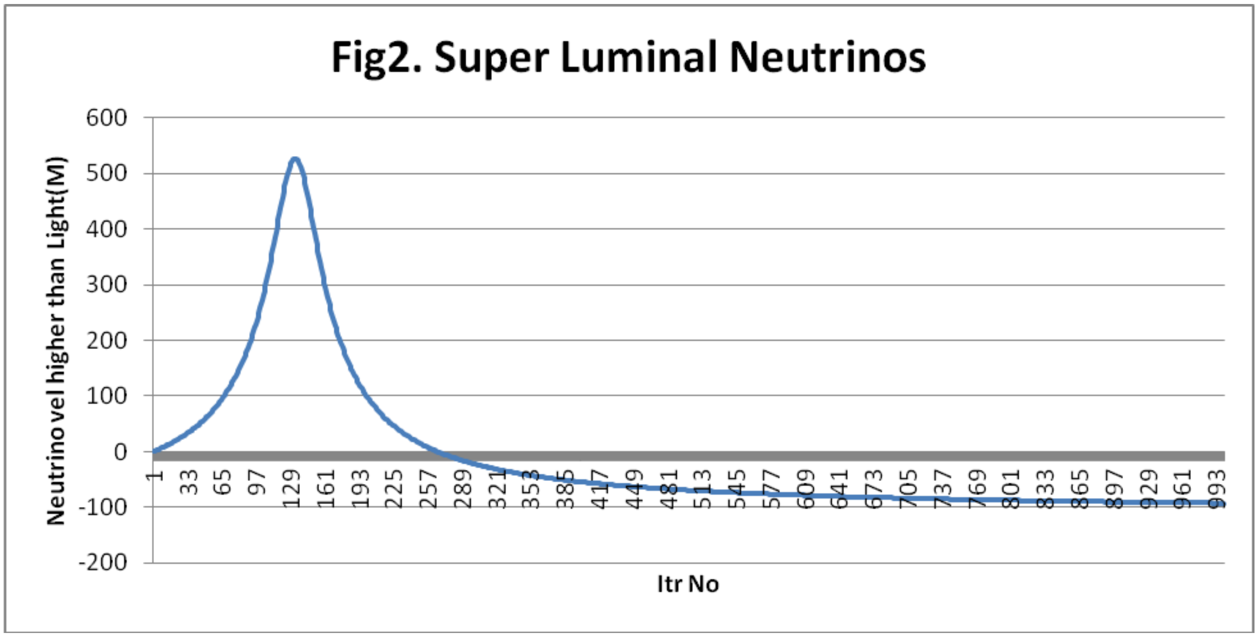

Fig2. Super luminal Neutrino initial conditions: Velocities in meters per second (vx, vy, vz) = (150.1563894,-211985280, -211985280) and Positions in meters (sx, sy, sz) = (696011352, 2804642125, 2804642125). The maximum Neutrino velocity achieved in this case is about 550 m/s higher than the velocity of light

One may feel it is very silly to consider the gravitational effect of the entire Universe at that point at that time, the gravitational effect of all the other bodies can be neglected near some huge Gravitating body. No, that is not true. For especially very low weight bodies like Photons of radio waves or light waves, or Neutrinos. Let's see an example. Consider me standing on this earth. One may think gravitation of other bodies like Sun and Moon can be neglected on earth. But what about the tide caused by Sun and Moon in Oceans? Yes it is High tide and Low tide in the morning and evening, or on full-moon-day on no-moon-day. And there will be higher tide on a full-moon-day evening. These tides are caused by Gravitation of Sun and Moon only.

Here in Dynamic Universe Model an attempt is made to calculate the 3 dimensional Cartesian vectorial force of Universe approximated to 133 mutually Gravitating N-bodies. These preliminary attempts are giving sufficiently accurate results otherwise not possible by other theories. Of course approximating the Universe by 133 bodies may not be correct and accurate. But these approximations are better than single point mass or uniform mass density approximations. But one has to consider that there are many images present in the Universe for many Galaxies. There are limitations like presently available commercial PCs and their available scientific and mathematical software, their accuracies, with in my purse. The present SITA calculations are giving sufficiently accurate results.

6. Conclusion:

A process similar to this happens at stars, Galaxy centers, Astronomical jets etc. Hence we can say Dynamic Universe Model can successfully solve the riddle of "Super Luminal Neutrinos" along with many other problems.

