UNIVERSE, DARK MATTER & DARK ENERGY

T. Nejat Veziroglu[a]* & Cagri Oztan[b]
[a]ASME Fellow, I. Mech. E. Fellow, Inst. A & A Fellow, AAAS Fellow
Emeritus Professor, University of Miami
4910 Biltmore Drive, Coral Gables, FL 33146, U.S.A.
[b]Graduate Student, University of Miami,
Coral Gables, FL 33124, U.S.A.
*Corresponding Author: email: Veziroglu@iahe.org; Tel: 1-305-456-9353

ABSTRACT

This paper points out that the Spin-Top Model of the universe explains many hitherto unexplained features of the universe, such as the universe being flat rather than spherical, collision of galaxies, some smaller galaxies orbiting bigger galaxies, etc. Using the Spin-Top Model of the universe, the paper explains the so called dark matter and dark energy, and derives the pertinent equations using the well-known laws of the physics. It clearly shows that we don't have to invoke some invisible particles with magical properties to try explain the dark matter and the dark energy.

Keywords: Universe, Spin-Top Model, Dark Matter, Dark Energy

INTRODUCTION

In the universe, all the heavenly bodies rotate around themselves, as well as rotating around each other. Observing such motions in more than 15,000 galaxies, US physicists have reached the conclusion that the universe was born spinning and continues to do so around a preferred axis [1, 2]. Taking into account such observations, the Spin-Top Model has been developed to explain the birth and workings of the universe. It is shown that the Spin-Top Model explains the observed features of the universe better than the Big Bang Model [3 - 5].

Initially universe is made up of a huge spinning mass, an oblate spheroid in shape, which we call "universe seed" or "u-seed. It essentially consists of the smallest stable elements, i.e., protons and electrons. When the pressures and temperatures are right – as a result of thermonuclear reactions – there will be an extra massive explosion creating the primordial soup, consisting of mainly hydrogen, isotopes of hydrogen, helium, neutrinos and electromagnetic rays. The matter in this soup will have outward velocity components imparted by the spinning u-seed and the explosion, and an inward acceleration (directed towards the universe center) generated the gravitational pull. The velocities will have radial components, angular components and relatively smaller axial components. The axial components will be upward if the particle in question comes out of the upper part (i.e., above the universe plane) of the u-seed, and will be downward if the particle in question comes from the lower part (i.e., below the universe plane) of the u-seed. This spinning soup, which is moving outwardly, will start to coalesce, forming the universe spirals, as well as the universe eye devoid of any matter, just like rotating humid air coalesces into hurricane spirals and forms the hurricane eye devoid of clouds (Fig. 1). In the figure the universe is rotating counterclockwise if you look from the top, and it is rotating clockwise if you look from the bottom. Hence, the symmetry principle is preserved. There has been proposals for a toroidal shaped universe [6, 7]; however, they are not spinning or rotating.

As a result of interplay between the spinning imparted from the u-seed and shear forces, the matter within the spirals will divide into cells. The cells will spin, as well as move around each other. Within the cells, as a result of gravitational effects, the matter will coalesce to form galaxies. Consequently, some smaller galaxies will orbit bigger ones, just like planets orbiting the sun [8, 9]. It should be noted that, because of the Coriolis effects, the spins (or rotations) of the galaxies will initially be in opposite direction to that of the universe. This is the reason why we are observing more galaxies with left-handed spins than the right-handed spins [10].

Within the galaxies, hydrogen/helium planets and stars will form. In turn, stars will generate all the elements to form "rocky" planets, moons and the star systems (or the solar systems), as well as meteors, asteroids and other heavenly bodies.

Eventually, the outward motions of the heavenly bodies within the universe spirals (i.e., galaxies, all the heavenly bodies and gas clouds) will slow down because of the gravitational forces pulling them towards the universe center, and the radial velocity components will reverse together with the axial velocity components, and they will start moving towards the universe center, while always rotating around the u-center. In other words, the **Growth Phase** of the universe will end and the **Recoil Phase** will start. Note that all the time the outermost envelope of the universe will be an oblate ellipsoid because of the velocities imparted to them at the time of the u-speed explosion. Then, the galaxies will start their travels towards the center of the universe, and begin reforming the u-seed. It will consist of all the space occupants (made up of stars, planets, other heavenly bodies and gases). As a result of high gravitational forces and high temperatures, molecules will be crushed into atoms, and atoms will be crushed into protons and electrons. Since all the heavenly matter making up the new u-seed have been rotating around the u-center, the new u-seed will also be rotating (or spinning) as the original u-seed. When the pressures and temperatures in the new u-seed reaches the critical values, a new huge explosion will ensue, forming a new universe. Fig. 2 presents the life cycle of the Universe.

