GALACTIC REPULSION

(According to 'MATTER (Re-examined)'

Nainan K. Varghese, matterdoc@gmail.com
https://www.matterdoc.in/

Abstract: Discovery of gravitational attraction necessitated a cause for the even distribution of macrobodies throughout the universe. Assumed mutual attraction due to gravitation defies their even distribution unless it is counteracted by a repulsion between them, at least in the case of large-scale groups of macrobodies. None of the current concepts supplies a rational theory. An alternative concept, presented in the book 'MATTER (Re-examined)', proposes a logical explanation that describes how neighbouring stable galaxies overcome gravitational attraction between them to settle at a stable distance from each other for the major part of their life. Halo at the outer periphery of a spinning galaxy is formed by independent primary 3D matter-particles. Their primary electric fields are mechanically oriented to create sufficient electromagnetic repulsion between neighbouring galaxies. This is a natural process originating in the universal medium, which encompasses the entire universe. Since stable galaxies are able to maintain their relative positions in space, the universe (as a whole) is able to have a perpetual steady state of existence, except for local recycling of matter.

Keywords: Gravitational attraction, galaxy, halo, primary electric field, biton, galactic spin, galactic repulsion, cosmological constant, Big Bang theory.

Introduction:

It is a fact of observation that all 3D matter-bodies in nature have a tendency to approach each other. The cause of this phenomenon has so far eluded logical explanations. The advent of Newtonian gravitational theories traced various properties and actions of this mysterious attraction. Although they could not offer logical causes, mathematically, they are quite successful in mechanics. Most other (widely accepted) modern theories also describe properties of this mysterious attraction in different ways. However, none of them attempts to describe its cause or origin. Currently, gravitational attraction is simply accepted as a 'fundamental natural force' based on available empirical evidence.

It is observed that macrobodies are present everywhere in space, as far as we can survey. From this, it is deduced that 3D matter is more or less evenly spread throughout the universe, however large or endless the universe may be. The discovery of gravitational attraction raised further logical questions. If macrobodies have a tendency to approach each other, at some stage of the universe, all 3D matter in nature should coagulate to form a single macrobody, and whole 3D matter in universe will concentrate at or about a point. This is illogical and contrary to empirical evidence. Thus, it has become necessary to discover a logical mechanism that keeps the total 3D matter in the universe widely and more or less evenly spread throughout an infinite extent. In the past, many theories (like the cosmological constant, Big Bang creation of the universe, expansion of space, etc.) were devised to justify the widespread presence of macrobodies in the universe, irrespective of gravitational attraction between them. Unfortunately, none of them gained acceptance as a logical theory. As long as the cause of gravitation remains elusive, a logical mechanism that can overcome gravitational attraction will evade discovery.

An alternative concept, presented in the book 'MATTER (Re-examined)', envisages that certain structural structural distortions in the universal medium (structured by quanta of matter) about the 3D material bodies produce the phenomenon of gravitation. Gravitation and gravitational attraction are different phenomena. Gravitational actions on different 3D material bodies cause their simultaneous displacements towards each other and produce an apparent (gravitational) attraction between them. Gravitational attraction between 3D material bodies is a minor by-product of separate gravitational actions on each of the 3D material bodies. If structural structural distortions in the universal medium, causing gravitational attraction, can be modified by natural phenomena, gravitational attraction between very large macro bodies (of certain characteristic properties) can be counteracted to keep them away from each other. At the same time, neutralization of gravitational attraction

is not available between macrobodies, which do not exhibit these peculiar physical properties. It is the nature and magnitude of structural structural distortions in the universal medium about 3D material bodies that dictate the nature of apparent interactions between them. This article gives a very brief description of the causes and mechanisms of gravitational attraction and its annihilation. All conclusions expressed in this article are from the book, 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

Universal medium:

The whole matter in the universe is in the form of quanta of matter. Matter-content of a 3D material body and energy about it are distinctly separate. The magnitude of matter-content is the total sum of 3D matter in it. Energy is the stress developed in the universal medium, due to 'structural structural distortions' in natural arrangements of its constituent quanta of matter, in and about a 3D material body. Matter-content and energy-content cause and support each other for their existence and stability. They are not convertible into each other.