7. Acknowledgements:
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Table 1:

Sl.No.	Name	Mass (kg)	HELIO CENTRIC ECLIPTIC XYZ VALUES of positions as on 01.01.2000@00.00:00 hrs in METR		
			xecliptic	yecliptic	zecliptic
1	Particle mass << neutrino mass (The initial Position vary with experiment)	1.10E-52	200000000	696000000	650947504.6
2	Mercury	3.30E+23	50644179263	8540296134	-3949485753
3	Venus	4.87E+24	69657878862	82614198079	-2889306238
4	Earth	5.97E+24	-29565785818	1.44096E+11	-2869446.398
5	Mars	6.42E+23	-3275068912	-2.17902E+11	-4484946284
6	Jupiter	1.90E+27	4.09177E+11	-6.46362E+11	-6473185584
7	Saturn	5.68E+26	-1.35874E+12	3.39522E+11	48167461412
8	Uranus	8.68E+25	2.97521E+12	-4.32376E+11	-40141525477
9	Neptune	1.02E+26	3.61461E+12	-2.66852E+12	-28350290138
10	Pluto	1.27E+22	69315882273	-4.69858E+12	4.82751E+11
11	Moon	7.35E+22	-29191657344	1.43975E+11	16609650.17
12	SUN	1.99E+30	0	0	0
13	near star	3.97658E+29	-3.07379E+16	-2.48085E+16	5.99014E+15
14	near star	1.88888E+30	-1.70141E+16	-4.49612E+13	3.79378E+16
15	near star	2.18712E+30	-1.71774E+16	-1.53305E+14	3.78638E+16
16	near star	7.95317E+29	-1.85801E+15	1.6393E+15	-5.61485E+16

17	near star	8.94731E+29	9.02924E+15	-7.13182E+15	-7.77879E+16
18	near star	1.73976E+31	-3.1682E+16	-2.99664E+16	6.86968E+16
19	near star	8.94731E+29	2.37665E+16	-7.07555E+15	8.82862E+16
20	near star	1.88888E+30	9.77757E+16	-1.69837E+16	3.32855E+15
21	near star	8.94731E+29	-1.75629E+16	-2.0874E+16	9.78004E+16
22	near star	3.97658E+29	3.82107E+16	6.00795E+16	7.44241E+16
23	near star	1.82923E+30	-4.50486E+16	3.01003E+16	9.28066E+16
24	near star	3.28068E+30	-8.42312E+15	5.24915E+16	-9.39112E+16
25	near star	1.19298E+30	-4.60396E+16	3.03873E+16	9.29744E+16
26	near star	7.95317E+29	4.90495E+16	9.64605E+16	7.35909E+15
27	near star	8.94731E+29	4.99158E+16	9.78689E+16	7.06783E+15
28	near star	7.95317E+29	-1.39114E+16	-1.09124E+17	4.36506E+15
29	near star	1.82923E+30	-6.28738E+16	-8.89396E+16	-2.56335E+16
30	near star	2.18712E+30	-6.90623E+16	-8.50246E+16	2.58319E+16
31	near star	3.97658E+29	-2.35768E+16	2.08864E+16	1.10275E+17
32	near star	7.95317E+29	1.86257E+16	-5.54342E+16	-1.01576E+17
33	near star	8.94731E+29	-5.04468E+16	3.78032E+16	-1.03142E+17
34	near star	1.19298E+30	2.09805E+16	-4.31965E+16	-1.11915E+17
35	near star	5.96488E+29	-3.34107E+16	-3.81344E+16	1.12791E+17
36	near star	5.96488E+29	1.20105E+17	-5.23499E+15	-4.10595E+16
37	near star	8.94731E+29	-5.81398E+16	4.54439E+16	-1.08443E+17
38	near star	6.95902E+29	-1.07352E+17	7.50846E+16	-1.2264E+16
39	near star	9.94146E+29	2.96095E+16	1.22996E+17	4.58116E+16

40	near star	2.90291E+30	8.24904E+16	-2.35538E+16	-1.05478E+17
41	near star	8.94731E+29	-6.10305E+16	4.80435E+16	-1.15415E+17
42	near star	8.94731E+29	9.76996E+16	2.14625E+16	-9.75422E+16
43	near star	7.95317E+29	2.15194E+16	1.34558E+17	-3.20268E+16
44	near star	5.64675E+30	-5.35209E+16	-2.81642E+16	-1.29127E+17
45	near star	6.95902E+29	1.14625E+16	1.39712E+16	-1.43945E+17
46	near star	8.94731E+29	-1.32781E+17	1.60851E+16	-6.59031E+16
47	near star	1.19298E+30	-4.78813E+16	9.19484E+16	-1.08903E+17
48	near star	1.65028E+30	1.04974E+16	-1.34655E+17	-7.02332E+16
49	near star	8.94731E+29	-4.59519E+16	8.94752E+15	1.44982E+17
50	near star	5.96488E+29	1.36804E+17	5.36738E+16	-5.10992E+16
51	near star	2.00817E+30	1.77107E+16	2.7082E+16	-1.52249E+17
52	near star	8.94731E+29	-1.0952E+17	9.68318E+16	5.3829E+16
53	near star	1.88888E+30	-4.72306E+16	-1.16764E+17	9.36129E+16
54	near star	5.09003E+30	9.79121E+16	-9.2465E+16	8.39443E+16
55	near star	3.97658E+29	1.09829E+17	9.70466E+16	6.62157E+16
56	near star	7.95317E+29	-9.10748E+16	-1.36971E+17	-2.48893E+16
57	near star	1.09356E+30	-7.0043E+16	9.14497E+16	1.2171E+17
58	near star	5.96488E+29	-2.64948E+16	4.32255E+16	1.61635E+17
59	near star	1.49122E+30	-3.16721E+16	1.25283E+17	1.1067E+17
60	near star	7.95317E+29	4.73982E+16	1.59067E+15	1.63433E+17
61	near star	5.96488E+29	1.20195E+17	-9.0224E+16	8.74395E+16
62	near star	8.94731E+29	-5.75703E+16	-1.4009E+17	8.88539E+16

