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Dynamic Universe Model's Prediction "No Dark Matter" in the Universe Came True!

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Abstract

This paper discusses about Dark matter or Missing mass in Galaxies. In this work the tensor mathematics called Dynamic Universe Model was used to find out theoretical star circular velocity curves in a Galaxy. Here we are presenting four main cases. In the first case, there is a Galaxy with huge central mass at the center, sun like stars and external galaxies are present in the calculations; only in this case the theoretical predictions of circular velocity curves (star circular velocity verses star distance from the center of galaxy) were matching with the observed velocities. In the later three cases either the huge central mass was absent or external galaxies were absent or both were absent, the theoretical circular velocities did not match the observations. Hence the question of missing mass / dark matter does not arise as it is only a calculations error. This prediction was first presented in Tokyo University in 2005, that No dark matter (Missing mass) is required according to Dynamic Universe Model. Later the findings from LUX in 2013 the (Large Underground Xenon) experiment confirmed this prediction.

Keywords: Dark matter, Tensors, stars: rotation curves, Missing mass in Galaxies, (cosmology:) dark matter, Dynamic universe model, Blue Shifted Galaxies, LUX (Large Underground Xenon) experiment

1. Introduction

1.1 Rotation Curve of Galaxy: Missing Mass / Dark Matter: Concept

The astronomical observation and understanding of the internal star motions in the Galaxies was started in about 1956. From this study of star light and especially the 21-cm maps of neutral hydrogen, it was established that Galaxies star circular velocities can be found. In about 1962, missing mass in galaxies became more evident, especially from the astronomical observations of our Milkyway.

Theoretical star circular velocities in a Galaxy, in present day cosmologies are predicted as shown in the left of Figure 1. The observed rotation curves are shown on the right side of Figure 1. To determine the rotation curve of the Galaxy, stars are not used, due to interstellar extinction. Instead, 21-cm maps of neutral hydrogen are used. When this is done, one finds that the rotation curve of the Galaxy stays flat out to large distances, instead of falling off as in the Figure 1. This was interpreted as the mass of the Galaxy increases with increasing distance from the center with Dark matter, as the orbital velocity or speed of stars around its Galaxy center gives the idea of the mean mass inside of its orbit. There is very low amount of visible matter after Sun's orbit around Milkyway centre. But the rotation curve suggests some unknown Dark matter in the halo of our Milkyway. Hence Dark Matter (missing mass) is proposed, to increase the matter density of Galaxy with increasing radius. A general distribution plot of such speed vs. radius is depicted in Figure 1 showing the Dark matter. An earlier version of this paper and other two on Dynamic Universe Model were kept for public about 10 years back, in the servers of members of WAP org, thankfully by Dr Kevin parker. Later these were updated also (See ref SNP. Gupta wap).

There is a usual conceptual mistake. Newtonian Gravitation or Einstein's General theory of Relativity treated the Multi-body dynamical problem as a single body static problem. The usual situation is, there are many Galaxies present in the universe. In each Galaxy there is a Galaxy center with huge mass and many stars rotating about it. How to tackle this problem? It is usual to consider the Galaxy as a solid rotating child's top about a central axis. It may be of disk shape or sphere shape. No external Galaxies, no heavy-duty center, but with uniform density.

Hence the rotation curves are drooping curves. But the observations star circular velocities in a Galaxy, gives us a different picture. People went for speculating invisible missing mass. There is a search but in vain.

Now this assumption of Dark matter proved wrong experimentally. Experiments like LUX (Large Underground Xenon) experiment were devised to detect this mysterious dark matter. There is an abandoned gold mine in LEAD (South Dakota), approximately one mile underground; the dark matter search came empty handed. The most advanced Earth-based search for the dark matter gave absolutely no signal.as said by Akerib and Davis on the Large Underground Xenon (LUX) experiment. A detector attached to the International Space Station has so far also failed to find any dark matter. The experimental results say that there is no dark matter detected from these LUX experiments or any other satellite experiments (Akerib, 2013; UC Davis, 2013).