The entire space, outside basic 3D matter-particles (3D matter-cores of photons), is filled with two-dimensional latticework formations by quanta of matter, called '2D energy-fields'. 2D energy-fields in all possible planes, together, form an all-encompassing universal medium. 2D energy-fields, intersecting at a point, coexist. Parts of 2D energy-fields, within the spatial dimensions of a macrobody, contain sufficient structural structural distortions (and corresponding energy) to sustain the macrobody's integrity and stability in its current state. This part of the universal medium is the macrobody's 'matter-field'. Structural structural structural distortions in a macrobody's matter-field are the 'work', associated with the macrobody.

All apparent interactions between 3D material bodies take place through the universal medium. Universal medium is in direct contact with every basic 3D matter-particle in nature. Simultaneous and direct actions by the universal medium on two different 3D material bodies appear as an interaction between them. This avoids the assumption of 'actions at a distance through empty space'. There are no 'pull forces' or 'rigid bodies' in this concept. All efforts, classified into various types of 'natural forces', are different manifestations of only one type of effort, and it is of a 'push nature'. A free macrobody is free from all external influences other than the efforts/actions considered.

The tendency of a 2D energy-field to attain serenity does not allow static structural distortions in it. Transfer of structural distortions in the matter-field of a macrobody carries its constituent 3D matter-particles and thus produces the body's motion. This inertial action, about a macrobody, maintains its state (of motion). [Adjective 'inertial', in this concept, means an 'action that causes inertia, rather than to indicate fictitious nature]. Inertia is a property of the universal medium. A change in inertial actions about a macrobody produces its acceleration. If a certain magnitude of additional work is invested into or removed from a macrobody's matter-field, its state of motion will stabilise only after inertial delay, during which additional work within its matter-field stabilises. This is true even after the action of external effort is terminated. Matter is inert; it has no ability to move or act on its own. Associated structural distortions in the matter-field of a macrobody produce all apparent actions, presently assigned to it.

The presence of a 3D matter-particle, in a 2D energy-field, breaks its continuity. Discontinuity causes an imbalance in its latticework structure. Pressures applied by the latticework structure from all sides, in an attempt to restore its own continuity, compress the 3D matter-particle present in the gap. This compressive action is the gravitation. [Basic 3D matter-particles (3D matter-cores of photons) are of uniform radial size, and they constitute all superior 3D material bodies]. If the extents of universal medium on opposite sides of a 3D matter-particle are unequal, it experiences a resultant effort, which tends to move it towards the side of lower effort (pressure or force).

The extent of universal medium between two 3D matter-particles is always less than the extent of universal medium on their outer sides. As a result, 3D matter-particles are always pushed towards each other. This phenomenon gives rise to gravitational attraction (gravity) between them. Motions of constituent 3D matter-particles move the whole macrobody. Gravitational attraction between two macrobodies is, relatively, a minor by-product of gravitational actions on them. Gravitational attraction takes place between spinning and disc-shaped 3D matter-cores of photons (in two macrobodies), whose disc-planes coincide at a given instant. Gravitational attraction between two macrobodies, at any instant, is produced between extremely small numbers of their constituent photons. Average gravitational attraction is derived from sporadic actions between various photons, whose 3D matter-cores happen to be in the same plane at any instant. Contrary to present belief, gravitation is enormously stronger compared to other manifestations of effort ('natural forces'). Its

dynamic action, observed as gravitational attraction between macrobodies, is only a very minute fraction of gravitation on each of the photons constituting the macrobodies.

Universal medium stores work in the form of structural distortions in its latticework structures. Structurally distorted regions in the universal medium, about 3D matter-particles, are the 'distortion-fields'. Distortion-fields of all 3D matter-particles in a macrobody, together, form its matter-field. When distortion-fields of two 3D matter-particles overlap, the distortion-density in the region varies. The inherent property of the universal medium, to maintain homogeneity, causes translational transfer of structural distortions in the latticework structures in the region. This tendency produces 'field-efforts (forces)'. Transfer of structural distortions carries any 3D matter-particle, which happens to be in the region, along with structural distortions. Movements of 3D matter-particles convert 'field-effort' into inertial actions of 3D material bodies. The nature of a distortion-field is indicated by imaginary lines of force with an arrow in the direction of average distortions in its structure. Depending on the nature of structural distortions, distortion-fields are classified into linear (magnetic field), angular (electric field), and radial (nuclear field) distortion-fields. Electric field, with lines of force with low curvature of its lines of force, acts as a magnetic field [1].