63	near star	7.95317E+29	6.76572E+16	-4.60048E+16	-1.57068E+17
64	near star	2.12747E+30	-9.2162E+16	-1.20447E+17	9.30606E+16
65	near star	8.94731E+29	5.72296E+15	1.76608E+17	-2.27853E+16
66	near star	5.96488E+29	-1.34996E+17	-1.16182E+17	-1.30636E+16
67	near star	5.96488E+29	-1.19512E+17	4.88067E+16	-1.2445E+17
68	near star	9.94146E+29	7.87302E+16	1.638E+16	-1.62411E+17
69	near star	1.82923E+30	3.91777E+16	1.47326E+17	-9.98492E+16
70	near star	6.95902E+29	1.67294E+17	-1.18466E+16	-7.32836E+16
71	near star	8.94731E+29	-1.39077E+17	-9.10857E+16	7.67253E+16
72	near star	2.78361E+30	5.24234E+16	-1.59364E+16	1.75315E+17
73	near star	1.65028E+30	3.6434E+15	2.91335E+16	-1.81794E+17
74	near star	9.94146E+29	-9.07771E+16	1.01639E+17	1.23937E+17
75	near star	1.88888E+30	6.41076E+15	1.79687E+16	-1.83691E+17
76	near star	1.88888E+30	-2.06314E+15	-5.39393E+15	1.86646E+17
77	near star	2.18712E+30	1.0974E+17	-3.31921E+16	1.4771E+17
78	near star	2.18712E+30	-1.54154E+17	-1.01333E+17	3.85252E+16
79	near star	5.96488E+29	4.30221E+16	-1.83542E+17	8.55871E+15
80	near star	9.94146E+29	-1.30645E+17	6.84493E+16	-1.20949E+17
81	near star	1.09356E+30	-1.31276E+17	6.75268E+16	-1.20784E+17
82	near star	1.19298E+30	-1.33898E+17	-5.20951E+16	1.2578E+17
83	near star	1.09356E+30	-2.19059E+16	6.93128E+16	-1.77114E+17
84	near star	1.49122E+30	3.99999E+16	8.00904E+16	1.70731E+17
85	near star	6.95902E+29	-2.19758E+16	-1.28321E+16	-1.9175E+17

86	near star	1.09356E+30	-1.3524E+17	-5.38681E+16	1.27447E+17
87	near star	8.94731E+29	-2.07383E+16	-9.28974E+15	1.93754E+17
88	near star	5.96488E+29	1.01434E+17	8.45481E+16	1.45159E+17
89	near star	5.96488E+29	7.37726E+16	-5.17702E+16	-1.79009E+17
90	near star	1.82923E+30	-1.50711E+17	6.46728E+16	1.16827E+17
91	near star	6.95902E+29	-3.30768E+16	-1.22256E+17	-1.58766E+17
92	Glob Clus Group	1.20578E+37	-1.16925E+21	-1.04245E+21	9.31497E+19
93	Glob Clus Group	7.43305E+36	-1.79414E+20	-3.61781E+20	-1.42253E+19
94	Glob Clus Group	9.58802E+36	1.48744E+19	2.77665E+19	-7.91706E+19
95	Glob Clus Group	7.05555E+36	6.94375E+19	-4.44352E+18	7.944E+17
96	Glob Clus Group	6.46631E+36	9.11252E+19	-4.39257E+19	1.89032E+20
97	Glob Clus Group	7.23385E+36	1.05314E+20	2.06504E+19	8.97721E+19
98	Glob Clus Group	6.79923E+36	1.25702E+20	6.15542E+19	3.76993E+19
99	Glob Clus Group	8.07244E+36	1.5288E+20	2.40773E+19	-1.58338E+19
100	Glob Clus Group	9.57827E+36	1.74887E+20	1.35743E+19	-3.13919E+19
101	Glob Clus Group	8.2981E+36	1.85602E+20	5.87126E+19	1.50955E+19
102	Glob Clus Group	1.03904E+37	2.00762E+20	1.02368E+20	7.89348E+19
103	Glob Clus Group	8.99599E+36	2.21232E+20	1.03194E+19	-1.15685E+20
104	Glob Clus Group	8.5572E+36	2.40926E+20	2.38732E+19	8.08095E+18
105	Glob Clus Group	9.81786E+36	2.52521E+20	-1.04214E+19	-1.90968E+18
106	Glob Clus Group	9.86105E+36	2.63724E+20	1.58631E+19	2.36248E+19
107	Glob Clus Group	8.93192E+36	2.80244E+20	4.57404E+18	-5.62166E+18
108	Glob Clus Group	1.00965E+37	2.93615E+20	-2.52379E+19	6.36066E+18
109	Glob Clus Group	1.37127E+3	3.13834E+20	-	1.46617E+19

