The outward acceleration of galaxies may be a result of a non uniform and non linear distribution of matter in the universe – Non local gravity directed 'upwards' due to higher density outwards ! Non elliptical and slightly spiraling planetary orbits.

Not only are the galaxies receding away from us; the solar system is also receding away from the center of the universe in a spiral path, a little every year- this may be the cause of the apparent perihelion advance of Mercury. We may be falling in spiral path towards higher density of matter outwards in space!

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Abstract

The 'elliptical' shape of planetary orbits results from motion of the solar system. The planetary orbits are essentially not elliptical. Motion of the solar system also results in the increase of the sizes of the orbits. The solar system is not only moving, but also moving with acceleration around an outward spiraling orbit. This acceleration leads to non fixed planetary orbits. Due to the acceleration of the solar system, the planets are moving in orbits that continuously increase in size. Thus, the planets are not actually moving in fixed orbits, but rather in a spiral path around the sun due to the acceleration of the sun so that the planets are always slightly receding away from the sun. (This effect is analogous with electromagnetism in which an accelerating charge radiates an EM wave). The acceleration of the solar system can be explained by the same factor causing acceleration of galaxies. Thus the paradigm of fixed orbits should be abandoned, according to this theory. If the solar system was not moving, the orbits would be circular and smaller. The apparent perihelion advance of Mercury may also be explained by this theory. It may be because of the non steady state condition and the accumulation of 'errors' throughout every revolution, and the position, speed and direction at the end of each revolution becomes the initial condition for the next revolution and hence the apparent perihelion advance in a complicated way. According to the theory proposed in this paper, a perihelion point always is at ninety degrees to the left of the sun (for counterclockwise revolution) when looking in the direction of motion of the solar system and cannot change in a steady state condition. Therefore, no sustainable orbital precession is possible in a steady state condition. However, there is no steady state condition in the solar system (at the small level of the observed perihelion advance of Mercury) because of the acceleration. We cannot talk about a perihelion point in a non steady state condition. The observed apparent advance of the perihelion is because of non steady state conditions. The orbits would be spherical and fixed and smaller if the solar system was at rest. One consequence of this theory is the need to review the calculated mass of the sun: the mass of the sun is actually smaller than what we know so far because it is calculated on the basis of the measured radius.

The acceleration of the solar system may be due to its spiraling outward orbit from the center of the universe. (in this paper, the whole concept of relativity and hence 'expanding of space' is discarded). The universe has a center. The acceleration of galaxies away from us may be a result of non linear and non uniform distribution of matter in the universe. The distribution of matter may be such that the overall density increases as we go away from the center. ***Thus every object in the universe is falling (spiraling and accelerating) towards outer space***. Therefore, the observed red shift (acceleration) of galaxies may be due to their falling towards the higher density outwards away from us. On the cosmic scale, therefore, the distribution of matter (for example, directly proportional to the square of distance from the center; this should be checked mathematically) should be in such a way that the direction of the gravitational field is away from the center.

Introduction

The elliptical shape of orbits and the perihelion advance of Mercury have been two of the cosmological phenomena that haven't been explained fairly completely so far. The perihelion advance of Mercury orbit had been accounted to the effect of the gravitational pull of other planets, except a 43 arc seconds not explained by Newton's laws. The outward acceleration of galaxies is another cosmological phenomena not understood so far.

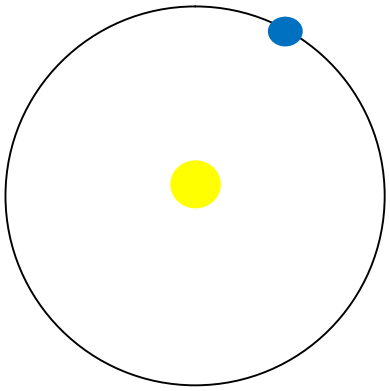
Discussions

We know that the planets are rotating about their own axis and revolving around the sun. But their orbits are 'elliptical' (non circular) and also apparently precessing.