Primary matter-particles:

During local breakdowns in universal medium, gravitational actions on a group of free quanta of matter within the gap create 3D matter-core of a basic 3D matter-particle. Gravitation, by the distorted region of universal medium, moulds the 3D matter-core into a segmented spherical disc, moves it at the highest possible linear speed (without causing its own breakdown) and spins it about one of its diameters at a spin speed proportional to its 3D matter-content. Linearly moving, spinning 3D matter-core, together with associated structural distortion-field (equivalent to an electromagnetic wave), is a photon (corpuscle of light or other radiation). 3D matter-core and associated structural distortion-field cause and support each other to maintain the stability of the photon.

Under suitable conditions, gravitational actions help two complementary photons (of high 3D matter-contents) to form a binary unit of 'biton'. Bitons are self-sustaining primary matter-particles. Under suitable conditions bitons group themselves, under gravitational actions, in a variety of structural formations to develop various fundamental particles, found in nature.

Constituent photons of a biton maintain their linear motion at critical linear speed in a common circular path. Simultaneously, they spin in phase, about a common axis passing through biton's centre. Under gravitational actions, two bitons may form tetrons. Tetrons, arranged as spherical shells, form neutrons or, in conjunction with positrons, form protons. If there are three bitons in a combined unit, it becomes a hexton, which (depending upon its distortion-field) is classified into positron or electron.

Repeated passages of distortion-fields associated with photons of a biton along the same circular path create a common distortion-field around the biton, in its plane of rotation. By virtue of its structure and movements of constituent photons, a biton has an angular distortion-field around the common path of its photons. This is a 'primary electric field'. An electric field is an angular distortion-field, whose direction may be indicated by imaginary, circular 'lines of forces' with arrows in the direction related to inertial action, it may cause. Face, where the lines of force are in a clockwise direction, is 'positive electric charge' and the face, where lines of force are in an anti-clockwise direction, is 'negative electric charge'. Electric charges are nothing but relative angular directions of distortion-fields. Every electric field has both positive and negative electric charges.

Bitons are unable to move at any appreciable linear speed in the planes of their existence. While moving in a linear path at considerable speed, bitons orient themselves so that the resistance to their motion from the universal medium is least. To achieve this, the plane of biton orients itself so that constituent photons move in identical 'cork-screw' shaped paths. Planes of bitons' primary electric fields are held perpendicular to the direction of linear motion. In all cases, where the bitons need to move at very high linear speeds, they orient themselves in this fashion. This is a mechanical action, and identical electric charges may face forward or rearward direction, at random.

Direction of inertial motion (apparent attraction or repulsion), during interaction between electric fields, depends not only on directions of electric fields, but also on the distance between their centers of curvatures. Interaction between two electric fields at 'zilch-effort distance' between them causes no inertial action. Direction of inertial actions, on either side of the 'zilch-effort distance' between them, reverses. If two electrical fields of certain relative orientation, at less than 'zilch-effort distance', apparently attract each other, the same electric

fields have no inertial action between them when they are placed at 'zilch-effort distance', and the same electric fields apparently repel each other when the distance between them is increased beyond 'zilch-effort distance'.

Magnetic fields are structural distortion-fields in the universal medium, where lines of force of structural distortions have a linear nature (or of angular nature with low curvature). The electric field has angular structural distortions. As there are no means to produce linear distortion-fields, a combination of electric fields in a proper array is the only way to create magnetic fields. An increase in the curvature of lines of force increases the distortion-field's electric nature and reduces its magnetic nature. A reduction in the curvature of lines of force reduces the distortion-field's electric nature and increases its magnetic nature. An electric field with lines of force of low curvature behaves as a magnetic field.