1.2 No Dark Matter in Dynamic Universe Model

This result was predicted by Dynamic Universe Model theoretically in 2005. The author presented papers saying No missing Mass / No Dark matter in OMEG05, Japan; PHYSTAT05, UK; and HELAS, 2005 Greece. These papers can be seen in Book 1in page 238 (SNP. Gupta, 2010). These *Predicted results came true now in Oct 2013!* In this present work SITA (Simulation of Inter-intra-Galaxy Tautness and Attraction forces) calculations of Dynamic universe model were used to find out Theoretical star circular velocity curves in a Galaxy (star circular velocity verses star distance from the centre of galaxy), depends on various initial conditions and are never half bell shaped curves as predicted by Bigbang cosmologies. We have predicted using Dynamic universe model of cosmology in five different cases and presented them here.

SITA of Dynamic Universe Model was successful in the formation and prediction existence of Blue shifted Galaxies in the Universe. (Papers presented by SNP. Gupta, GR17, Dublin, 2004 & Presented in ICR 2005 International Conference on Relativity, at Amravati University, India, Jan 11- 14, 2005). These blue shifted Galaxies which were about 20 that time. But Hubble space telescope started predicting in large number of Blue shifted Galaxies in 2009. Now this number of blue shifted Galaxies is about 32% including quasars, as quasars also blue shifted. The actual ratio of Red shifted to Blue shifted Galaxies will depend on 1. Universal Gravitational Force acting on each Galaxy at that instant of time; 2. The position of the observer in the Universe; and 3. The actual point mass distribution in three dimensions at that instant of time. This ratio can never be 50:50 (SNP. Gupta, 2012a). for further details. Testing of Dynamic Universe Model and its behaviour at micro sec, 1 sec, 1 month, I year, 10 year was done. The pictures show a non- collapsing mass distributions and formations of orbits due to mutual gravitational attraction forces (Paper presented by SNP. Gupta, Brit Grav 4, Oxford, 2004).

How this “No Missing mass” predicted in Dynamic Universe Model? Five cases were worked out to prove this concept in Dynamic Universe Model. Various graphs show the positions velocities achieved graph after 100 iterations in all the cases. ***Case 1***: deals with a *Huge central mass at the centre of galaxy, sun like stars and external galaxies* ***Case 2***: deals with a situation … ***without*** *a Huge central mass at the centre* of galaxy, sun like stars and external galaxies are present. Similarly in ***Case 3***: is with a Huge central mass at the centre of galaxy, sun like stars and ***no*** external galaxies And the ***Case 4***: is ***without*** *a Huge central mass at the centre* of galaxy, sun like stars and ***no*** *external galaxies in all these*. Here in all these three cases we can conclude final graph won’t match the observations. Whereas only ***Case 1:*** which deals with a *Huge central mass at the centre of galaxy, sun like stars and external galaxies* ***and this matches with observations*. So we can safely conclude that all the three are required to predict Galaxy circular velocity curves and NO DARK MATTER IS required additionally** for further details and for seeing about 20 graphs of this work see the COSPAR 12 poster presentation by the author (SNP. Gupta, 2010, 2011a). Hence these velocity curves depend on various configuration conditions and are never half bell shaped curves as predicted by present day cosmologies. All these “Dist-vel-galaxy-CG graphs” show: X-axis: Radial distance: Distance from mass centre of Galaxy masses to the mass under consideration, in this simulation (110 masses) y- axis: Orbital speed: Projection of velocities perpendicular to the line joining centre of mass to the mass under consideration to the central plane of the Galaxy. Here the plane to be projected is Galaxy central plane. Mass center is the Galaxy mass center pertaining to the set.

1.3 Main Foundational Points of Dynamic Universe Model

Some of the basic initial or working suppositions are -No Isotropy -No Homogeneity -No Space-time continuum -Non-uniform density of matter, universe is lumpy -No singularities -No collisions between bodies -No Blackholes -No warm holes -No Bigbang -No repulsion between distant Galaxies -Non-empty Universe -No imaginary or negative time axis -No imaginary X, Y, Z axes -No differential and Integral Equations mathematically -No General Relativity and Model does not reduce to GR on any condition -No Creation of matter like Bigbang or steady-state models -No many mini Bigbangs -No Missing Mass / Dark matter -No Dark energy & -No Bigbang generated CMB detected -No Multi-verses. Only Newtonian physics based linear equations are used.