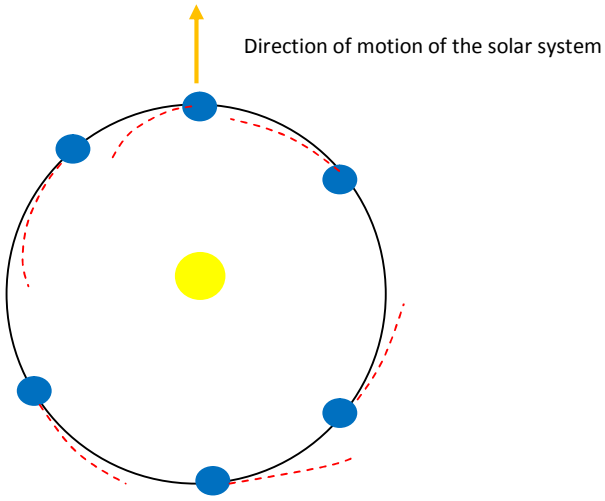
Why are the orbits 'elliptical'?

The 'elliptical' shapes of the orbits can be explained by the translational movement of the solar system itself. Before looking at the cause of this movement, we see why movement of the solar system can cause 'elliptical' orbits, intuitively.

We start with a solar system at rest. We can figure out that the planets orbit around the sun in circular orbits and the radius of the orbits can be calculated easily, $r = GM/v^2$.



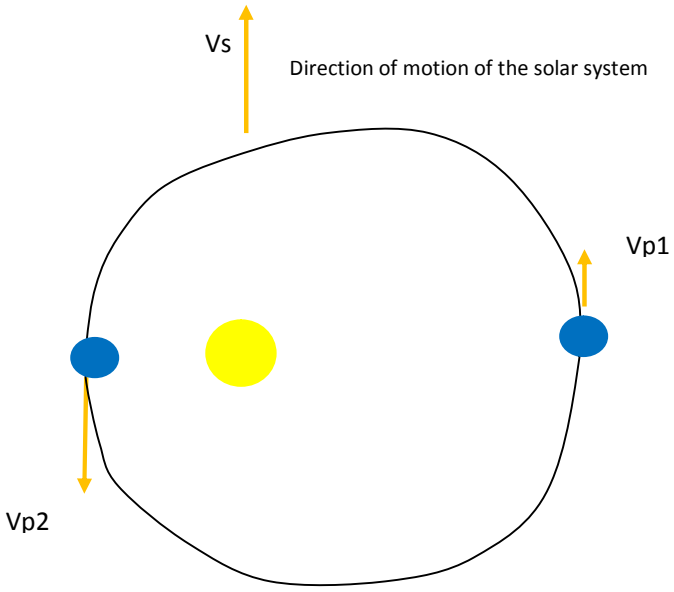
Suppose now that the solar system (the sun) moves ahead slowly as shown below. Let us see at the possible different effects.
What will happen to the orbit of a planet revolving around the sun if the sun started moving forward just at the time when the planet was at the different positions shown in the figure below ? (counter clockwise revolution)



We see that the orbit will increase in size if the planet was on the back side of the sun and the orbit will decrease in size if it was in the front half of the sun at the moment the sun started moving, because of increasing and decreasing distance, and hence gravitational pull, respectively.

It is difficult to determine the final steady state shape and size of the orbit from the above discussion alone. Suppose that the sun continued to accelerate in the forward direction and finally settled at some speed, stopping the acceleration. Since the acceleration is slow, the planets can follow the sun to the final speed. Thus the planets would also have a forward translational velocity equal to the velocity of the sun, in addition to their velocity around the sun. As the sun was continuously accelerating before finally settling in some speed, the orbits of the planets during the acceleration time should be continuously increasing in an outward spiral path. Finally the orbits of the planets should settle on some stable size and shape. What is the size and shape of the final orbit? It is difficult to determine this size and shape just intuitively. We need a quantative analysis for this. However, one may make the following argument.