An electric field (whose lines of force have high curvature), while moving within a region of external magnetic field (whose lines of force have very small or no curvature) with a gradual change in magnetic field-strength, orients itself so that its interaction with the magnetic field becomes apparently attractive towards the region with higher magnetic field-density. If a 3D matter-particle that produces this electric field is free to move, it will be (apparently) attracted towards the direction of higher magnetic field-density. A free electric field-producing element, like a biton, moving in a magnetic field with a gradient (gradually varying in strength), tends to reorient itself such that it is in an attractive (interactive) phase towards a higher-density region of the magnetic field. Details of these actions are given in [1].

Stable galaxy:

The speed of light is the ultimate linear speed of 3D material bodies in nature. It is limited by the ability of the universal medium to move 3D matter-particles, without its own breakdown. As the linear speed of a macrobody approaches that of light, it breaks down into its constituent fundamental particles and primary particles. At the linear speed of light, only 3D matter-particles that can survive are the photons. Beyond this linear speed, no 3D material body can be moved because that is the ultimate linear speed that the universal medium can provide.

Due to the very large size of the galactic cloud and its spin motion, the linear speed of 3D matter-particles, situated towards its edge, is extremely high and is comparable to the linear speed of light (photons). No 3D matter-particles, larger than photons and bitons (with their planes perpendicular to the direction of their motion), can survive at this linear speed. Therefore, all 3D material bodies along the periphery of a galactic cloud disintegrate into their constituent bitons. Dismembered photons radiate into free space. Bitons, in this region, orient themselves to minimize resistance to their motion from the universal medium by keeping their planes perpendicular to their direction of motion [1], so that the moving bitons experience minimum resistance from the universal medium. Independent bitons, moving in this fashion, fill the outer edge of the galactic cloud. The peripheral region of a spinning galactic cloud, occupied by free bitons, is its 'halo'. The effect of gravitational attraction between bitons in the halo and the 3D matter-content of the rest of the galactic cloud is balanced by the outward motion (centrifugal action) of the bitons due to their linear motion in circular paths around the galactic cloud.

Depending on its parameters, it is possible for a galactic cloud to become a stable galaxy during a brief period in its life. As the magnitude of angular speed or radius of a galactic cloud increases, inward radial motion of 3D matter-particles due to gravitational collapse becomes too small to compensate for their outward displacement due to centrifugal action. 3D matter-contents of the galactic cloud continue to spread outwards in planes of its spin. Halo, formed around a spinning galactic cloud, tends to arrest whole-body linear displacements of the galactic cloud towards any other similar galactic cloud and keep it steady in space, for it to become a stable galaxy, for further inner development.

A very large galactic cloud, during its condensation, may be fragmented into many smaller clouds by spinning motion and uneven distribution of its 3D matter-content, as is envisaged in the 'Nebular hypothesis'. These smaller clouds further condense into separate macrobodies but are simultaneously constituents of the same group. In this case, the total 3D matter-content of the combined macrobody is distributed over a wider region, and hence there is no concentration of 3D matter-content in a place, as in the case of a 'black hole'. Photons, escaping from the region of a galactic cloud, are not slowed down very much, and hence these types of groups of macrobodies, called 'galaxies', are visible to outside observers within the universe.

Galactic stability, which is related to the translational motion of one galaxy towards another, is a short-lived phenomenon. Except for its translational motion, a galactic cloud never reaches a stable state. A galaxy is a combined macrobody who's constituent macrobodies continuously move and evolve within. A galaxy, itself,

changes its parameters continuously, until the whole of its 3D matter-content is dispersed or reverted into the universal medium. This is the death and ultimate fate of all galaxies. Smaller galaxies or galactic clouds (before their development into stable galaxies) may approach each other under gravitational attraction to collide and integrate into a single rotating group of macrobodies. Depending on the magnitude and direction of their spin motions, these types of collisions may help to form super-galaxies or cause total disintegration of both galaxies.