The above described universe life cycle will be repeated for eons to come. Since all the matter and the energy - generated in various forms – remains within the universe, it is the perfect and only perpetual motion machine!

Dark Matter

Vera Rubin and her colleagues [11, 12] noticed that the rims of some galaxies were rotating much faster than the estimates showed. They estimated that they must contain about six parts of invisible matter for every one part of the visible matter. Of course, they assumed that the Big Bang model of the universe was correct, and the galaxies were just moving away from each other in straight lines. As we shall show here below, when you consider that all the galaxies are rotating around the universe center, then you don't need dark matter to explain the observed high velocities of the galaxy rims.

Consider a smaller mass M_1 rotating around a larger mass M_0 with a velocity V_1. Hence the equilibrium of the forces acting on M_1 can be expressed as:

Gravitational Force = Centrifugal Force

or $$C \cdot \frac{M_0 M_1}{{R_1}^2} = \mathrm{M}_1 \frac{{V_1}^2}{R_1} \quad (1)$$

where C is a constant and R_1 is the radius of the orbit.

From (1):

$$V_1 = \sqrt{\frac{CM_0}{R_1}} \quad (2)$$

Fig. 3 shows a quarter of the universe looking down along the axis of rotation (i.e., z axis) of the universe, as well as two galaxies, viz., the Milky Way and another galaxy, which is being observed from the earth in the Milky Way galaxy. If we are able (more or less easily) to observe the circular motion of the rim (where a cluster of stars reside) of the galaxy, it should be between the earth or the Milky Way and the universe axis as indicated in the figure. Also, the galaxy would be facing the earth, but not necessarily exactly at a right angle. The dotted line in the figure indicates where the projection of the velocity vector V_r of the rim lies as seen from the earth. Then the velocity V_{g0} of the rim of the galaxy as observed from the earth or from the center of the Milky Way (since the distances within the Milky Way are much smaller than the distance between the two galaxies) becomes:

$$V_{g0} = V_r \cdot cos\theta_r + V_g \cdot cos\theta_g - V_m \cdot cos\theta_m \quad (3)$$

where V_r, V_g and V_m are the rim velocity of the galaxy, the galaxy's velocity around the universe center and V_m the Milky Way's velocity around the universe center respectively; θ_r, θ_g and θ_m are the angles between the respective velocity vectors and the dotted line. Since the velocity vectors V_g and V_m do not intersect the dotted line, one should move vectors parallel to themselves till they intersect the dotted line to measure the angles θ_g and θ_m.

From (2) and (3), one obtains:

$$V_{go} = \sqrt{C}\left\{\sqrt{\frac{M_g}{R_r}}cos\theta_r + \sqrt{\frac{M_u}{R_g}}cos\theta_g - \sqrt{\frac{M_u}{R_m}}cos\theta_m\right\} \quad (4)$$

This is the velocity measured by Vera Rubin et al. As assumed by them, let us assume that the measured velocity V_{go} is due to the actual mass of the galaxy (M_g) plus the "dark matter" equal to N times the mass of the galaxy. Hence,

$$V_g = \sqrt{\frac{C\cdot(N+1)\cdot M_g}{R_r}}\ cos\theta_r \quad (5)$$

From (4) and (5), rearranging one obtains:

$$\sqrt{N \cdot \frac{M_g}{M_u}} = \sqrt{\frac{R_r}{R_g}} \cdot \frac{cos\theta_g}{cos\theta_r} + \sqrt{\frac{R_r}{R_m}} \cdot \frac{cos\theta_m}{cos\theta_r} \quad (6)$$

Dark Energy

It has been observed that the far away galaxies are moving away from each other much faster than expected, and the unknown energy causing this effect has been named "dark energy"

[13, 14]. It is clear that the dark energy is the spinning energy of the u-seed. Assuming the u-seed is spherical in shape, we can express the spinning energy as follows:

$$E_s = \frac{1}{2} I_u {\omega_s}^2 \quad (7)$$

where I_u is the moment of inertia of the u-seed and ω_s is the angular velocity of the spinning.