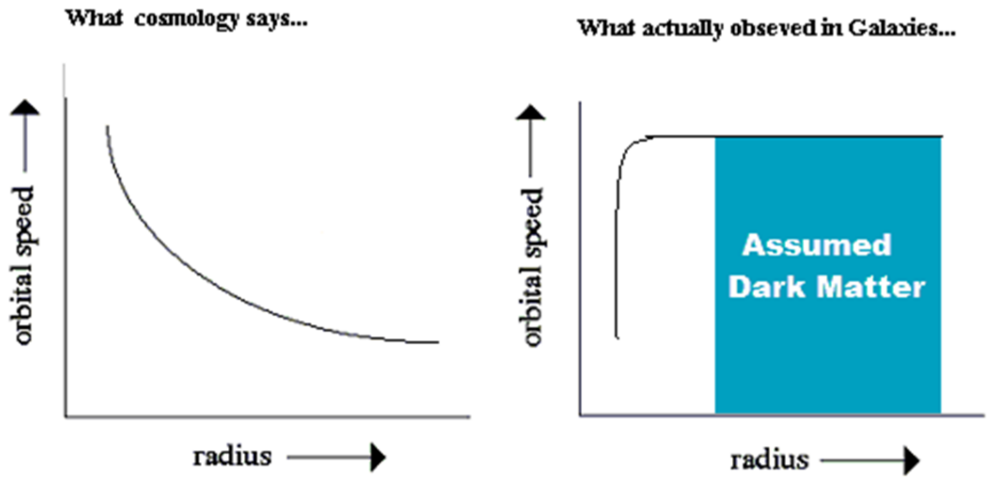


Figure 1. Rotation curve of the Galaxy

2. Mathematical Background

2.1 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. Here the point mass is not a Blackhole but is the total mass of a Star or a Galaxy or a Cluster etc., assumed to be concentrated at the set of coordinates of its Gravitational Center. 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.

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

Total force on the point mass α is F_α, 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}.

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

It may be noted that the above Equation (3) holds good for rigid or fluid bodies or to point masses. (According to notations used here in this paper, point masses are mass values located at the center of gravities of masses they represent. These point masses may represent a light photon, or a proton or a planet or a star or Galaxy etc.) Here system under study is not a Galaxy; it can be any type of set of bodies. Mathematical model here is a general one that is applicable to many situations. Even though, for the present, we use this math setup for Galaxy case by giving suitable numerical values for the equations. Only linear equations are used in this setup.

This paper is about "no dark matter" and concepts like *relative constant Mass, variable mass and missing mass* etc., are not required. There are minor differences between the tensors here and the usual co-variant and contra-variant tensors. "*Tensor potentials are commonly used in the nuclear Physics short ranges forces*" *is correct but can be used for long range also, no problem.* General relativistic effects, modified gravity, MOND, or MOG etc., are avoided in this paper, as these effects introduce singularities. By avoiding such GR based theoretical approach, we can use this N-body problem solution for many problems which are otherwise unsolvable

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 mass α 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

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

$$\text{Or} \Rightarrow \overset{\circ\circ}{x_j^\alpha} = \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\beta \left(x_j^\beta - x_j^\alpha \right) \hat{F}}{\left| x^\beta - x^\alpha \right|^3} - \nabla\Phi_{ext} \tag{7}$$

$$\text{And} \Rightarrow \overset{\circ\circ}{x_k^\alpha} = \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\beta \left(x_k^\beta - x_k^\alpha \right)}{\left| x^\beta - x^\alpha \right|^3} - \nabla\Phi_{ext} \tag{8}$$

Let's define Energy tensor (in the external field ϕ_{ext})

$$\begin{aligned} \frac{d^2 I_{jk}}{dt^2} = 2\sum_{\alpha=1}^{N} m_\alpha \left(\overset{\circ}{x_j^\alpha}\, \overset{\circ}{x_k^\alpha} \right) + \sum_{\substack{\alpha=1 \\ \alpha\neq\beta}}^{N} \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\alpha m_\beta \left\{ \left(x_k^\beta - x_k^\alpha \right) x_j^\alpha + \left(x_j^\beta - x_j^\alpha \right) x_k^\alpha \right\}}{\left| x^\beta - x^\alpha \right|^3} \\ - \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_j^\alpha - \sum_{\alpha=1}^{N} \nabla\Phi_{ext} m_\alpha x_k^\alpha \end{aligned} \tag{9}$$