Galactic repulsion:

Each biton has a primary electric field. Primary electric fields, being very small in size, act within 'zilch-effort distance' with other structural distortion-fields, in their immediate neighbourhood. Orientation of biton, along the periphery of the galaxy, is a mechanical activity. Therefore, in the beginning, the bitons are oriented randomly. They could be oriented in either of two directions. Their electric charges could be in phase or out of phase with a reference. Primary electric fields of equal numbers of bitons (in any region of halo), which are out of phase with each other, neutralize. There are some surviving primary electric fields, which produce a resultant electric field in any one direction.

Primary electric fields (in any region of the halo), together, make a resultant doughnut-shaped (toroid) electric field along the outer edge of the spinning galaxy, as shown in Figure 1. Resultant electric field being large (lines of force of low curvatures), acts beyond its 'zilch-effort distance' and hence behaves like a magnetic field. Therefore, there are strong magnetic fields around the edge of a (spinning) galaxy, perpendicular to its plane of spin. Lines of force of the magnetic fields at two places on the periphery of a galaxy are shown by grey arrows in Figure 1. They are in opposite directions. Directions of magnetic fields, appearing on the periphery of galactic-disc, are with respect to an external reference. Each biton, contributing to this magnetic field, is also capable of

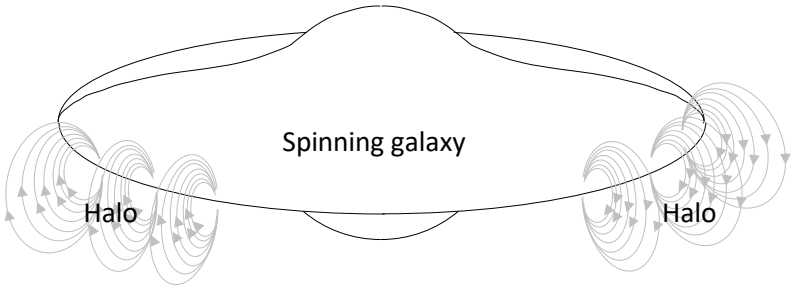

Figure 1

interacting on its own with any other external distortion-fields.

Galaxies in space are also under gravitational influence. They apparently attract each other due to gravitation. Galaxies tend to move towards each other. If they are near enough, the magnetic fields about their peripheries interact with each other. There are two possibilities. Their magnetic fields can be in a repulsive phase or in an attractive phase with each other. Two galaxies, moving towards each other under gravitational attraction, may have strong magnetic fields about their peripheries, perpendicular to their plane of spin.

As their magnetic fields interact, each of the primary electric fields of free bitons, present near the rim of galactic periphery, is also interacting with the magnetic field of the other galaxy in its own capacity. They are able to act on their own because each biton is an independent 3D matter- particle and is not mechanically or otherwise bound to any other 3D material body of the galaxy. Because of the great distance between the interacting galaxies, there is a gradient in their magnetic field-strength along the line joining their centers. The magnetic field gradient of one galaxy affects the primary electric fields of bitons of the other galaxy. Each of the primary electric fields (if required) tends to reorient itself so that it is in an attractive phase towards the higher-density region of the magnetic field of the other galaxy. Many of the bitons succeed in re-orienting. The ability of a biton to re-orient itself depends on the relative strength of the re-orienting effort with respect to aligning effort due to its linear speed. Re-orientation of a biton does not always mean that it is turned through 180 degrees, but it is turned by an angle enough to make a change in the sense of its primary electric field with respect to the external distortion-fields. Figure 1 shows magnetic fields produced at two different places in the halo of a spinning galaxy, facing two other external galaxies. They are of different polarities.

Two parallel and unidirectional distortion-fields (similar magnetic fields) apparently repel each other. Let the magnetic lines of force of two approaching galaxies be of the same polarity. Lines of force are parallel and

unidirectional. Hence, the approaching galaxies apparently repel each other. If their repulsion is strong enough, the galaxies halt at a distance from each other, where the gravitational attraction and apparent repulsion due to their magnetic fields balance each other. Since the galaxies are spinning bodies, this balancing is a dynamic action. As the galaxies turn, the nearest points on their peripheries, facing each other, change. The strength of the magnetic field at these points may be different. Therefore, variation in the strengths of galaxies' magnetic fields needs to be continuously updated to maintain the required balance.