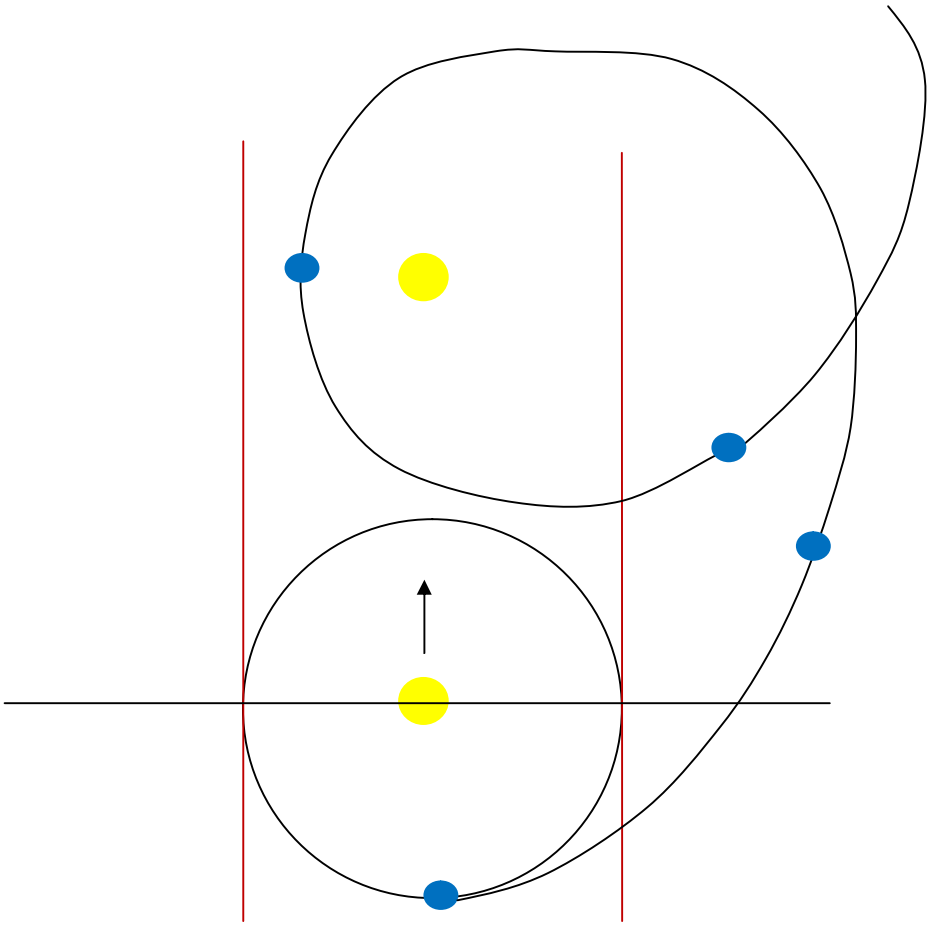
I have intuitively sketched the final shape of the orbit. The relative velocity of the planet with respect to the sun is shown to be small on the right side of the sun and higher on the left side, thus resulting in larger and smaller radiuses respectively. ***The shape is neither circular nor elliptic.***



In this orbit, the law of conservation of momentum and energy hold. Therefore, the law of equal areas (Kepler's Law) also holds.

What is the explanation for this shape? Suppose the planet was revolving on the back side of the sun at the moment the sun started moving forward (see figure on next page). Now the planet orbit starts to deviate towards a higher radius circle due to a decrease in gravitational pull of the sun because of the continuously increasing distance. The planet will move to a bigger radius and reverses direction at a longer radius because of the weaker gravitational pull. By then the sun will have advanced forward and the planet tries to catch up slowly at a bigger radius. The planet follows the sun without much curvature and catches up finally. Then its orbit starts to decrease to smaller radiuses gradually because of the increasing pulling by the sun and finally comes ahead of the sun with a more tight turn. Now the planet velocity changes direction and becomes opposite to the velocity of the sun and this makes the relative speed to increase and the planet recedes rapidly to the rear of the sun to bigger circles with its speed continuously decreasing because of conversion of kinetic energy to potential energy. Now, again, it takes the planet a longer travel on larger circles on the right side to turn its direction and catch up with the sun again. In the steady state condition, this leads to larger radius on the right side of the sun than on the left side and an increase and a change in the overall size and shape of the orbit. As the speed of the sun increases the size of the orbit increases too. Of course such intuitive explanation is difficult to be accurate.

This explanation is only intuitive and a mathematical model has to be worked out and solved or simulated with Matlab to get the exact shape and size of the orbits for different speeds and to see what happens during acceleration time.



Note how the size and shape of the orbit has increased from the original (circular) one.

