Blue and Red Shifted Galaxies are resulted due to frequency shifting in electromagnetic radiation near gravitating masses in Dynamic Universe Model

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Abstract: According to General theory of relativity the frequency shift in electro-magnetic (EM) radiation close to a gravitating mass happens in one direction only, but in accordance with Dynamic Universe Model this frequency shift happens on both the sides of spectrum. Here we will derive the results using general Physics and Mathematics that changes the frequency of electromagnetic radiation passing near a moving gravitating mass. The frequency of the radiation will increase (Red shifted) when the relative movement of the gravitating body is in opposite direction to EM radiation and the frequency will reduce when in same direction (Blue shifted).

Keywords: Dynamic Universe Model, Hubble Space telescope (HST), SITA simulations , singularity-free cosmology, Blue shifted Galaxies , Red shifted Galaxies

1. Introduction:

General theory of relativity says that the frequency shift in electro-magnetic radiation near a gravitating mass happens in one direction only. Here in this paper we will see that Dynamic Universe Model says this frequency shift happens on both the sides of spectrum. That means towards the frequency of a mass like electron or positron also. In other words Dynamic Universe Model predicts conversion of energy into mass.

Dynamic Universe model is a singularity free tensor based math model. The tensors used are linear without using any differential or integral equations. Only one calculated output set of values exists. Data means properties of each point mass like its three dimensional coordinates, velocities, accelerations and it's mass. Newtonian two-body problem used differential equations. Einstein's general relativity used tensors, which in turn unwrap into differential equations. Dynamic Universe Model uses tensors that give simple equations with interdependencies. Differential equations will not give unique solutions. Whereas Dynamic Universe Model gives a unique solution of positions, velocities and accelerations; for each point mass in the system for every instant of time. This new method of Mathematics in Dynamic Universe Model is different from all earlier methods of solving general N-body problem.

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.

Because of the dynamism built in the model, the universe does not collapse into a lump (due to Newtonian gravitational static forces). This Model depicts the three dimensional orbit formations of involved masses or celestial bodies like in our present universe.

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. 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. This book written in 2011 [15] explains more than 21,000 different equations. 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 is a simplified version and contains explanation for 3000 equations instead of earlier 21000 and this book also was written in 2011[16]. The fourth book (2012) [20] in the series on Dynamic Universe Model: SITA, gave simulations that predicted the existence of the large number of Blue-shifted Galaxies in 2004, ie., more than about 35 ~ 40 Blue-shifted Galaxies known at the time of Astronomer Edwin Hubble in 1930s. The far greater numbers of Blue-shifted galaxies was confirmed by the Hubble Space Telescope (HST) observations in the year 2009. Some of the other papers published by the author are available at refs. [3, 5, 8, 9, 10, 11, 17, 19].

SITA solution can be used in many places like presently 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.

2. History of frequency shifting

After 1922 Hubble published a series of papers in Astrophysical Journal describing various Galaxies and their red shifts / blue shifts. Using the new 100 inch Mt. Wilson telescope, Edwin Hubble was able to resolve the outer parts of some spiral nebulae as collections of individual stars and identified some Cepheid variables, thus allowing him to estimate the distance to the nebulae: they were far too distant to be part of the Milky Way. In the Ref. [6,8,23] one can find more detailed analysis of this issue. And later using 200 inch Mt Palomar telescope Hubble could refine his search. In 1936 Hubble produced a classification system for galaxies that is used to this day, the Hubble sequence.
In the 1970s it was discovered in Vera Rubin's study of the rotation speed of gas in galaxies that the total visible mass (from the stars and gas) does not properly account for the speed of the rotating gas. This galaxy rotation problem is thought to be explained by the presence of large quantities of unseen dark matter. This dark matter question was discussed by Vera Rubin, see the Ref. [1, 2].
In fact there are millions of Blue shifted Galaxies not just 8300 found from 2009 by Hubble space telescope. 'Beginning in the 1990s, the Hubble Space Telescope yielded improved observations. Among other things, Go to ADS search page try searching title and abstract with keywords "Blue shifted quasars". If you search with "and"s ie., 'Blue and Shifted and Galaxies" [use "and" option not with "or"option] you will find 248 papers in ADS search. I did not go through all of them. it established that the missing dark matter in our galaxy cannot solely consist of inherently faint and small stars. One can find more detailed analysis of this issue in the published ltarature on Hubble Deep Field, They gave an extremely long exposure of a relatively empty part of the sky, provided evidence that there are about 125 billion (1.25×10^{11}) galaxies in the universe. Further details can be found at ref [6]. Improved technology in detecting the spectra invisible to humans (radio telescopes, infrared cameras, and x-ray telescopes) allow detection of other galaxies that are not detected by Hubble. Particularly, galaxy surveys in the Zone of Avoidance (the region of the sky blocked by the Milky Way) have revealed a number of new galaxies. In the Ref. [7] one can find more detailed analysis of this issue.
Hubble Space Telescope's improved observational capabilities resolved as many as 8300 galaxies as Blue shifted till today which will discuss later in this paper.