If the apparent repulsion due to interaction between their magnetic fields is not strong enough, approaching galaxies may continue to move towards each other. Now, free bitons in a halo, moving along the periphery of one galaxy, are carried into the magnetic field of the other galaxy. Magnetic fields of galaxies have higher field-density in a direction towards their centres. Therefore, these bitons (disregarding their movements along the periphery of the galaxy) are also moving towards a region of a higher-density magnetic field. Bitons, displacing towards a higher-density magnetic region, tend to reorient themselves such that their primary electric fields are in an attractive phase with the region of higher-density magnetic field. Bitons in both galaxies tend to reorient, and many of them succeed. If the approaching speed of galaxies is faster, more bitons are re-oriented and at a higher rate. Reorientations of these bitons strengthen the magnetic fields of both galaxies to increase their magnetic field strength and the resulting mutual apparent repulsion.

Two parallel distortion-fields in opposite directions (dissimilar magnetic fields) apparently attract each other. Let the magnetic lines of force of two approaching galaxies be of opposite polarity. In this case, lines of force are parallel but in opposite directions. Hence, the galaxies apparently attract each other due to interactions between their magnetic fields. This apparent attraction assists the gravitational attraction already existing between them. Galaxies are bound to move on a collision course at an accelerating pace.

Since the magnetic fields of the approaching galaxies (let them be galaxy 'A' and galaxy 'B') are in opposite directions, they tend to neutralise each other. Only the resultant of the two is left over. For the time being, we will consider that galaxy 'A' has a stronger magnetic field compared to galaxy 'B'. The resultant magnetic field of their combination belongs to galaxy 'A', whose magnetic field is stronger. As the galaxies move towards each other, free bitons in the halo of galaxy 'B' are carried into the magnetic field of galaxy 'A', in a direction towards the high-density region of the magnetic field. These bitons tend to reorient so that they are in an attractive phase with a region of higher-density magnetic field. Many bitons succeed in re-orienting themselves. This reduces the strength of the magnetic field of galaxy 'B', which was in the opposite direction to the magnetic field of galaxy 'A'. The process of re-orientation of bitons continues, and gradually the galaxy 'B' develops a magnetic field, which is in the same direction as that of galaxy 'A'. Now, the magnetic fields of both galaxies are in a repulsive phase. The strength of apparent repulsion between galaxies is adjusted in due course of time as described earlier.

By re-orientation of bitons, the resultant electric field / magnetic field of parts of both galactic peripheries, facing each other, have now become in a repulsive phase with each other. Thus, galaxies are prevented from colliding, irrespective of their relative direction of spin. Factors controlling this phenomenon are the direction of the magnetic field of one galaxy and the direction of orientation of free bitons in the halo of the other galaxy. Due to this action, it is possible for a galaxy to have different directions of its magnetic fields at different places around its periphery, facing the other galaxies.

A multi-body system in space may be an independent group of macrobodies, like a stable galaxy or part of a system of macrobodies, like a planetary system. In either case, members of the group revolve around its central part or appear to do so. However, each member of the group has an independent existence in space and changes in the parameters of their movements depend on external efforts. The gravitational attraction between them is the only external effort. The attractive nature of gravitational attraction can only affect the movements of constituent macrobodies towards each other. However, for the stable existence of galaxies, it is necessary for the gravitational attraction between galaxies (between their member macrobodies, which have no mechanical connection) to create repulsion between them. This being the case, there is no riddle in the repulsion between stable galaxies (or other multi-body systems), which are under gravitational attraction.

Integrity of a spinning multi-body system is sustained by a balance between centrifugal action and gravitational attraction on each of its member macrobodies. In case a macrobody on its outer perimeter moves towards the centre of its rotation by an external effort, the centrifugal action on that macrobody diminishes, and the magnitudes of gravitational attraction between the displaced macrobody and all other macrobodies in the system increase. The overall effect on the system is to reduce its radial size by increased gravitational attraction between the members of the system. If the multi-body system is static in space, the movement of the displaced macrobody results in an increased magnitude of gravitational attraction on all other macrobodies in the direction

of the displaced macrobody. Every other macrobody in the system tends to move towards the displaced macrobody. As a result, the multi-body system as a whole displaces in the direction of motion of the displaced macrobody.