		7		1.18077E+18	
110	Glob Clus Group	1.01466E+37	3.35306E+20	-1.68075E+20	-3.47826E+19
111	Glob Clus Group	1.11914E+37	3.72364E+20	1.37362E+19	-1.25647E+20
112	Glob Clus Group	1.02218E+37	4.87315E+20	1.74393E+20	8.66073E+19
113	Glob Clus Group	9.30663E+36	6.49171E+20	1.82615E+18	9.06719E+19
114	Glob Clus Group	9.89727E+36	1.0232E+21	1.53107E+20	4.80442E+20
115	Galaxy centre	7.164E+36	4.79211E+19	1.67483E+20	1.56991E+20
116	Milkyway part	3.84731E+40	-1.63642E+20	1.47838E+20	-7.97417E+19
117	Milkyway part	4.80914E+40	1.54517E+20	8.22578E+19	1.56049E+20
118	Milkyway part	5.77096E+40	-1.14673E+19	4.68166E+19	2.29499E+20
119	Milkyway part	6.73279E+40	-8.86592E+19	-1.0611E+19	2.16841E+20
120	Milkyway part	7.69462E+40	5.62463E+19	-1.61296E+20	-1.60665E+20
121	Milkyway part	8.65645E+40	-1.1565E+20	2.03896E+20	6.68227E+18
122	Milkyway part	9.61827E+40	-3.63423E+19	1.12347E+19	-2.31401E+20
123	Milkyway part	1.05801E+41	-1.72238E+20	-7.67886E+19	1.39394E+20
124	Milkyway part	1.05801E+41	-2.05075E+19	-2.19577E+20	7.97417E+19
125	Milkyway part	9.61827E+40	-1.58373E+20	7.45639E+19	-1.56049E+20
126	Milkyway part	8.65645E+40	-3.06445E+19	-3.72049E+19	-2.29499E+20
127	Milkyway part	7.69462E+40	6.156E+19	-6.46792E+19	-2.16841E+20
128	Milkyway part	6.73279E+40	9.55613E+19	1.41591E+20	1.60665E+20
129	Milkyway part	5.77096E+40	2.32564E+20	-2.93704E+19	-6.68227E+18
130	Milkyway part	4.80914E+40	3.07501E+19	2.23922E+19	2.31401E+20
131	Milkyway part	3.84731E+40	4.15581E+19	1.83944E+20	-1.39394E+20
132	Andromeda	1.4129E+42	1.74266E+22	1.50487E+22	6.79254E+21

133	Triangulum Galaxy	1.41E+41	1.28546E+20	1.93083E+22	-1.82029E+22

Table 1: Giving the initial values of all the point masses, their respective masses in Kg, and their x y z Cartesian positions.

Expt Sl. No	Time step	No of iterations	File name	Initial position of neutrino			Final position of neutrino			GenRel Deflection degrees / 100000	Calculated Solar elongation angle in degrees	SITA Deflection degrees / 100000
				s x	sy	sz	s x	sy	Sz			
1	0.1	40	Vvtc vy -c. x Ro. 40x0.1s 4.6552.xls	69599998.6	-29979245.8	-1.3442E-11	695998564	-1169190027	-2.04E-08	-0.11688	11.59527069	10.4464361
2	0.1	40	Vvtc vy eq c.x eq 2c 40x.1s result 6.714.xls	59958491 5.5	-29979245.8	69599999	599584312	-1169190284	695999299	3.99E+15	11.59527069	7.24249697
3	0.1	40	Vvtc 40x0.1s Y 1.2 Radi result 3.48905.xls	-126.4124044	-2.7723E-07	83519972 8	-569605932	-1.05415E-06	835198835	4.79E+15	11.59527069	11.6150876
4	0.1	40	Vvtc 40x0.1s Y 1.5 Radi result 4.094753.xls	-29979325.19	-3.0566E-07	1043999785	-569605822	-1.05419E-06	1043999202	5.98E+15	11.59527069	7.91757108
5	0.1	40	Vvtc 40x0.1s Y 2 Radi result 5.167069.xls	-34.66477683	-2.7726E-07	1391999881	-569605742	-1.05426E-06	1391999524	7.98E+15	11.59527069	4.70583429
6	0.1	40	Vvtc 40x0.1s Y 3 Radi result 7.424343.xls	-11.20747624	-2.773E-07	2087999943	-569605693	-1.05442E-06	2087999778	1.2E+16	11.59527069	2.18339152
7	0.1	40	Vvtc 40x0.1s Y 10 Radi result 23.25372.xls	-0.32405192	-2.7782E-07	6959999995	-569605671	-1.05639E-06	6959999979	3.99E+16	11.59527069	0.20913098
8	0.1	40	vak variable time create vak1 40x 0.1 NORMAL radius	69599965 0.8	-190.331964	-5.3902E-09	695998440	-569606064.7	-2.0473E-08	-0.1173	11.59527069	15.6322201