Let's denote Potential energy tensor = W_{jk} =

$$\sum_{\substack{\alpha=1 \\ \alpha\neq\beta}}^{N} \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N} \frac{G m_\alpha m_\beta \left\{ \left(x_k^\beta - x_k^\alpha \right) x_j^\alpha + \left(x_j^\beta - x_j^\alpha \right) x_k^\alpha \right\}}{\left| x^\beta - x^\alpha \right|^3} \tag{10}$$

Let's denote Kinetic energy tensor =

$$2\ \mathrm{K_{jk}} = 2\sum_{\alpha=1}^{N} m_\alpha\left(\overset{\circ}{x}{}_j^\alpha \overset{\circ}{x}{}_k^\alpha \right) \tag{11}$$

Let's denote External potential energy tensor = 2 Φ_{jk}

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

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

Here in this case

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

$$= \sum_{\substack{\beta=1\\ \alpha\neq\beta}}^{N} \frac{G m_\alpha m_\beta \left(x^\beta - x^\alpha\right)}{\left|x^\beta - x^\alpha\right|^3} - \nabla\Phi_{ext} m_\alpha \tag{14}$$

$$= \left\{ \overset{\circ\circ\alpha}{x} (\mathrm{int}) - \nabla_\alpha \Phi_{ext}(\alpha) \right\} m_\alpha \tag{15}$$

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

We know that the total force at

$$x(\alpha) = F_{tot}(\alpha) = -\nabla_\alpha \Phi_{tot}(\alpha) m_\alpha$$

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

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

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

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

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

2.1.1 Let's 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.

2.1.2 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 … Nj point 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)

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

Here $^{\gamma}$ denotes Ensemble.

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

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

Assume ensemble in an 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 an isolated place.

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

There fore

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

$$\text{And } 2\Phi_{jk} = -\frac{d^2 I_{jk}}{dt^2} + W_{jk} + 2K_{jk} \tag{13}$$

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

2.1.3 Aggregate Equations (Aggregate Consists of Many Ensembles)

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

Here $^{\delta}$ denotes Aggregate.

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

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

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

$$\Phi^{\delta\gamma}_{tot}(\alpha) = \Phi^{\delta\gamma}_{ext} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm^{\delta\gamma}_{\beta}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \tag{22}$$

Therefore $$\Phi_{tot}^{\delta\gamma}(\,_{Aggregate}) = \Phi_{ext}^{\gamma}(\alpha)(_{Ensemble}) = -\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \tag{23}$$

And $$\Phi_{jk}^{\gamma} = \sum_{\alpha=1}^{N^{\gamma}} \nabla\Phi_{ext}^{\delta}\ m_{\alpha} x_{j}^{\delta\alpha} + \sum_{\alpha=1}^{N} \nabla\Phi_{ext}^{\delta}\ m_{\alpha} x_{k}^{\delta\alpha} \tag{24}$$

2.1.4 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).

$$\Phi_{ext}(\alpha) = -\sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\gamma}} \frac{Gm_{\beta}^{\gamma}}{\left|x^{\gamma\beta} - x^{\gamma\alpha}\right|} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left|x^{\delta\gamma\beta} - x^{\delta\gamma\alpha}\right|} \tag{25}$$

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

2.2 Corollaries

2.2.1 Corollary 1

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

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

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

$$2K + W = 0 \tag{28}$$

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

2.2.2 Corollary 2

Ensemble achieved a steady state,

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

$$W_{jk}^{\gamma} + 2K_{jk}^{\gamma} = 2\Phi_{jk}^{\gamma} \tag{30}$$

This Φ_{jk} external field produced at system level. Ensemble achieved a steady state; means system also reached steady state.