Conversely, if a macrobody on the outer perimeter of a spinning multi-body system is moved away from the centre of rotation by an external effort, centrifugal action on that macrobody increases, and the magnitudes of gravitational attraction between the displaced macrobody and all other macrobodies in the system decrease. The overall effect on the multi-body system is to increase its radial size by reducing gravitational attraction between its members. If a multi-body system is static in space, the movement of a displaced macrobody reduces the magnitude of gravitational attraction on all other macrobodies in the system, towards the displaced macrobody. Encouraged by the centrifugal action, every other macrobody in the system tends to move away from the displaced macrobody. As a result, the multi-body system as a whole displaces in the direction of motion of the displaced macrobody.

Repulsion between two stable galaxies works similarly to the second case mentioned above. Repulsion between two stable galaxies is initiated by the electromagnetic repulsion between their halos. As the halo of a galaxy is repelled in a certain direction (by the halo of an approaching galaxy), it is displaced towards its own galactic centre, and the action encompasses one or more constituent macrobodies at its periphery. The linear speed of the halo's inward displacement is very slow, and the inward-moving structural distortions in the universal medium about the halo have little effect on the enclosed macrobody. However, the bitons, constituting the halo, are moving (almost) at the speed of light, in a circular path around the galaxy. Structural distortions in the universal medium about the halo are being transferred at this linear speed to move its constituent bitons. Structural distortions in the universal medium, which are being transferred at this linear speed, carry any 3D material body (trapped within this part of the halo) also at the same linear speed.

As the linear speed of a trapped 3D material body (in circular path) increases, it disintegrates into constituent bitons (to strengthen halo), or centrifugal action on the 3D material body may overcome gravitational attraction towards other macrobodies of the galaxy to move away from the galactic centre. In the case of the disintegration of a 3D material body, its constituent bitons reorient, and gravitational attraction due to the 3D material body may be lost to the galaxy in its original form. Displacement of a 3D material body, away from the galactic centre, reduces the magnitudes of gravitational attraction between it and all other constituent macrobodies of the galaxy. All other macrobodies in the galaxy, under centrifugal action on them, overcome the balancing gravitational attractions and move away from the 3D material body, encompassed by the galactic halo. The overall effect is to displace the galaxy, as a whole, away from the halo of the approaching galaxy.

The only factor producing apparent repulsion between the galaxies is the ability of free bitons to reorient themselves, irrespective of their direction of motion. Hence, any two macrobodies with high spin-speed and with free bitons at their periphery can develop magnetic fields, which produce apparent repulsion between them. Therefore, the directions of the planes of galaxies or their shapes do not affect this phenomenon. Any two galaxies (even if their direction of approach is along their spin axes) are prevented from approaching each other within collision distances. They may collide only in accidental situations, which are most improbable. If sufficient time is not available to create enough apparent repulsion between stable galaxies, they will collide into each other.

Magnetic interactions between spinning galaxies keep them at a definite distance from each other. The distance between two galaxies, in a stable state, depends only on the magnitude of their 3D matter-contents. That is, the distance between two galaxies is proportional to the gravitational attraction between them. Strengths of their magnetic fields are automatically corrected to maintain this distance. A galaxy may have more than one neighbouring galaxy. The distance between a stable galaxy and its neighbours may be different. Similarly, the strength of the magnetic field or polarity at different points in the halo of a stable galaxy towards any of its neighbours may be different to suit the parameters of interacting galaxies.

The stable size and nature of a galactic cloud (formed in free space by the accumulation of intergalactic clouds and debris) are determined by its spin speed during formation. With low or no spin speed, a galactic cloud (or its central region) condenses to become a 'black hole'. As long as the approximate spin speed of a galactic cloud corresponds to equation (16/2), $\omega = \mathrm{Tan}^{-1}\left\{(MG) \div \left(4R^2c\right)\right\}$, given in chapter 16 of reference [1], it will maintain its stability as a galaxy. [Here, 'ω' is spin speed, R is radius, and 'M' is the rest mass of the galactic cloud. 'G' is the gravitational constant in the 3D spatial dimensional system, and 'c' is the linear speed of light]. As and

when the spin speed exceeds the magnitude given by the above equation, the galactic cloud (or stable galaxy) gradually disintegrates and loses most of its 3D matter-content into free space.