From the above figure we see how a perihelion point comes closer and closer to the sun before settling in a steady state condition.

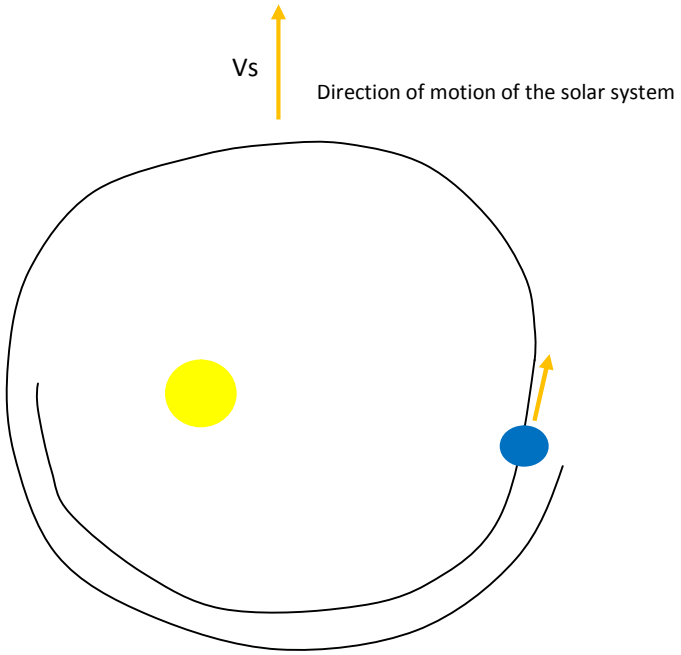
The above sketch roughly shows how the orbit changes from circular to a non-circular shape. A computer simulation using Matlab should be applied to know the exact shape. The equations required for the Matlab simulation will be presented in the sections ahead.

Is (sustained) orbital precession possible?

From the above discussion we see that the perihelion point is always at ninety degrees to the left (for counterclockwise revolution) and the aphelion point is always on the opposite left side of the sun. Therefore, no sustainable orbital precession is possible except that caused by the gravitational pull of planets on each other, which should be periodic and reversing directions.

How does the speed and acceleration of the solar system affect the shape and size of planetary orbits?

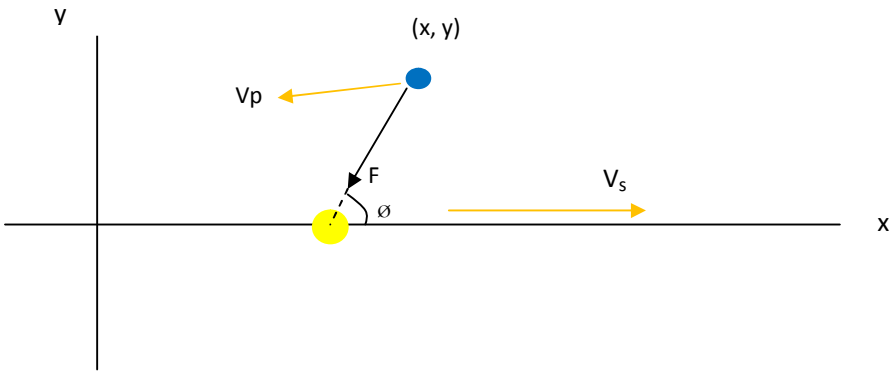
The more the speed of the solar system, the bigger the planetary orbits, in the steady state condition. But what will happen if the solar system continuously accelerates? In this case, the planetary orbits will continuously increase in size, spiraling outwards from the sun, towards bigger orbital sizes.



The figure above shows the spiral orbit of planets. The spiral may have been exaggerated.

The planets will follow a slightly expanding out ward spiral path. (This is analogous with the spreading of electromagnetic waves from accelerating charge).
This may explain the apparent advance of Mercury perihelion.

Equations describing the revolution of a planet around the sun in space



V_s is the velocity of the solar system in space
V_p is the velocity of the planet in space

Now, the gravitational pull of the sun on the planet is:
$F = GMm/r^2 = ma = m\sqrt{(a_x^2 + a_y^2)}$, $a_x = d^2x/dt^2$, $a_y = d^2y/dt^2$,

$r^2 = [(x - v_t t)^2 + y^2]^2$, the sun is at (0,0) at t = 0.