For a sphere, the moment of inertia is

$$I_u = \frac{2}{5} M_u {R_u}^2 \quad (8)$$

where M_u is the mass of the u-seed (or the universe) and R_u is the radius of the u-seed.

Substituting (8) in (7), one obtains,

$$E_s = \frac{1}{5} M_u {R_u}^2 {\omega_s}^2 \quad (9)$$

Since $R_u \cdot \omega_s$ is the tangential velocity V_s at the equator of the u-seed, equation (9) can also be written as follows:

$$E_s = \frac{1}{5} M_u {V_s}^2 \quad (10)$$

On the other hand, the explosion energy of the universe is

$$E_e = \frac{1}{2} M_u {V_e}^2 \quad (11)$$

where V_e is the velocity imparted to the building block particles of the universe. Hence, at the beginning of the growth phase, the total energy of the universe becomes,

$$E_t = E_e + E_s \quad (12)$$

From (10), (11) and (12),

$$E_t = M_u \left\{ \frac{1}{2} {V_e}^2 + \frac{1}{5} {V_s}^2 \right\} \quad (13)$$

The ratio of the energies becomes,

$$\frac{E_s}{E_e} = \frac{2}{5} \cdot \left\{ \frac{V_s}{V_e} \right\}^2 \quad (14)$$

At the beginning of the growth phase of the universe, when the u-seed explodes (as a result of the thermo-nuclear reactions), the spinning energy generates the centrifugal forces, which provides the additional forces (to that provided by the explosion) to separate the initial building blocks of the universe first and later the galaxies when they are formed. Since we are now observing the fast separation of the galaxies, clearly presently the universe is in the growth phase. When the recoiling phase starts, the galaxies will begin to get closer to each other as the time progresses, and finally they all meet at the u-center to reform the u-seed.

CONCLUSION

The spin-top model, in addition to explaining the rotations and orbiting of the heavenly bodies and the flat shape of the universe, also explains the so-called “dark matter” and “dark energy” using classical physics.

REFERENCES

1. Longo, Michael J. (2011). Detection of a dipole in the handedness of spiral galaxies with redshifts $z \sim 0.04$. Physics Letters B 699 (2011) 224-229.
2. Commissariat, Tushna (2011). Was the Universe born spinning? http://physicsworld.com/cws/article/news/2011/jul/25/was-the-universe-born-spinning

3. Veziroglu, T. Nejat (2013). Spin-Top Model of Galaxies and the Universe. Infinite Energy, Vol 18, Issue 110.
4. Veziroglu, T. Nejat (2014). Spin-Top Model versus Bog Bang Model, European Journal of Physical and Architectural Sciences, Vol. 2, No. 2
5. Veziroglu, T. Nejat (2016). Was the Universe Born Spinning? Infinite Energy, Vol. 22, Issue 128.
6. Overbeye, Dennis. *New York Times* 11 March (2003): Web. 16 January 2011. "Universe as Dougnut: New Data, New Debate" (http://nytimes.com/2003/03/11/science/universe-as-dougnut-new-data-new-debate.html)
7. Tegmark, M., A. de Oliveira-Costa, & A. J. S. Hamilton, (2003). Physical Review D. "A high resolution forefround cleaned CMB map form WMAP" (http://space.mit.edu/home/tegmark/mapforegs.pdf).
8. Ibata, R. et al. (2013). A vast, thin plane of corotating dwarf galaxies orbiting the Andromeda galaxy. Nature, 493, 62-69.
9. Tully, R. B. (2013). Andromeda's extended disk of dwarfs. Nature, 493, 31-32.
10. Ananthaswamy, A. (2012). The spirals that don't make sense. NewScientist, 215, 6-7.
11. Rubin, Vera C.; Ford, W. Kent, Jr. (February 1970). "Rotation of the Andromeda Nebula from a Spectroscopic Survey of Emission Regions". The Astrophysical Journal.159: 379 403.
12. Rubin, V.; Thonnard, W. K. Jr.; Ford, N. (1980). "Rotational Properties of 21 Sc Galaxies with a Large Range of Luminosities and Radii from NGC 4605 (R = 4kpc) to UGC 2885 (R = 122kpc)". The Astrophysical Journal. 238: 471.
13. Peebles, P. J. E.; Ratra, Bharat (2003). "The cosmological constant and dark energy". Reviews of Modern Physics. 75 (2): 559–606.
14. Durrer, R. (2011). "What do we really know about Dark Energy?", Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. 369 (1957).

