International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869, Volume-2, Issue-8, August 2014

Formation of Galaxies

C. Prabhakar

***Abstract*— There was a discrepancy in , Rotation curve of a typical spiral galaxy predicted based on the visible matter and observed, if the distance taken from the galactic core. But, we can show with the help of Involute of a circle equation, that Galaxy was formed due to the initial high whirling velocity of a high temperature molten mass of a shape of sphere, which ejected masses at certain intervals, which became the arms of a Galaxy. Also, with the help of the involute of a circle equation, based on the angular velocity at which it was ejected, it can be classified as spiral or elliptical Galaxies. we can show the observed values of a rotation curve of a typical spiral galaxy agrees with the equation. Hence, we can say that there is no such as dark energy, which was assumed to play role in factors for not matching with observed values in rotation curve.**

***Index Terms*— Involute, types of Galaxies, Rotation curve.**

I. INTRODUCTION

The origin of universe remained mystery for many ages, each one giving different explanations at different ages. Now, I have one of the Explanation , which will give reasons for different shapes of Galaxy and its corresponding velocities. Also, gives explanation for Rotation curve of a typical spiral Galaxy.

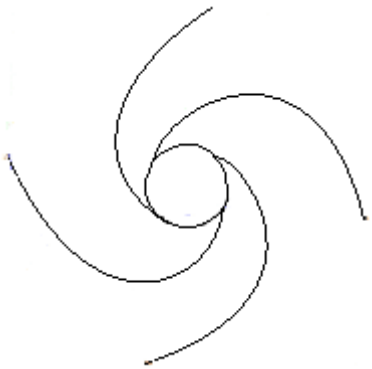
II. HISTORY

Most widely accepted one is Big bang theory. Based on this theory many scientific deductions made to explain many natural known phenomena. But still it was incomplete in some respects, such as it could not be able to explain the causes of different shapes of Galaxies and relationships with its corresponding velocities as it in rotation curve.

III. PROPOSED METHOD FOR FORMATION OF GALAXY

Spiral Galaxy would have formed initially from a high temperature huge round molten mass shape of a sphere whirling at a very high speed, Thereby, ejecting some amount of masses due to self inertia from the outer layer
of rotating sphere of molten mass, at certain time and space intervals These ejected mass from the main mass
follows the path of an Involute of a circle as it unfolds , which we call the arms of the Galaxy, where in turn ejects Masses from the corresponding arms to form Stars and Planets. Number of arms of galaxy indicates, number of times mass ejected from the Huge mass at the centre at regular intervals. The initial angular momentum which stars and planets got from, while separating from parent mass makes them to continually rotate in elliptical orbits. Having said that Gravity does not exist due to mass, but, only due to the motions of the Heavenly bodies, in my previous paper (Acceleration due to the motion of Planets inferred as Gravity) ,we can prove that there is no such thing as dark energy or dark matter exists in the universe. Also, with the help of involute of a circle equation, we can show that rotation curve agrees with the observed value by not considering the presence of dark matter. Spiral shape of a galaxy, which is nothing. But, the shape of a involute of a circle. which in turn shows that Galaxies formed due to Huge round molten mass shape of a sphere, whirled at high speed, ejected masses, which in turn became Galaxies ,Stars and Planets by following the path of an involute of a circle, which is nothing but, spiral in shape. Galaxies Spiral shape, after formation of it shows that its original shape would have been in the form of sphere, As it unwounded it formed the shape of a spiral or elliptical. The difference between Spiral and elliptical Galaxy was in the case of spiral the initial whirling rotational velocity(angular momentum) was more than in case of elliptical, so that it could not able to complete its cycle, as it was done in the elliptical Galaxy .but, forms incomplete elliptical that is spiral shape .The rotation curve of a spiral galaxy which plots the graph between distance and velocity, shows some variation between observed and predicted values based on visible matter, which is said to be due to dark matter can be disproved with the parametric equation of the involute of a circle that, it exactly matches with the observed values, if dark energy or dark matter is not taken into account.