After some manipulations, we get

$(G^2M^2)/[(x - v_t t)^2 + y^2]^2 = (d^2x/dt^2)^2 + (d^2y/dt^2)^2$ .....(1)

Since the gravitational force is always directed towards the center (the sun), the acceleration is also directed towards the center.

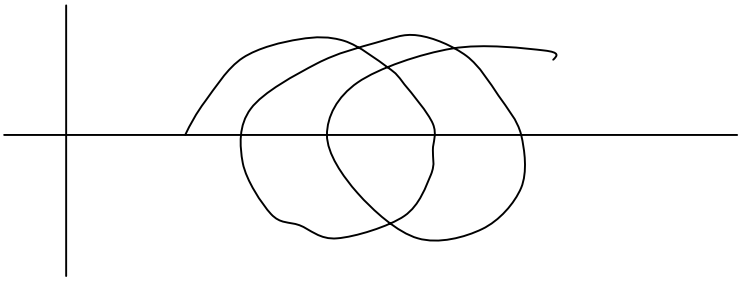
Therefore, $a_y/a_x = \tan ø = y/(x - x_s) = y/(x - v_s t)$, where x_s is the position of the sun at time t.

Thus, from the above, $(d^2y/dt^2)/(d^2x/dt^2) = y/(x - v_s t)$ ..... (2)

The expression for r and ø is

$r = \sqrt{((x - v_s t)^2 + y^2)}$, $ø = \tan^{-1}(y/(x - v_s t))$ ..... (3)

The path of the planet, when solved, will be roughly as follows



The above equations can be used only by inserting some initial conditions and looking if the resulting orbit repeats (i. e is stable) and repeating this until we get a stable orbit. One should start with the initial known values, such as the speed of a planet at its perihelion point and the perihelion radius. The speed of the sun is about 800, 000 Km/ hr. The values of r and ø with respect of time, r (t) and ø (t) determine the shape and size of the orbit. It is this orbit that we check for stability. The orbit is stable if the values of r(t) and ø(t) are periodic with a period equal to the period of revolution around the sun for a given planet.

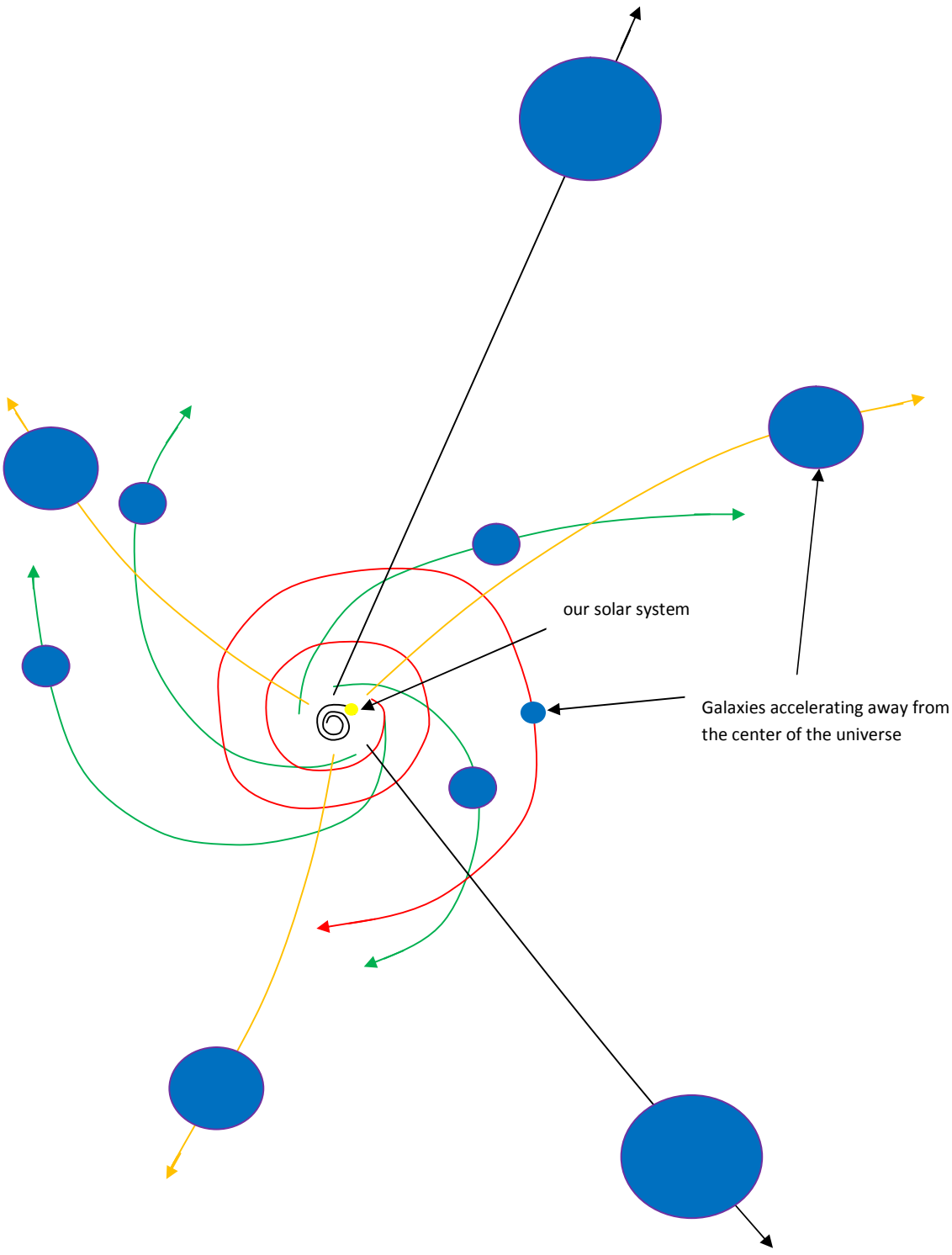
Alternatively one could build a mathematical model for a solar system which slowly accelerates from rest, so that we can determine the steady state shape and size of the orbit for the known speed of the sun (the solar system), which is about 800,000Km/hr.