3. Prediction of Blue shifted Galaxies

3.1. Co-Existence of Red and Blue shifted Galaxies

These simulations of Dynamic Universe Model predicted the existence of the large number of Blue shifted Galaxies in 2004, ie., more than about 35 ~ 40 Blue shifted Galaxies known at the time of Astronomer Edwin Hubble in 1930s. See the ref [8]. The far greater numbers of Blue shifted galaxies was confirmed by the Hubble Space Telescope (HST) observations in the year 2009. Today the known number of Blue shifted Galaxies is more than 8300 scattered all over the sky and the number is increasing day by day. This is a greater number compared to 30-40 Blue shifted galaxies earlier.
In addition the author presumes that there is a greater probability that the Quasars, UV Galaxies, X-ray, γ- Ray sources and other Blue Galaxies etc., are also Blue shifted Galaxies. Another assumption can be made about images of Galaxies. A safe assumption can be… out of a 930,000 Galaxy spectra in the SDSS database, about 40% are images for Galaxies; that leaves about 558,000 as Galaxies. If both the assumptions are correct, then there are 120,000 Quasars, 50,000 brotherhood of (X-ray, γ-ray, Blue Galaxies etc.,) of quasars, 8300 blue shifted galaxies. That is about 32% of available Galaxy count are Blue shifted. And if we don't assume any images and assume about Quasars etc only, then it will be about 20% are Blue shifted Galaxies.

3.2. Dynamic Universe Model: Blue and Red shifted Galaxies:

In this Dynamic Universe Model – Galaxies in a cluster are rotating and revolving. Depending on the position of observer's position relative to the set of galaxies, some may appear to move away, and others may appear to come near. The observer may also be residing in another solar system, revolving around the center of Milky Way in a local group. He is observing the galaxies outside. Many times he can observe only the coming near or going away component of the light ray called Hubble components. The other direction cosines of the movement may not be possible to measure exactly in many cases. It is an immensely complicated problem to untangle the two and pin point the cause of non–Hubble velocities. This question was discussed by JV. Narlikar in (1983) see the ref [18]. 'Nearby Galaxies Atlas' published by Tully and Fischer contains detailed maps and distribution of speeds of Galaxies in the relatively local region.[4] The multi component model used by them uses the method of least squares. Hence we can say that Galactic velocities are possible in all the directions.

3.3. Present-day peculiar motions of Galaxies, Hubble flow, Distant Red-shifted Galaxies:

'Peculiar motions' of Galaxies is the thing predicted by Dynamic Universe Model theoretically, whereas a Bigbang based cosmology predicts only radially outward motion from earth or red-shifted Galaxies and no blue-shifted Galaxies at all.

Local group of Galaxies are present up to a distance of 3.6 MPC. From that point onwards, we will find red-shifted Galaxies. I don't know where actually *Hubble flow* starts. But I think that is the distance of 3.6 MPC where so called Hubble-flow starts. If the Hubble flow does not start here, why do red-shifted galaxies appear from this distance onwards? If the Hubble–flow is such strong, why would it leave some 8300 blue-shifted Galaxies? Anybody can see the updated list of Blue shifted Galaxies in the NED. (NASA/IPAC EXTRAGALACTIC DATABASE) by JPL anybody can get the exact number of Blue shifted Galaxies by Hubble space telescope to the present date & time. (If you need any assistance in searching NED, please contact the author) As on 4th April 2012 at 1210 hrs Indian time, it is 7306 Blue-shifted galaxies. But presently this search gives 8300. Some current active research and discussions can be found in physics forums by searching 'blue-shifted-galaxies-there-are-more'.