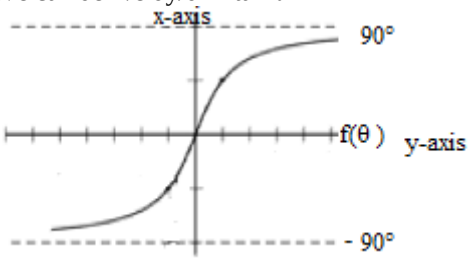
The involute of a circle



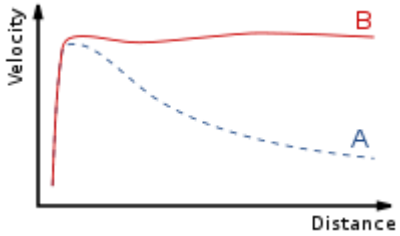
The involute of a circle forms a shape which resembles an Archimedean spiral. Its successive turns are parallel curves with constant separation distance.
In Cartesian coordinates the involute of a circle has the parametric equation:
$X = r (\cos \theta + \theta \sin \theta)$
$Y = r (\sin \theta - \theta \cos \theta)$
Where **r** is the radius of the circle and θ is an angle parameter in radians.
From the the involute of a circle parametric equation
$x = r (\cos \theta + \theta \sin \theta)$

Manuscript received August 14, 2014.
Prabhakar C. B.E.,(Mech) DCA .

$y = r (\sin \theta – \theta \cos \theta)$
We can derive $dy/dx = \tan \theta$



Graph 1: $f(\theta) = \tan \theta$ The oriented graph of $\tan \theta$



Graph 2: Rotation curve of a typical spiral galaxy: predicted based on the visible matter (A) and observed (B). The distance is from the galactic core.

The plot of velocity versus distance from the centre of the galaxy is called a rotation curve.

From the Graph 1 we can see that the curve changes till 90 degrees, afterwards it remains straight line.

That is, Slope is infinite and the tangent remains parallel to y-axis. In other words, the velocity of whirling masses varies greatly at initial stages, later just as the slope is parallel to the y-axis in the graph, it remains constant along x – axis, meaning the velocity remains constant at outer distant place from the core as per observed, flat rotation curve at large radii of a typical spiral galaxy, Also, shown below the tan θ curve, which is changed its orientation in the Graph 1 to align with the Rotation curve. Slope is infinite and the tangent remains parallel to y-axis, this is possible only

when $\theta = 90° = \prod/2$ radians=1.57

$dy/dx = \tan \theta = \tan 90° = \infty$ Slope is infinite

$\theta = \omega t = vt/r = 1.57$ since $\omega = v/r$

$s = vt$ where s= distance travelled

Therefore substituting in the above equation, we get s/r=1.57

That is, the ratio of distance travelled to the radius of central galactic core equals or exceeds 1.57 the velocity of whirled masses remains constant at outer distant place from the galactic core.

IV. Proposed method for classification of Galaxies based on the rotational angular velocities

Equation of Ellipse $= x^2/a^2 + y^2/b^2 = 1$

$e = \sqrt{1-(b/a)^2}$……..(1) where e= eccentricity of the ellipse

From the parametric equation of a ellipse and a spiral curve, we get

$X = a \cos \theta = r (\cos \theta + \theta \sin \theta)$……(2)

$Y = b \sin \theta = r (\sin \theta – \theta \cos \theta)$…….(3)

dividing (2) by $\cos \theta$ and (3) by $\sin \theta$ both sides

we will get the ratio of $b/a = (\tan \theta - \theta)/((1+ \theta \tan \theta)\tan \theta)$

from the equation (1) we get $(b/a)^2 = 1-e^2$

Also, for the Ellipse e lies between 0 and 1

then $(\tan \theta - \theta)/((1+ \theta \tan \theta)\tan \theta) = 0$

for maximum value of e=1

we get , $\tan \theta = \theta$ this is possible only if $\theta < 10°$

That is $\theta < 10°$ or $\omega t < 10°$ or 0 .174 rad

$2\prod nt = 0.174$ since $\omega = 2\prod n$

n= 0.027 rev/sec or 10° /sec

Hence, rotational angular velocities of the core of the galaxies will be less than 10° /sec to become elliptical galaxy, while the rotational angular velocities of the core will be more than 10° /sec to become spiral galaxy.

IV. Conclusion

Hence, It can be concluded that Galaxies formed due to high whirling velocities, ejecting lump of masses at certain time interval periods, which in turn becomes arms of various Galaxies and also rotation curve agrees with the observed values, without considering the dark matter or dark energy, which does not exist .we can make out shapes of spiral galaxy or elliptical galaxy based upon initial velocity of whirled masses of the galactic core .

REFERENCES

[1] Internet

Prabhakar C. B.E.,(Mech) DCA is a Mechanical Engineer having work experience of more than 14 Years in Diverse Fields Like CAD, Telecommunication, Fabrication, Assembly, Stores and in Teaching, Now, working independently on various topics of science and technology.Published two articles in the International journal.