For this, we simply need to substitute $v_s = Kt$ in the above equations. K should take some selected value until the translational velocity reaches the velocity of the sun in space, and then K should be zero afterwards so that the velocity of the sun settles at 800, 000 Km/hr. K is the selected translational acceleration of the sun. The selected value of K should be small enough so that the planets can follow the sun and not left behind. Then this model can be simulated on the computer to see the steady state values of r(t) and ø (t) and hence the shape and size of the orbits. The simulation should start from zero velocity of the sun (circular orbits) and then slowly accelerating with an acceleration of K until its velocity reaches the known velocity of the sun in space and then the acceleration should be set to zero afterwards and continuing the simulation until steady state condition is reached.

The overall structure of the universe: a universe with a center, with galaxies accelerating in spiral path away from the center due to increasing density of matter outwards.

To date there is no model of the entire universe that can completely explain observed phenomenon, such as the acceleration of galaxies away from us, the non circular orbits of planets, the apparent advance of perihelions, etc. In this paper, a model which can explain these observed phenomena will be presented. The whole theory of relativity, including its implications such as 'every point in the universe is the center of the universe', 'expanding space', concepts of 'space-time' and 'mass-energy ', is considered invalid in this paper. I have presented a paper on the non-universality of the speed of light in my other paper: http://vixra.org/abs/1210.0182

"Corrections to Maxwell's equations for 'free' space – Invalidating the theory of relativity?! "



Massive galaxies are further away from us, their path is less spiraled or nearly straight; this may be why massive galaxies are further from us