We are discussing 'Hubble flow' as some unknown force pulling away all the galaxies to cause the expansion of universe. But in reality it is the going away component of 'peculiar motion' of that particular Galaxy. That Galaxy may be moving in any direction in reality. Each Galaxy move independently, with the gravitational force of its Local group, clusters etc. There is no separate Hubble force to cause a separate Hubble flow…

Different estimates of distances of Blue-shifted Galaxies especially in Virgo Cluster are varying. There are about 3000 blue-shifted Galaxies in Virgo cluster. Some estimate for the most distant Blue-shifted Galaxy in Virgo cluster may go as high as 40 MPC, and other estimate go as low as 17 MPC. I don't know whom to believe. Here distance estimate is not dependent on Red / Blue shift, but dependent on various other methods. Here probably the distance and red shift proportionality is not working. So we can see that blue shifted Galaxies are not confining to earlier thinking of 3.6 MPC distances. Here, the estimated distance is not depending on Red / Blue shift, but on various other methods. Accurate

measurement of distances after 40 MPC depends mostly on red-shift only. There is a hope to find an accurate estimate of distance, if type 1a Supernova standard candle is observed in a Galaxy. When we are estimating the distance with red-shift, finding far off blue-shifted Galaxies is not possible.

All these findings are from some recent times only. Hence nothing can be said about the peculiar motions of blue shifted Galaxies. All these velocities are at present radial velocities only. A lot of work is to be done in these lines.

In general, whether the Source is emitting radiation in Infrared (Microwave or some lover frequencies) region or lower, or the Source is in Ultra violet (X-rays or higher) frequency region, we take the source as red-shifted only. The sources which emit only X-rays were taken as red-shifted, though by definition, X-rays are blue-shifted, due to their higher frequency. Even if the source is emitting a single frequency radiation, we find it is only red-shifted.

4. Mathematical Background

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 = $$M = \sum_{\alpha=1}^{N} m_\alpha \qquad (1)$$

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.

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

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}.

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

Its second derivative is

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

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

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

Writing a similar formula for F^{α}_k

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

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

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})

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

$$-\sum_{\alpha=1}^{N}\nabla\Phi_{ext}m_{\alpha}x_j^{\alpha} - \sum_{\alpha=1}^{N}\nabla\Phi_{ext}m_{\alpha}x_k^{\alpha} \tag{9}$$

Lets denote Potential energy tensor = Wjk =

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

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}

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

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

Here in this case

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

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

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

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

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

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

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

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

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

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

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 masses in the same system (Galaxy), they are at the same level, a higher level for a cluster of galaxies, and a lower level is for planets & asteroids].

ϕ_{ext} is 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, the center of (mass) gravity outside systems (Galaxies) will act as (unit) its own internal lower level, practically will be considered into calculations. Hence separate 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 masses 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 $^{\gamma}$ denotes Ensemble.

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

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

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 $\phi^{\gamma}_{ext}(\alpha) = 0$
Therefore

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

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)

$$\frac{d^2 I_{jk}^{\delta\gamma}}{dt^2} = W_{jk}^{\delta\gamma} + 2K_{jk}^{\delta\gamma} - 2\Phi_{jk}^{\delta\gamma} \quad (18\text{-A})$$

Here $^{\delta}$ denotes Aggregate.

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

$$\frac{d^2 I^{\gamma}{}_{jk}}{dt^2} = W_{jk}^{\gamma} + 2K_{jk}^{\gamma} - 2\Phi_{jk}^{\gamma} \quad (18\text{-E})$$

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.

$$\Phi_{tot}^{\delta\gamma}(\alpha) = \Phi_{ext}^{\delta\gamma} - \sum_{\substack{\beta=1 \\ \alpha\neq\beta}}^{N^{\delta\gamma}} \frac{Gm_{\beta}^{\delta\gamma}}{\left| x^{\delta\gamma\beta} - x^{\delta\gamma\alpha} \right|} \quad (22)$$

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

Therefore (23)

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

And (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).