			result 3.11093.xls									
9	0.1	40	vak variable time create vak1 40x 0.1s 3 radius result 7.24.xls	2087999943	-11.2074768	-5.5567E-09	2087999778	-569605693.3	-2.1104E-08	-0.12092	11.59527069	2.18339152
10	0.1	160	Vvtc vx 0.25c.vy 0.97c, x 2e8 y 6e8 z 5e11 160x0.1s result 0.797441 extr Good	57619336.65	13320063.2	4.9714E+11	-871737283	-3586062665	4.9714E+11	2.85E+18	26.07278278	0.08537736
11	0.1	80	Vvtc vx vz 0.25c.vy 0.93c, y Ro. 80x0.1s result 0.7345 V GOOD IMP.xls	-17987495 5	22967354.8	-17987495 5	-592077652	-1519405093	-592077652	-3.4E+15	29.99487522	66.2037468
12	0.1	40	Vvtc -vy vz eq .7c.x eq 2c 40x result 12.032.1s.xls	59958491 5.5	-21198528	71719852 7	599584480	-826742460.5	1522741954	8.72E+15	46.15658888	4.04169627
13	0.1	160	Vvtc vy vz 0.7c. x Ro. 80x0.1s result 4.169102.xls	69600249 8.6	-21198528	-21198528	695998662	-1674682200	-1674682200	-9.6E+15	46.1587618	11.6645604
14	0.1	160	Vvtc vz vy 0.7c. x Ro yz 2.8e08 264x0.1s result 2.0309 GOOD.xls	69601216 0.8	6434934.11	6434934.11	695998984	-2770573788	-2770573788	-1.6E+16	46.1587724	23.9448121
15	0.1	160	Vvtc vz vy 0.7c. x Ro. 160x0.1s result 2.083574 v Good.xls	69600536 3.3	9.0590489	9.0590567 3	695996805	-1674682214	-1674682214	-9.6E+15	46.1587804	23.3400541

16	0.1	160	Vvtc vz vy 0.7c.x Ro yz 8e08 160x0.1s result 2.181198 Good.xls	695999302.4	-5543272.01	-5543272.01	695986377	-2570560903	-2570560903	-1.5E+16	46.1587804	22.2954287
17	0.1	160	Vvtc vz vy 0.7c.x Ro yz 4e08 160x0.1s result 2.473451 Good.xls	695999671.9	-2771539.85	-2771539.85	695986439	-2970558735	-2970558735	-1.7E+16	46.1587804	19.6610928
18	0.1	160	Vvtc vz vy 0.7c.x Ro yz 6e08 160x0.1s result 2.27 Good.xls	695999488.7	6441856.72	6441856.72	695986065	-2770559962	-2770559962	-1.6E+16	46.1587804	21.3697685
19	0.1	160	Vvtc vz vy 0.7c.x Ro yz 6e08 160x0.1s result 2.2456 Good.xls	695999413.6	-7153681.74	-7153681.74	695986096	-2720560223	-2720560223	-1.6E+16	46.1587804	21.655746
20	0.1	160	Vvtc vz vy 0.7c.x Ro yz 6.2e08 160x0.1s result 2.605 Good.xls	695999468.4	5243344.22	5243344.22	695986073	-2750560069	-2750560069	-1.6E+16	46.1587804	21.4893317
21	0.1	160	Vvtc vz vy 0.7c.x Ro yz 5.8e08 160x0.1s result 2.89314 Good.xls	695999509.5	7640369.05	7640369.05	695986064	-2790559852	-2790559852	-1.6E+16	46.1587804	21.2424991
22	0.1	160	Vvtc vz vy 0.7c.x Ro yz 5.5e08 160x0.1s result 2.311574 Good.xls	695999518.4	-1161118.37	-1161118.37	695986077	-2820559682	-2820559682	-1.6E+16	46.1587804	21.0362966
23	0.1	160	Vvtc vz vy 0.7c.x Ro yz 4e08 160x0.1s result 2.220438 Good.xls	695999671.9	-2771539.85	-2771539.85	695986161	-2670560467	-2670560467	-1.5E+16	46.1587804	21.9014159

