the general science journal

On the formation of prograde disk galaxies from spherical galaxies with a global null angular momentum

Thierry De Mees

thierrydemees @ telenet.be

There seems to exist a way to transform apparent chaos into an ordered system. The key for such a behavior lays in gravity itself, and more precisely in gravitomagnetism. The results of the G Probe-B experiment, in 2011, proved gravitomagnetism's superiority over other theories like General Relativity and its deduced metrics, and it is in this light that the solution can be found. We apply the gravitomagnetic principles to a random spherical galaxy with a global null angular momentum and unveil how this system eventually becomes a disk galaxy. Moreover, we deduce the quantum nature of galaxies through this process and, by the analogy between electromagnetism and gravitomagnetism, we prove by deduction the quantum nature of atomic structures as well.

Keywords: gravitomagnetism, general relativity theory, Jefimenko, Heaviside, spherical galaxy, disk galaxy, quantum state.

Introduction

This paper will unveil how a random spherical galaxy with a global null angular momentum eventually becomes a disk galaxy. This incredible evolution occurs by the strict application of the laws of gravity, as proven by the G Probe-B experiment results. This experiment has indeed proven that gravity exactly works like electromagnetism, except for the fact that masses attract. So, O. Heaviside [1] and O. Jefimenko [2] were right about gravitomagnetism. Let us have a closer look at this theory.

1. A word on gravitomagnetism

Before we get to the core of the matter, we need to understand a bit about gravitomagnetism. Since 2011, we know that this theory supplants all other gravity theories. In that year, the results from the Gravity Probe B experiment [8] became known, and spites the efforts of the establishment to not widely disclose these results, except in very guarded terms, we found evidence that gravitomagnetism is the sole valid gravity theory. The Gravity Probe B measured very precisely the angle changes of gyroscopes, installed in satellites, due to the Earth's gravity field. The results of the Gravity Probe B confirm gravitomagnetism within an error of 1%. Also the Lunar Laser Ranging (LLR) confirms the gravitomagnetic term to 0.1% [8]. By addition to this experiment, the General Relativity and its deduced metrics have also been invalided theoretically [5] [6] [7].

But how does gravitomagnetism work in a nutshell? It states that there exists, in addition to the Newton gravity, a second gravity field $\mathbf{B}_g$ that is exclusively caused by the motion of masses, when these masses move inside a static gravity field.

This is totally analogous to the creation of a magnetic field by a moving charge.

When another mass moves inside that second gravity field, it gets a transverse force $\mathbf{F}$ that is perpendicular on both the gravity field vector and the velocity vector.

$$\mathbf{F} = m\,(\mathbf{v}\times\mathbf{B}_g) \tag{1}$$

wherein v is the velocity of the mass m.
(I call "gyrotation" the second gravity field $\mathbf{B}_g$ and I used the symbol Ω in most of my works) [3] [4].

The eq.(1) is totally analogous to the Lorentz force in electromagnetism.

With eq.(1) it is possible to deploy a lot of situations in order to understand how gravitomagnetism can provide structural changes in cosmic structures. For example in an uniform gyrotation field, a moving mass will undergo a circular motion, just like with the betatron effect of electrons in an uniform magnetic field.

A spinning object like the Sun will generate a gyrotation field that is alike a magnetic field between the poles of a magnet.

When a planet is orbiting the spinning Sun in an arbitrary inclination angle with regard to the Sun's equator, it will be trapped by the force of eq.(1) and the planet's orbit will be slowly swiveled into a prograde orbit at the Sun's equatorial level.

This amazing property, which is explained in several of my earlier papers, is crucial in order to understand the rest of the present paper.

2. From a random to an ordered spherical galaxy

From electromagnetism, the reader will remember that two parallel electric wires under voltage will repel or attract, depending from the direction in which the electrons flow in each of the electric wires.

Also in gravitomagnetism, two parallel linear masses will attract if they move in the same direction by the gyrotation force of eq.(1), and two parallel linear masses will repel if they move in the opposite directions. However, in both cases they will be attracted by the Newtonian gravity force. If the velocities are high, the Newtonian gravity force might become negligible.

In any case, when one considers a galaxy of which the inclination angles of the stars' orbits are random, one can get two orbits nearby that are in opposite direction and other two orbits that are in the same direction. In analogy with electromagnetism, one can say that like oriented orbits will have the tendency of getting closer, and opposite oriented orbits to widen from each other.

The consequence is that the orbits of galaxies are searching for an ordered structure: like oriented orbits will get the tendency to group.

3. From a globally zero to a locally non-zero angular momentum

The above property can transform a global null angular momentum with totally randomly inclined orbits in all directions, into several local zones of non-null angular momentums. Indeed, consider the initial situation of a spherical galaxy with stars that orbit at almost randomly chosen orbit inclinations, so that the angular momentum of each orbit, seen by an observer as being clockwise, cancels out another orbit nearby, seen as being counter-clockwise. This can be done by each time adapting the stars' masses of each two orbits in relation to the distance to the galaxy's center, and cancel the momentums out, two by two. The global angular momentum of the galaxy is then indeed null.

But when the effect of grouping occurs, which I explained in the former paragraph, more and more orbits of one type will locally group, and at certain inclination angles we will see more of these groups. So, theoretically, at some inclination angles we will get groups of orbits, which are orbiting in more or less the same inclination and in the same direction.