Figure Titles

1. Spin-Top Model of the Universe.
2. Life Cycle of the Universe.
3. Cross-Section of a Quarter of the Universe Showing two Galaxies.

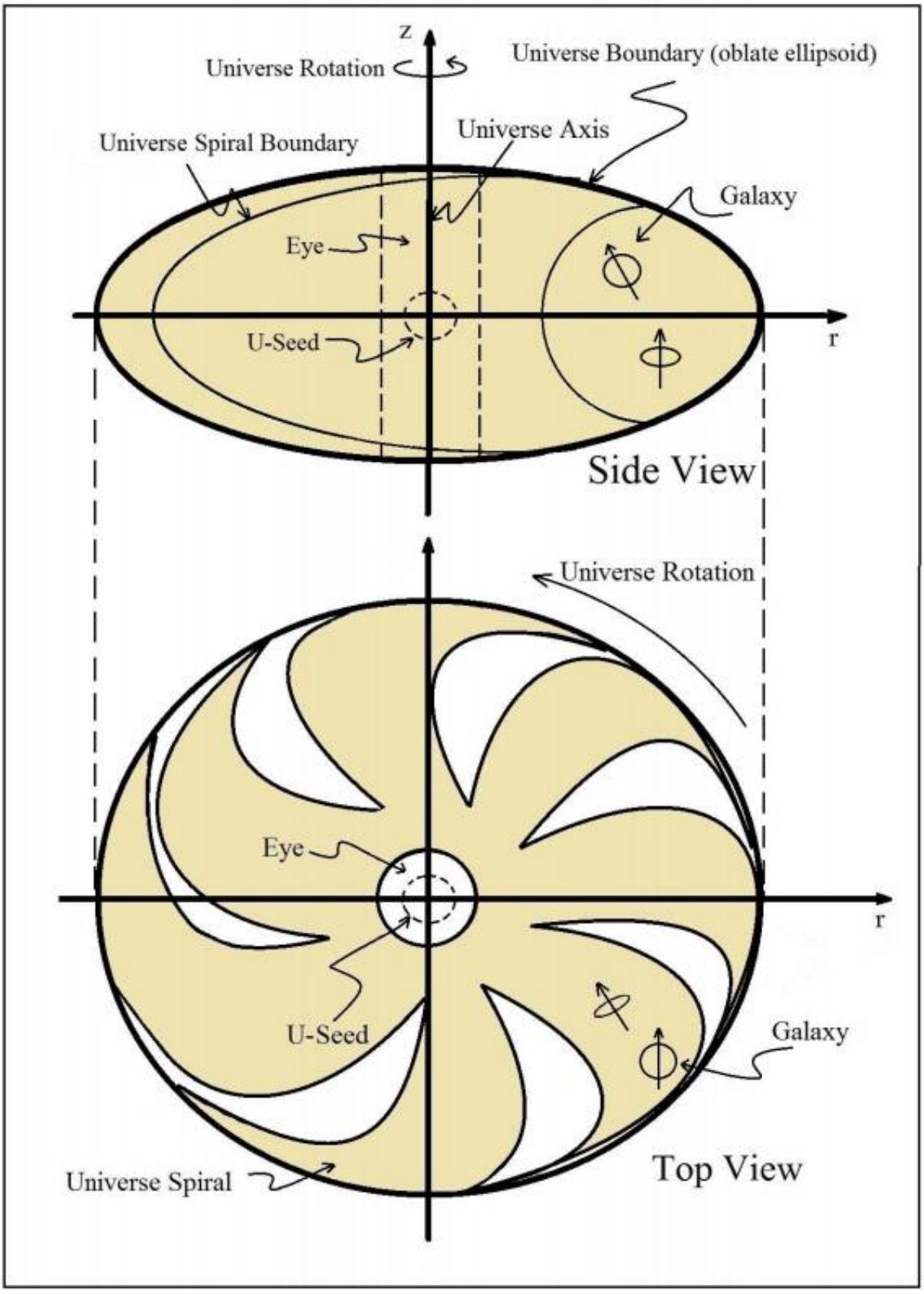
z
Universe Rotation
Universe Boundary (oblate ellipsoid)
Universe Spiral Boundary
Universe Axis
Galaxy
Eye
U-Seed
r
Side View
Universe Rotation
Eye
r
U-Seed
Galaxy
Universe Spiral
Top View