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

$$W_{jk} + 2K_{jk} = 2\Phi_{jk}^{\gamma} \tag{31}$$

With this tensor math setup, SITA calculations in Lotus 123 (later transported to excel sheet) was prepared for tensor in Equation (25) about 20 years back. SITA is one of the simplest formations for this equation. There are many other types of calculations possible for this Equation (25). This Equation (25) gives many results that are not possible otherwise today. This tensor can be subdivided into 21,000 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 tensor 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 (SNP. Gupta, 2010, 2011a, 2011b). 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. The second book in the series describes the equations and SITA software in EXCEL emphasizing the singularity free portions. It explains more than 21,000 different equations (2011). 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 21,000 (2011). With this same SITA setup, many physical problems were solved, which are otherwise not possible. For using this SITA, we have to give the initial values of Masses and Cartesian X Y Z "coordinates of Positions, Velocities, & Accelerations". Feeding accelerations is not compulsory. Velocities are also not very important, after few iterations of calculations, all the three dimensional Velocities and accelerations will be formed automatically. For this setup to calculate dark matter, we use the values given in Table 1, as shown in next section 2.3.

2.3 SITA (Simulation of Inter-intra-Galaxy Tautness and Attraction forces):

SITA is a totally non-general relativistic algorithm. Here in NO way GR effects are taken into consideration. No space-time continuum. No λ factor to introduce repulsion between Galaxies at any distance. In this SITA Simulation Universe is assumed to be dynamically moving & rotating. This is not a static model as assumed by Newton, but is a dynamic model. Additionally on SITA, an inhomogeneous and anisotropic lumpy universe was assumed. Details of the structure formations are given below.

Table 1. Simulation: The different masses and their coordinates in three dimensions and the distances are given in the following table. The masses are in Kilograms, and the distances are given in Meters

Sl No.	Name	Qty	Approx mass for each (Kg)	Typical mass	Approx xyz coordinates (M)	Typical distance
1	System	10	7.0e+29	Solar mass	1.0e+20	Inside of Galaxy
2	System*10^9	100	5.0e+39	Galaxy Mass /100	1.0e+20	Inside of Galaxy
3	Ensemble	8	5.0e+41	Galaxy Mass	5.0e+23	Inside of cluster
4	Aggregate	8	5.0e+43	Cluster Mass	2.0e+24	Inside of super cluster
5	Conglomeration	7	5.0e+45	Super Cluster	2.0e+25	Inside of Mega cluster
6	Total	133	2.5e+46	Less than Mega cluster	-	-

Please note the numbers of point masses in different systems are different. The number of systems in different ensembles is different. The point mass is not a Blackhole but is the total mass of a Star or a Galaxy or a Cluster etc., assumed to be concentrated at the set of coordinates of its Gravitational Center as we mentioned earlier. The number of ensembles in different aggregates is different. The number of aggregates in different conglomerates is different. Each point mass represents a Star, Sun, or Globular Cluster. Each system represents Galaxy. Each Ensemble represents local group. Each aggregate represent cluster. Each conglomerate represents group of clusters. The masses & distances were simulated according to near real value. Using the equations developed in the mathematic formulation section, calculations are done to find vectorial resultant forces on each point mass for above configuration. Starting with one- micro second time step. Later the time step was changed to, one second, one minute, one hour, one day, one week, one month, and one year. These steps were given to give a better resolution of initial stages of formations from the starting of simulation. (SNP. Gupta, 2004) (3) Longer time steps were given for seeing the long time effects of the model and were presented in GR17 at Dublin. (SNP. Gupta, 2004) (2) Ring formations were observed.

2.4 Using Regression Analysis

Regression analysis is used for analyzing this large amount of generated data for finding the central plane of Galaxy formed in the context. For this purpose, data from various sources was collected. This data consists of masses, positions, velocities, accelerations, initial velocities, their time stampings etc. From these the data pertaining to Galaxy was separated. Mass center of the data was found. For finding out the present central plane of positions of all masses in the galaxy the following method was used.

Calculate the using statistics, equation for a plane by using the "least squares" method that best fits our data. The equation for the plane is: $y = m1x1 + m2x2 + ... + b$ where the dependent y-value is a function of the independent x-values. The m-values are coefficients corresponding to each x-value, and b is a constant value. In this regression analysis, we calculate for each point the squared difference between the y-value estimated for that point and its actual y-value. The sum of these squared differences is called the residual sum of squares. We then calculate the sum of the squared differences between the actual y-values and the average of the y-values, which is called the total sum of squares (regression sum of squares + residual sum of squares). The smaller the residual sum of squares is, compared with the total sum of squares, the larger the value of the coefficient of determination, r2, which is an indicator of how well the equation resulting from the regression analysis explains the relationship among the variables. The accuracy of the plane calculated depends on the degree of scatter in our data. This uses the method of least squares for determining the best fit for the data. When we have only one independent x-variable, the calculations for m and b are based on the following formulae:

$$m = \frac{n\,(\sum xy)\,(\sum x)\,(\sum y)}{n\,(\sum x^2) - (\sum x)^2} \tag{34}$$

$$b = \frac{(\sum y)(\sum(x^2)) - (\sum xy)\,(\sum x)}{n\,(\sum x^2) - (\sum x)^2} \tag{35}$$