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

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

Corollary 1:

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

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

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

$$2K + W = 0 \quad (28)$$

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,

$$\frac{d^2 I_{jk}^{\gamma}}{dt^2} = 0$$

i.e. (29)

$$W_{jk}^{\gamma} + 2K_{jk}^{\gamma} = 2\Phi_{jk}^{\gamma} \quad (30)$$

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

$$\frac{d^2 I_{jk}}{dt^2} = 0$$

i.e. (27)

$$W_{jk} + 2K_{jk} = 2\Phi_{jk}^{\gamma} \quad (31)$$

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

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

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. 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 relatively simple and straightforward. For all the mathematics, and the Excel based software, details are explained in the three books published by the author [14, 15, 16]

4.1. Derivation of equations for the effect of movement of gravitational mass on the frequency of the incoming light ray with c:

The rest mass of the photon is = $\boldsymbol{m} = \boldsymbol{E / c^2}$. Gravitational field of the mass (Sun or star or some gravitational mass) = $\boldsymbol{g_o}$. The distance of the photon from center = $\boldsymbol{r}$. Energy = $\boldsymbol{E\, g_o\, r / c^2}$. Frequency of photon = $\boldsymbol{\vartheta} = \boldsymbol{E / h}$ *or* $\boldsymbol{E} = \boldsymbol{h\, \vartheta}$.

Case1*. When the velocity of gravitational mass is opposite to the incoming light ray:*
In this case the gravitational field will act as some brake on the incoming light ray.

The gravitating mass is moving with a velocity $\boldsymbol{\mu}$ in the opposite direction and applies brake on the photon. This is something similar to the case where the gravitational mass is fixed in position and the photon of the rest mass $\boldsymbol{E / c^2}$ is moving with velocity $\boldsymbol{\mu + c}$
Hence the initial velocity of photon = - $\boldsymbol{\mu - c}$. It's velocity is towards the gravitational mass. The photon is having a freefall. Its final velocity = - $\boldsymbol{\mu - c - g_o t}$ [where $\boldsymbol{t}$ is the time of flight of photon].

Initial Energy = $m(\mu+c)^2/2 = E(\mu+c)^2/2c^2 = E(\mu^2+c^2+2\mu c)/2c^2$
Final Energy = $\frac{1}{2}(E/c^2)(-\mu-c-g_o t)^2 = \frac{1}{2}(E/c^2)(\mu^2+c^2+g_o^2t^2+2\mu g_o t+2cg_o t+2\mu c)$
Change in Energy = $\frac{1}{2}(E/c^2)(g_o^2t^2+2\mu g_o t+2cg_o t)$, here $E = h\vartheta$ that means
Change in Energy = $\frac{1}{2}(h\vartheta/c^2)(g_o^2t^2+2\mu g_o t+2cg_o t)$

Hence change in Frequency = $\vartheta = 1/\{2(h/c^2)(g_o^2t^2+2\mu g_o t+2cg_o t)\}$ (32)
Here the frequency increases. The incoming ray from a distant Galaxy will be Red shifted.

Case2*. When the velocity of gravitational mass is same direction as the incoming light ray:*
In this case the gravitational field will enhance the energy of the incoming light ray.

The gravitating mass is moving with a velocity μ in the same direction and enhances energy of the photon. This is something similar to the case where the gravitational mass is fixed in position and the photon of the rest mass E/c^2 is moving with velocity $(c-\mu)$
Hence the initial velocity of photon = $(c-\mu)$. It's velocity is towards the gravitational mass. The photon is having a freefall. Its final velocity = $-\mu+c-g_o t$ [where t is the time of flight of photon].
Initial Energy = $m(-\mu+c)^2/2 = E(-\mu+c)^2/2c^2 = E(\mu^2+c^2-2\mu c)/2c^2$
Final Energy = $\frac{1}{2}(E/c^2)(-\mu+c-g_o t)^2 = \frac{1}{2}(E/c^2)(\mu^2+c^2+g_o^2t^2+2\mu g_o t-2cg_o t-2\mu c)$
Change in Energy = $\frac{1}{2}(E/c^2)(g_o^2t^2+2\mu g_o t-2cg_o t)$, here $E = h\vartheta$ that means
Change in Energy = $\frac{1}{2}(h\vartheta/c^2)(g_o^2t^2+2\mu g_o t-2cg_o t)$

Hence change in Frequency = $\vartheta = 1/\{2(h/c^2)(g_o^2t^2+2\mu g_o t-2cg_o t)\}$ (33)
Here the frequency decreases. Incoming ray from a distant Galaxy will be Blue shifted.