24	0.1	160	Vvtc vz vy 0.7c.x Ro yz 4e08 160x0.1s result 2.220438 Good1.xls	69599939 0.8	449293.027	449293.027	695986161	-2670560467	-2.671E+09	-1.5E+16	46.1587804	21.9014159
25	0.1	160	Vvtc vz vy 0.7c.x Ro yz 2e08 160x0.1s result 2.9314.xls	69599987 9.2	-11984981.4	-11984981.4	695988030	-3170557360	-3170557360	-1.8E+16	46.1587804	16.5893734
26	0.1	160	Vvtc vz vy 0.7c.x Ro yz 1e09 160x0.1s result 2.1318 Good.xls	69599920 7.5	3670121.84	3670121.84	695987045	-2370561602	-2370561602	-1.4E+16	46.1587804	22.8120586
27	0.1	160	Vvtc vz vy 0.7c.x Ro yz 1.4e09 160x0.1s result 2.090797.xls	69599904 1.7	898426.816	898426.816	695988869	-1970562510	-1970562510	-1.1E+16	46.1587804	23.2652927
28	0.1	160	Vvtc vz vy 0.7c.x 3437 Ro. 160x0.1s result 2.104776.xls	69600262 2.5	-8314993.67	-8314993.67	695991441	-2170562122	-2170562122	-1.2E+16	46.1587804	23.1049511
29	0.1	160	Vvtc vz vy 0.7c.x 0000 Ro. 160x0.1s result 2.104761 Good.xls	69599908 5.5	-8314993.68	-8314993.68	695987904	-2170562122	-2170562122	-1.2E+16	46.1587804	23.1051088
30	0.1	2000	Vvtc vz 0.25c.vx 0.97c, yRo. x 2e8 z 6,5e8 2000x0.1s result 2.357395 Good.xls	35114073.22	695999620	12347120.7	-1.4782E+10	695786980.5	-5.7375E+10	-3.3E+17	46.1587804	20.6291925
31	0.1	160	Vvtc vz 0.25c.vx 0.97c, yRo. x 2e8 z 6,5e8 160x0.1s result 2.357032 Good.xls	50124424.53	695999562	-15707474.8	-961675531	695986215.7	-3934387845	-2.3E+16	46.1587804	20.6321958

32	0.1	80	Vvtc vy vz 0.7c. x Ro. 80x0.1s result 4.1691.xls	696002498.6	-21198528	-21198528	695998662	-1674682200	-1674682200	-9.6E+15	46.1587804	11.6645604
33	0.1	160	Vvtc vz vy 0.7c. x Ro yz 6e08 264x0.1s result 2.262125 Good.xls	695999488.7	6440954.63	6440954.63	695974356	-4975209668	-4975209668	-2.9E+16	46.15880458	21.4978102
34	0.1	160	Vvtc vz vy 0.7c. x yz Ro.1.7e9 160x0.1s result 2.083574 v Good.xls	696000373.5	9.05510929	9.05511728	695986887	-1674682214	-1674682214	-9.6E+15	46.15881362	23.3403664
35	0.1	1000	Vvtc vz vy 0.7c. x Ro yz 6e08 1000x0.1s result 2.015571 v Good.xls	696012160.8	6434934.11	6434934.11	695917209	-18372686666	-1.8373E+10	-1.1E+17	46.15896774	24.1275284
36	0.1	2000	Vvtc vz vy 0.7c. x Ro yz 6e08 2000x0.1s result 2.015268 v Good.xls	696012160.8	6434934.11	6434934.11	695805961	-39571207721	-3.9571E+10	-2.3E+17	46.1592003	24.1311535
37	0.1	3000	Vvtc vz vy 0.7c. x Ro yz 6e08 3000x0.1s result 2.015243 v Good.xls	696012160.8	6434934.11	6434934.11	695694706	-60769728423	-6.077E+10	-3.5E+17	46.15943289	24.1314556
38	0.1	160	Vvtc vx vy 0.7c. z 714Ro. 160x0.1s result 0.79744121 extr Good.xls	-8316096.002	-8316096	4.9714E+11	-2170565952	-2170565952	4.9714E+11	2.85E+18	56.59527064	0.08537736
39	0.1	160	Vvtc vx vy 0.7c. z Ro. 160x0.1s result 2.104776.xls	-8316830.082	-8316830.08	696003086	-2170567245	-2170567245	695991904	3.99E+15	56.59527064	23.1049511