3. Resulting Graphs

In all these cases, with same initial conditions, SITA calculations for N-body dynamic systems were done. Stars at star distances and external Galaxies at Galactic distances were taken. Results of 100 iterations were taken uniformity. A total of 15 graphs were plotted using that data as shown in Table 2.

Case 1: From starting positions to positions after 100 iterations showing disk formation and velocities achieved graph. This is with a *Huge central mass at the center of galaxy, sun like stars and external galaxies xy,* zx position graphs. This Graph shows the theoretical star circular velocity curves in a Galaxy (star circular velocity verses star distance from the center of galaxy).

Case 2: Similar as above, showing disk formation and velocities achieved graph. This is *without a Huge central mass at the center* of galaxy, sun like stars and external galaxies xy, position graphs

Case 3. Similar ascase1, showing disk formation and velocities achieved graph. This is *wih a Huge central mass at the center* of galaxy, sun like stars and *no external galaxies* xy, position graphs.

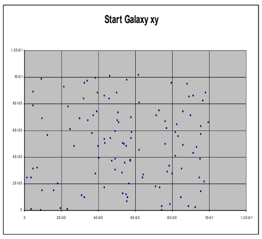
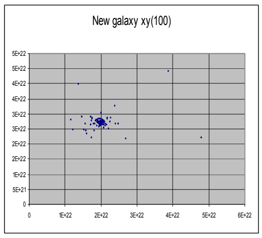
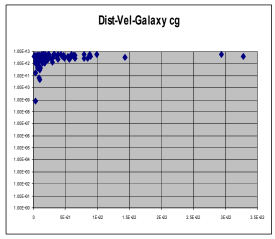
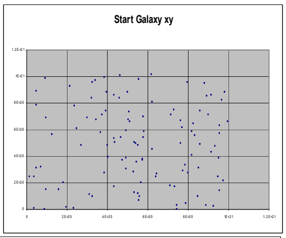
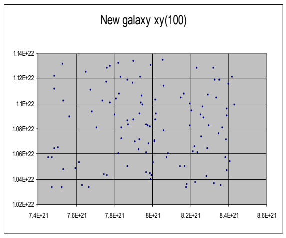
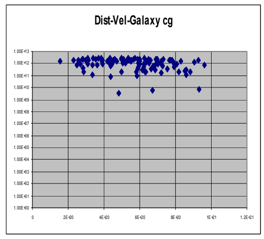
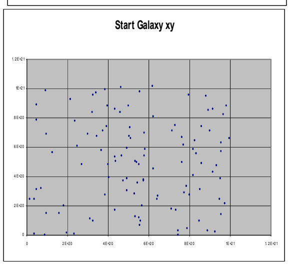
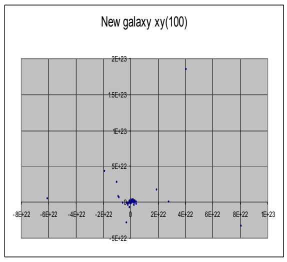
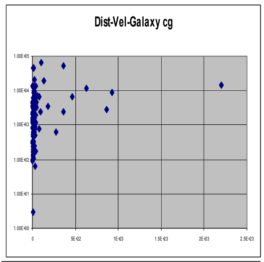
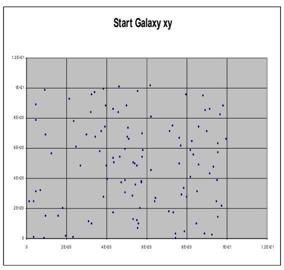
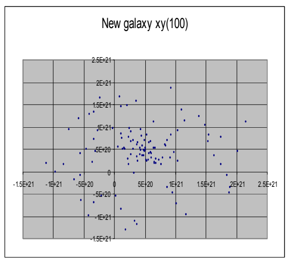
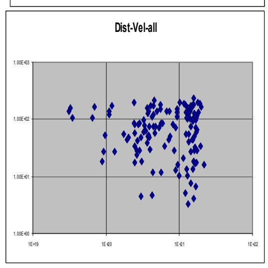
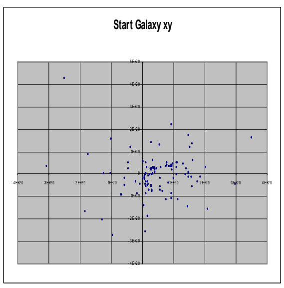
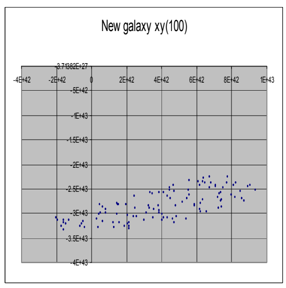
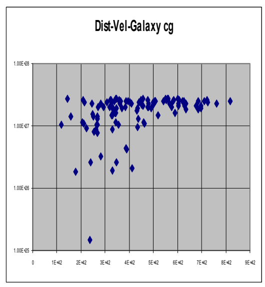
Case 4. Similar as case 1, showing *no* disk formation and velocities achieved graph. This is *wihout a Huge central mass at the center* of galaxy, sun like stars and *no external galaxies* xy, position graphs.