At each inclination angle, two groups of orbits can occur: a clockwise one and a counter-clockwise one, which will remain at a respectable distance from each-other. Also the number of inclination angles will remain limited, at a sufficient gravitational distance from each-other. If nearly like-oriented and nearly like-inclined orbits come too close, they will also group. Therefore, there will be voids where no orbits will remain, and places where orbits at higher densities are created.

The groups of inclined clockwise or counter-clockwise oriented orbits will become distributed in such way, that it becomes more or less like the squares of a chessboard: the white squares represent clockwise orbits, the black squares the counter-clockwise ones.

But in most of the cases, the inner orbits will show a majority of, say arbitrarily clockwise orbits (or vice versa, determined by coincidence) and the outer orbits a majority of orbits in opposite direction. That means that the local angular momentums don't cancel out, and the orientation of the more inner orbits will overrule the orientation of the more outer orbits. The result is that a gravitational dipole effect occurs with two zones: an inner clockwise and an outer counter-clockwise zone (or vice-versa).

4. From a spherical galaxy to disk galaxy

Still, the galaxy is globally spherical, consisting of stars with inclined orbits at a lot of angles. The second step of the galaxy's ordering comes precisely from the eq.(1), a force that appears if there exists a centrally rotating object in the galaxy. And from the former paragraph, we know that such a situation exists: the more inner part of the galaxy has now a slightly different angular momentum, and opposite to the more outer one.

This angular momentum of the inner orbits activates the force represented in eq.(1) that will make all the inner orbits swivel in the plane, perpendicular to the new, global angular momentum's vector. At that stage, the inner orbits become prograde with respect to the angular momentum of the inner orbits.

This angular momentum will now also catch the more outer orbits and, very slowly, make them swivel into prograde orbits too.

The prograde disk galaxy is now formed, and only the central bulge, where a high activity of heavy stars occurs in very eccentric orbits, remains fuzzy.

5. Is the conservation of angular momentum respected?

How can one get a disk galaxy with a specific angular momentum out of a spherical galaxy with a global null angular momentum? The reason is that only a part of the spherical galaxy swiveled into a disk galaxy. The outer regions, which contain more retrograde groups than prograde groups, will remain too far from the rest of the galaxy to swivel as well. So, it is expected to find essentially retrograde orbits outside the disk galaxy [13].

Also a number of the stars are trapped in the halo as globular clusters [12]. They will not play a role in the transmission of angular momentum.

We must however keep in mind that in this paper we assumed an angular momentum of the spherical galaxy being globally null, in order to emphasis the most extreme situation. In practice, no spherical galaxy will possess a totally neutral angular momentum. The more asymmetry occur at the start, the less retrograde groups will be found outside the disk galaxy.

6. Discussion and Conclusion

We have managed what appeared impossible at the start: the transformation of a spherical galaxy with millions of stars, orbiting in all possible inclinations and directions, into a disk galaxy.

However, at the start, the global angular momentum of that spherical galaxy was null. Only by the properties of gravity as explained through gravitomagnetism and confirmed by the Gravity Probe B, such a result could be obtained.

With this paper, we have proven the quantum nature of galaxies during the galaxy's transformation process. The grouping of orbits into orbiting blocks, at several inclinations and at different distances from the galaxy's center follow directly from gravitomagnetism.

By analogy, exactly the same process occurs in electromagnetism. Indeed, there are only a few electrons in an atom, and the electrons repel. So, the second step of a transformation into a disk will not happen with atoms in most cases.

For atoms, we have now qualitatively shown, by derivation, how the quantum state of atomic structures occur, whereby electrons obey the exclusion principle and occupy specific inclinations around the nucleus. Indeed, electrons that are prograde or retrograde don't orbit at the same distance. The more electrons that are present, the more different inclinations and distances will be occupied about the nucleus.

References

[1] Heaviside, O., "A Gravitational and Electromagnetic Analogy", The Electrician, 31, 281-282 and 359, (1893).

[2] Jefimenko, O., "Electromagnetic Retardation and Theory of Relativity", Electret Sientific Cy, ISBN 0-917406-24-9, (1997).

[3] De Mees T., "Analytic Description of Cosmic Phenomena Using the Heaviside Field", Physics Essays, Vol. 18, No. 3 (2005).

[4] De Mees, T., "Gravitomagnetism", General Science Journal (2010-2011).

[5] De Mees, T., "General Relativity and its metrics vs. Gravitomagnetism: a state of affairs", General Science Journal, (2015).

[6] Vankov, A., Einstein's Paper: "Explanation of the Perihelion Motion of Mercury from General Relativity Theory", General Science Journal (2013).

[7] Crothers, S., "On the alleged 'Incompleteness' of General Relativity", General Science Journal (2014).

[8] Michelsen, E., "Gravitomagnetism, The Myth and the Legend", http://physics.ucsd.edu .

[9] Mashhoon, B., "Gravitoelectromagnetism: A Brief Review", arXiv:gr-qc/0311030v2 (2008).

[10] De Mees, T., "The observed symmetrical Supernovae remnants form overwhelming evidence for the Gravitomagnetic force", General Science Journal, (2012).

[11] Maxwell, J. C., "A Dynamical Theory of the Electromagnetic Field", Phil. Trans. R. Soc. Lond. (1864).

[12] De Mees, T., "Swivelling time of spherical galaxies towards disk galaxies", General Science Journal, (2010)

[13] Lockman, F. J., "High Velocity Cloud Complex H: A Satellite of the Milky Way in a Retrograde Orbit?", arXiv:astro-ph/0305408v1 (2003).