Case3*. When the velocity of gravitational mass is not exactly opposite or exactly in the same direction to the incoming light ray:*

In this case the gravitational field will act as some brake or enhance the energy of the incoming light ray depending on $(\text{Cos}\,\phi)$ of the velocity of gravitational mass relative to incoming radiation, where (ϕ) is the angle between the light ray and velocity of gravitational mass .

The gravitating mass is moving with a velocity μ in the opposite direction and applies brake on the photon. This is something similar to the case where the gravitational mass is fixed in position and the photon of the rest mass E/c^2 is moving with velocity $\mu\,\text{Cos}\,\phi + c$
Hence the initial velocity of photon = $-\mu\,\text{Cos}\,\phi - c$. It's velocity is towards the gravitational mass. The photon is having a freefall. Its final velocity = $-\mu - c - g_o t$ [where t is the time of flight of photon].
Initial Energy = $m(\mu\,\text{Cos}\,\phi+c)^2/2 = E(\mu\,\text{Cos}\,\phi+c)^2/2c^2 = E(\mu^2\,\text{Cos}^2\,\phi+c^2+2\mu\,\text{Cos}\,\phi\, c)/2c^2$
Final Energy = $\frac{1}{2}(E/c^2)(-\mu\,\text{Cos}\,\phi-c-g_o t)^2 = \frac{1}{2}(E/c^2)(\mu^2\,\text{Cos}^2\,\phi+c^2+g_o^2t^2+2\mu\,\text{Cos}\,\phi\, g_o t+2cg_o t+2\mu\,\text{Cos}\,\phi\, c)$
Change in Energy = $\frac{1}{2}(E/c^2)(g_o^2t^2+2\mu\,\text{Cos}\,\phi\, g_o t+2cg_o t)$, here $E = h\vartheta$ that means
Change in Energy = $\frac{1}{2}(h\vartheta/c^2)(g_o^2t^2+2\mu\,\text{Cos}\,\phi\, g_o t+2cg_o t)$

Hence change in Frequency = $\vartheta = 1/\{2(h/c^2)(g_o^2t^2+2\mu\,\text{Cos}\,\phi\, g_o t+2cg_o t)\}$ (34)

Here it can be observed that equation 34 is the main equation and the equation 32 and 33 are special cases of equation 34. It will become equation 32 when ϕ is '0 degrees' and equation 33 when ϕ is 180 degrees.

5. SITA: Blue Shifted galaxies Graphs and Numerical Outputs

Regarding the earlier work on the Blue shifted galaxies using Dynamic Universe Model, its new simulations and old simulations and the resulting graphs of new & old simulations for Blue Shifted Galaxies and their tables of Initial values for these old & new Blue shifted Galaxies simulations… see the old published material like books and papers from the author [20].

6. Discussion:

Here we derived the equations using general Physics and Mathematics that changes the frequency of electromagnetic radiation passing near a moving gravitating mass. Using these equations we can

clearly see that the light from distant Galaxy when passes grazingly near a gravitating mass like Sun the incident frequency of the radiation will increase (Red shifted) when the relative movement of the gravitating body is in opposite direction to EM radiation and the frequency will reduce when the relative movement of the body is in same direction (Blue shifted).

7. Conclusion

Dynamic Universe model is based on hard observed facts and gives many verifiable facts. Even though the frequency shifting as described here was not a physically observed fact, this paper gives possible outcome viz., blue and red shifting.

The ultimate shape of the Universe and its content like the number of Galaxies cannot be decided from the present observed data. Many more experiments were to be conducted and observations to be made. There will be many images for Galaxies due to multiple bending of light, which are to be eliminated first.

8. Acknowledgements

I sincerely thank Maa Vak for continuously guiding this research.

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