40	0.1	228	Vvtc vx vy 0.7c. z Ro. 160x0.1s result 2.104776.xls	-8316830.082	-8316830.08	696003086	-2170567245	-2170567245	695991904	3.99E+15	56.59527064	23.1049511
41	0.1	160	Vvtc vx vy 0.7c. z Ro. 160x0.1s result 2.10477.xls	-8316830.082	-8316830.08	696003086	-2170567245	-2170567245	695991904	3.99E+15	56.59527064	23.1049511
42	0.1	80	Vvtc vx c. x Ro. 40x0.1s.result div 0.xls	725979244.4	-6.93E-10	-1.3442E-11	1865189527	-1.05405E-06	-2.0611E-08	-0.11809	78.40472937	0
43	0.1	40	Vvtc vx vz eq .7c.x eq 2c 40x.1s result 171.14.xls	620783443.5	-6.9306E-10	717198527	1426327053	-1.05421E-06	1522742080	8.72E+15	81.82829177	0.28316468
44	0.1	80	Vvtc vz -c. x Ro. 80x0.1s result PI see.xls	695999998.6	-6.93E-10	29979245.8	695996162	-4.32552E-06	2368358279	1.36E+16	89.99888233	11.6645604
45	0.1	160	Vvtc vx vy0 vz c. z4.97e11 Ro. 160x0.1s result div0.xls	6.69738E-06	-1.3131E-05	4.9234E+11	6.6138E-06	-1.29672E-05	4.9237E+11	2.82E+18	90.00111767	0
46	0.1	160	Vvtc vz c-c. y Ro. 160x0.1s result 2.08388.xls	3.84259E-06	696006966	1658889.86	1.5185E-05	695998410	-2366703025	-1.4E+16	90.00111767	23.339898
47	0.1	80	Vvtc vz c-c. y Ro. 80x0.1s result 2.320042.xls	9.82582E-07	696000777	-1247.05305	3.7712E-06	695997241.8	-1169192521	-6.7E+15	90.00111767	20.9611428
48	0.1	160	Vvtc vz c-c. y Ro. 160x0.1s result 2.083588.xls	696006965.5	-4.4364E-06	1658889.86	695998410	-1.75225E-05	-2366703025	-1.4E+16	90.00111767	23.339898
49	0.1	80	Vvtc vz c. x Ro. 80x0.1s result 4.1067.xls	695999998.6	-6.93E-10	-29979245.8	695996162	-4.32475E-06	-2368358279	-1.4E+16	90.00111767	11.6645604

50	0.1	40	Vvtc 40x0.1s Y NORMAL light ray in different direction result 2.5.xls	59958443 0.5	-3.6662 E-07	6477 007.4	599583 146	-1.0541E -06	-473191 257	-2.7E+ 15	90.0011 1767	19.431 5581
51	0.1	40	Vvtc vz eq c.x eq 2c 40x.1sresult 2.502.xls	59958443 0.5	-3.6662 E-07	6477 007.4	599583 146	-1.0541E -06	-473191 257	-2.7E+ 15	90.0011 1767	19.431 5581
52	0.1	160	Vvtc vz vy 0.7c. x Ro. 160x0.1s result 15.32195 not bad.xls	65103513 0.2	23237 90014	-1741 6368 0	-495671 353	2323788 188	-461533 6694	-2.6E+ 16	92.8813 6738	3.1739 2578
53	0.1	1000	Vvtc vz 0.25c.vx 0.97c, yRo. x 2e8 z 6,5e8 1000x0.1s result 2.3576 Good.xls	3511 4073. 22	69599 9620	1234 7120. 7	-728731 1867	6958953 09.6	-2.8347 E+10	-1.6E+ 17	92.8813 6738	20.626 5423
54	0.1	160	Vvtc vz 0.25c.vx 0.97c, yRo. x 2e8 z 6,5e8 160x0.1s result 2.377165 Good.xls	2761 9255. 29	69599 9577	-1668 0176. 8	-991675 061	6959862 05.8	-396438 7731	-2.3E+ 16	92.8813 6738	20.457 457
55	0.1	160	Vvtc vz 0.25c.vx 0.97c, yRo. x 1.8e8 z 6,2e8 160x0.1s result 240159 Good.xls	1511 4079. 8	69599 9597	-1765 2877. 1	-101167 4778	6959862 46.4	-399438 7580	-2.3E+ 16	92.8813 6738	20.249 7399
56	0.1	160	Vvtc vz 0.25c.vx 0.97c, yRo. x 1.5e8 z 5.8e8 160x0.1s result 2. Good.xls	1037 23.40 16	69599 9651	4017 19.00 9	-104167 4338	6959863 40.5	-403438 7381	-2.3E+ 16	92.8813 6738	19.928 0719
57	0.1	160	Vvtc vz 0.25c.vx 0.97c, yRo. 160x0.1s result	4201 2429 4.9	69599 9699	-9665 4868.	-591680 288	6959904 80.2	-401533 4352	-2.3E+ 16	92.8813 6738	17.014 3186