Fig. 1

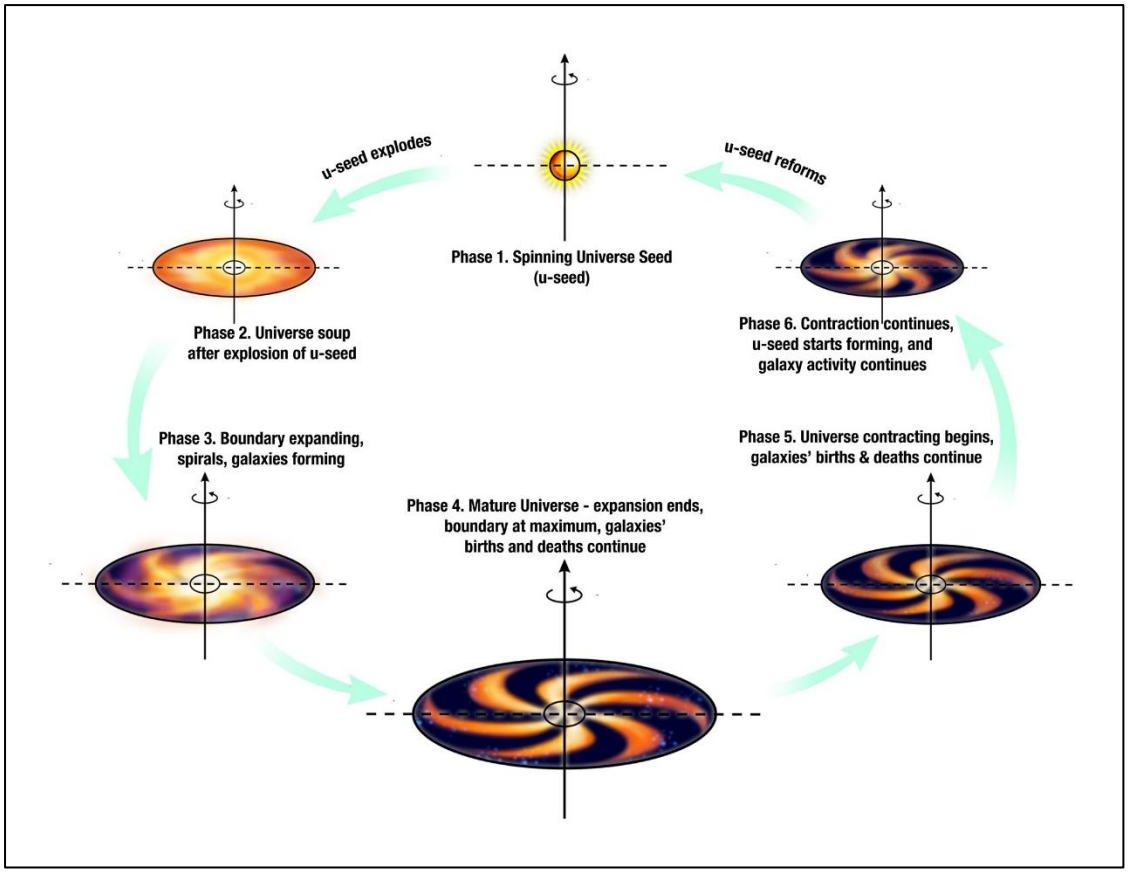
u-seed explodes
u-seed reforms
Phase 1. Spinning Universe Seed (u-seed)
Phase 2. Universe soup after explosion of u-seed
Phase 6. Contraction continues, u-seed starts forming, and galaxy activity continues
Phase 3. Boundary expanding, spirals, galaxies forming
Phase 5. Universe contracting begins, galaxies' births & deaths continue
Phase 4. Mature Universe - expansion ends, boundary at maximum, galaxies' births and deaths continue