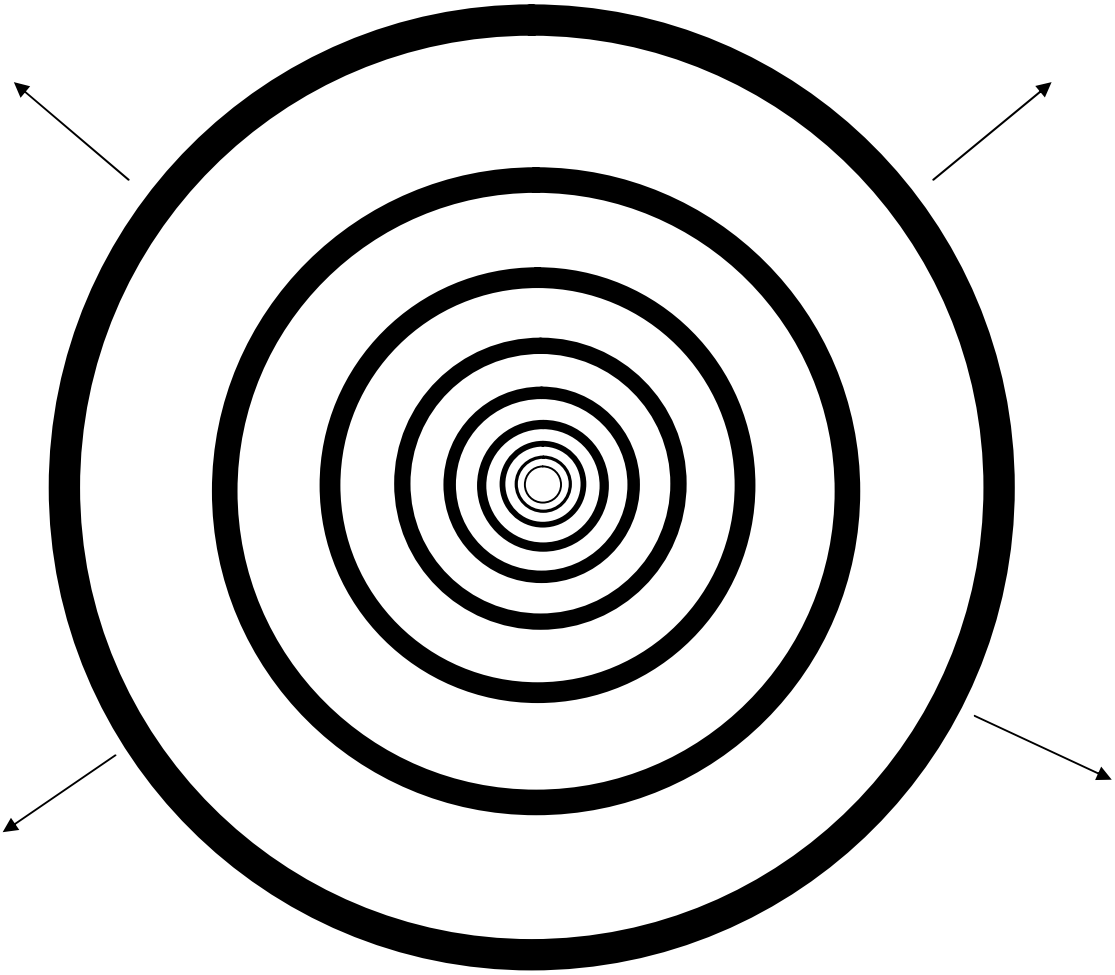
The figure above shows that more massive objects (galaxies) will go outward in a path with less spiral, where as less massive objects go outward in a more spiral path. The solar system has been shown to be near the center.

The cause of the observed outward acceleration of the galaxies : the overall direction of gravitational force should be outwards due to increasing density of matter outwards! The density should be increasing directly with distance from the center in such a way that the direction of gravitational field will be outwards!

From the previous figure we can see that the overall density of matter in the universe increases as we go away from the center of the universe. This can be explained, for example, by : the more distant the galaxies are from us, the more massive they are. Therefore, the overall direction of gravitational force is away from the center.

Thus every object in the universe is falling (spiraling) towards outer space.

Our solar system is also falling (accelerating) *in spiral path* towards outer space from the center.



The figure in the previous page shows the non linear increasing of distribution density of matter in the universe as we go away from the center. The weight of the lines represents the density at that radius.

Conclusions

In this paper a series of arguments starting from the observed elliptical orbits and perihelion advance to the cause of acceleration of galaxies have been presented. We have seen the significance of elliptic orbits and the absence of sustained orbital precession. The mathematical law describing the overall distribution of matter in the universe should be worked out so that the direction of gravitational force becomes outwards. The currently estimated mass of the sun is based on the current average radius of orbits around the sun. Therefore, if the theory presented in this paper is correct, the estimated mass of the sun has to be changed. The sun is actually less massive than the existing estimate.

References