Case 5. Theoretical star circular velocity curves in a Galaxy (star circular velocity verses star distance from the center of galaxy) in *gravitationally stabilized system of masses after forming a galaxy disk. I did it's stability analysis tests, by giving perturbations and Jeans swindle test.*

4. Results and Discussion

This paper shows that Dark matter or Missing mass in Galaxies is nothing but a calculation mistake. When we consider the dynamically changing mutual gravitation effects of the huge central mass at the center of Galaxy, sun like stars in the Galaxy and external Galaxies are present in the calculations; the theoretical predictions of circular velocity curves (star circular velocity verses star distance from the center of galaxy) were matching with the observed velocities. The calculations were done using Newtonian gravitation and a new tensor mathematics called Dynamic Universe Model were used to find out dynamically changing mutual gravitation effects on all the bodies. For any further discussions the author can be contacted at snp.gupta@gmail.com. The theoretical star circular velocity curves in a Galaxy were plotted. Here four main cases were presented. Hence the question of missing mass / dark matter does not arise as it is only a calculations error. This prediction was first presented in Tokyo University in 2005, that No dark matter (Missing mass) is required according to Dynamic Universe Model. Later the findings from LUX in 2013 the (Large Underground Xenon) experiment confirmed this prediction.

Graph Table 2. Theoretical Galaxy Circular Vel vs radius Graphs in different cases with start end of 100 iterations positions

	Case	Starting positions	End of 100 iterations	Velocity vs Gal Radius
1	Case 1: From starting positions to positions after 100 iterations showing disk formation and velocities achieved graph. This is with a *Huge central mass at the center of galaxy, sun like stars and external galaxies xy,* zx position graphs.			
2	Case 2: From starting positions to positions after 100 iterations showing disk formation and velocities achieved graph. This is *without a Huge central mass at the center* of galaxy, sun like stars and external galaxies xy, zx position graphs.			
3	**Case 3: From starting positions to positions after 100 iterations showing disk formation and velocities achieved graph. This is *wih a Huge central mass at the center* of galaxy, sun like stars and *no external galaxies* xy, zx position graphs.**			
4	Case 4: From starting positions to positions after 100 iterations showing *no* disk formation and velocities achieved graph. This is *without a Huge central mass at the center* of galaxy, sun like stars and *no external galaxies* xy, zx position graphs.			
5	Case 5: Theoretical star circular velocity curves in a Galaxy (star circular velocity verses star distance from the center of galaxy) in gravitationally stabilized system of masses after forming a galaxy disk when it's stability analysis was done by giving perturbations and jeans swindle test			

Cases 1, 2, 3 & 4 show cases with and without central mass and / or external galaxies. We can see clearly external Galaxies and Central mass in Galaxy is required as distance velocity curves are near to actual observational results. These N-body calculations and results are showing theoretical star circular velocity curves. So the Galaxies need not be assumed to have some missing mass.

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