			2.85844.xls			3						
58	0.1	80	Vvtc vx 0.25c.vz 0.97c, y Ro. 80x0.1s result 4.297657.xls	-29958484 3.5	696002951	1606142.3 4	-292090044	696003005.3	30633467.4	1.76E+14	92.88136738	11.3156416
59	0.1	80	Vvtc vx 0.25c.vz 0.97c, y Ro. 80x0.1s result 4.16899.xls	-7494811.4 5	695999999	-29027280.1	-592089570	695997653.7	-2293153054	-1.3E+16	92.88136738	11.6648728
60	0.1	80	Vvtc vx 0.25c.vz 0.97c, y less Ro. 160x0.1s result 2.08335.xls	-908.0555036	696002962	-3516.88386	-592091386	695994403.7	-2293160088	-1.3E+16	92.88136738	23.3405226
61	0.1	80	Vvtc vx 0.25c.vz 0.97c, y less Ro. 80x0.1s result 4.16899.xls	-7494811.4 5	695999999	-29027280.1	-592089570	695996161.6	-2293153054	-1.3E+16	92.88136738	11.6648728
62	0.1	2000	Vvtc vz 0.25c.vx 0.97c, yRo. x 2e8 z 6,5e8 2000x0.1s result 2.36 Good.xls	27619255.29	695999577	-16680176.8	-1.4782E+10	695786980.5	-5.7375E+10	-3.3E+17	92.88189979	20.6291925
63	0.1	40	Vvtc -vx vz eq .7c.x eq 2c 40x.1s result 7.217.xls	57838638 7.5	-6.9306E-10	71719852 7	-227158051	-1.05418E-06	1522741731	8.72E+15	98.17011138	6.73832433
64	0.1	40	Vvtc vz vz eq .7c.x eq 2c 40x.1sresult 7.127.xls	57838638 7.5	-6.9306E-10	71719852 7	-227158051	-1.05418E-06	1522741731	8.72E+15	98.17011138	6.73832433
65	0.1	80	Vvtc vy vz 0.7c. x Ro. 80x0.1s result 4.169.xls	-21198528	696001491	-21198528	-1674682200	695997653.7	-1674682200	-9.6E+15	98.17170823	11.6645604

66	0.1	160	Vvtc vx vz 0.7c. y Ro. 160x0.1s result 2.10471.xls	-70786889 8.4	69600 0057	-70786889 8	-217056 7245	6959919 03.9	-217056 7245	-1.2E+ 16	98.1717 0823	23.104 7933
67	0.1	80	Vvtc vz 0.25c.vx 0.97c, y Ro. 80x0.1s result 4.3715.xls	1606 213.1 98	69600 2966	4147 22.46 3	306335 37.7	6960030 23.8	790954 5.39	4.53E +13	101.222 4936	11.124 3135
68	0.1	80	Vvtc vz 0.25c.vx 0.97c, y Ro. 80x0.1s result 4.169.xls	-2902 7280. 06	69600 1491	-7494 811.4 5	-229315 3054	6959976 53.7	-592089 570	-3.4E+ 15	101.222 4936	11.664 8728
69	0.1	160	Vvtc vz 0.25c.vx 0.97c, y less Ro. 160x0.1s result 2.083537.xls	-3516. 8838 55	69600 2962	-908.0 5550 8	-229316 0088	6959944 03.7	-592091 386	-3.4E+ 15	101.222 4936	23.340 3664
70	0.1	80	Vvtc vx c-c. z Ro. 80x0.1s result 2.3200.xls	-1247. 0530 45	-1.0874 E-06	6960 0077 7	-116919 2521	-4.30388 E-06	695997 242	3.99E +15	101.595 2706	20.960 969
71	0.1	160	Vvtc vx c-c. y Ro.2.4e in z 160x0.1s result 16.2.xls	-2997 9245. 8	69600 8000	2400 0000 00	-476669 9340	6960075 22.9	239999 8355	1.38E +16	101.595 2706	3.0003 7974
72	0.1	160	Vvtc vx c-c. y Ro.2.4e in x 160x0.1s result 2.083588.xls	1658 889.8 57	69600 6966	-8.814 9E-08	-236670 3025	6959984 10	-3.4244 E-07	-1.9620 6	101.595 2706	23.339 898
73	0.1	40	Vvtc vy vz eq .7c.x eq 2c 40x result 12.032.1s.xls	5995 8491 5.5	21198 528	7171 9852 7	599584 480	8267424 60.5	152274 1954	8.72E +15	133.841 2196	4.0416 9627
74	0.1	80	Vvtc vx 0.25c.vz 0.97c, y 3000 Ro. 80x0.1s result 4.169102.xls	-7494 811.4 5	69600 2999	-2902 7280. 1	-592089 570	6959991 61.6	-229315 3054	-1.3E+ 16	168.404 7293	11.664 5604

75	0.1	40	Vvtc vy c. x Ro. 40x0.1s result 4.65524.xls	69599999 8.6	29979245.8	-1.3442E-11	695998564	1169190027	-2.0491E-08	-0.11741	168.4047293	10.4464361
76	0.1	20	vak variable time create vak1 20x 0.1 sec result 9.956.xls	69599988 1.5	35.5718466	-1.3425E-09	695999990	-209854716.6	-1.2078E-10	-0.00069	168.4047293	4.88445089

Table 2. The various filenames, Time step values, Number of iterations, initial position, and final position of the Neutrino, General relativistic deflection (bending) angle, Calculated Solar elongation angle in degrees, and SITA Deflection are mentioned there.

xXx