Fig. 2

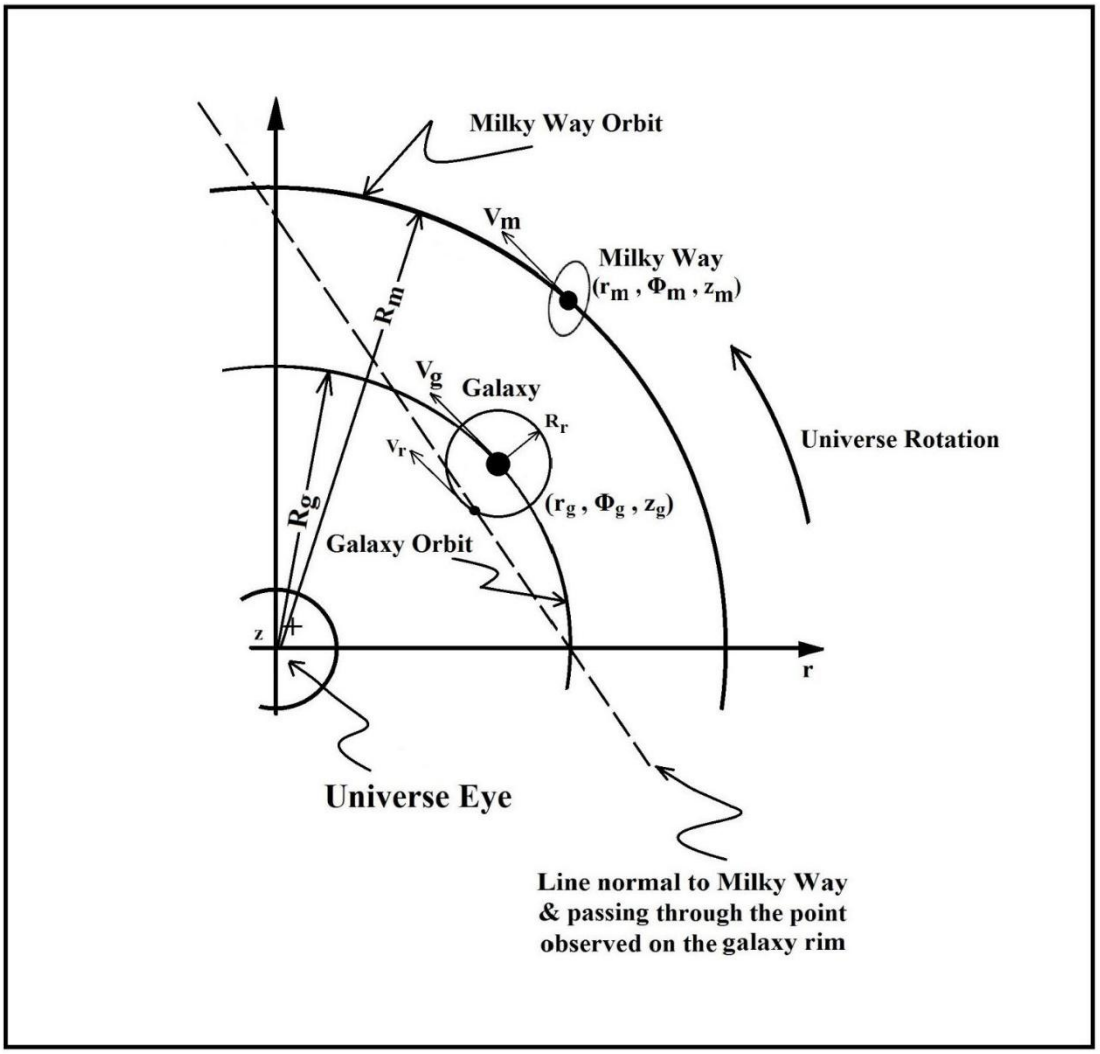
Milky Way Orbit
Vm
Milky Way
(rm , Φm , zm)
Rm
Vg
Galaxy
Rr
Vr
Universe Rotation
(rg , Φg , zg)
Rg
Galaxy Orbit
z
r
Universe Eye
Line normal to Milky Way
& passing through the point
observed on the galaxy rim

Fig. 3