Since a stable galaxy is a spinning fluid macrobody, its gravitational collapse and spin acceleration continue, even after it has attained a brief period of stability. An increase in the internal pressure of the galaxy, due to gravitational collapse, causes radiation of 3D matter-content from it in the form of light, heat, and other forms of radiation. Loss of 3D matter-content reduces the rate of gravitational collapse. At the same time, the spin speed of the galaxy gradually increases. These two effects together compel 3D matter-content of the galaxy to have a constant tendency to spread outward. As the diameter of the galaxy increases further and linear speeds of peripheral primary 3D matter-particles approach the linear speed of light, they break down into independent photons and radiate away in various directions. Gradually, most of the galaxy disintegrates into photons and radiates away. Reducing the 3D matter-content and increasing the radius make it impossible for an expanding galaxy to satisfy the above equation. Therefore, 3D matter-contents of such galaxies disperse into space to re-form into new free intergalactic clouds.

An external effort on a very large fluid macrobody, like a group of macrobodies in a galaxy, has its immediate effect in the region of action of the effort. The rest of the fluid body accepts the effects gradually. Due to dissimilar repulsion at different points on the periphery of a galaxy, these points move inward by different magnitudes. Macrobodies in the region that move towards the galactic centre achieve greater linear (and angular) speeds. This phenomenon, along with the uneven distribution of macrobodies in galactic clouds, causes an uneven equatorial periphery. Therefore, most galaxies acquire spiral shapes (with different lengths of arms) during their formation.

Macrobodies, smaller than a galaxy (or galactic clouds with no or low spin speed), do not have this protection. Here, it is the size of the macrobody and its spin speed that counts and not its 3D matter-content. Many of the smaller macrobodies are spinning and have magnetic fields of their own, but they do not apparently interact in this way for two reasons. First, their peripheral speed is too slow to have free bitons around their periphery. Secondly, magnetic field-producing elements are not free to reorient under the influence of an external magnetic field. As a result, they approach each other under gravitational attraction to collide or to be captured in, to form a union of a multi-body system.

Mutual galactic repulsion gives stable galaxies their ability to exist independently and remain static in space (relative to an absolute reference). Hence, wherever in space we look, we may find galaxies there. Stable galaxies constitute the 3D material world for us. This 3D material world, on a large scale, is in a steady state and perpetual. However, macrobodies are not perpetual. Locally, in any part of a galaxy (or galaxies themselves) are destroyed and rebuilt in a cyclic manner. 3D matter is created from the universal medium at a cyclically varying rate. At the same time, 3D matter is reverted into the universal medium at a similar cyclically varying rate. The development of 3D matter and formations of composite macrobodies in nature increases entropy. Reversion of 3D matter into the universal medium, which is a highly ordered stable system, reduces the entropy of nature. Cyclic conversion and reversion of matter into its 3D spatial state and its 1D spatial status in the universal medium keep the entropy of the universe within limits. Here, ‘entropy’ means the measure of disorganization or degradation of the universe.

Conclusion:

Spinning galaxies, in their stable state, have a natural protection to prevent them from approaching each other and colliding under gravitational attraction. Similar protection is not available to black holes or other macrobodies, even if they have comparable or higher 3D matter-content. This mechanism automatically regulates the magnitude of apparent repulsion to overcome gravitational attraction between stable galaxies, irrespective of their sizes, spin speeds, or total 3D matter-contents. A stable galaxy may have many neighbouring stable galaxies. Sustaining relative positions of galaxies in space (at somewhat constant distance from each other) helps to maintain a steady state of a perpetual universe. This is irrespective of occasional local disintegration of macrobodies, necessary to maintain the universe’s entropy within limits. Gradually, even stable galaxies disperse their 3D matter-contents into the universal medium and disintegrate.

Reference:

[1] Nainan K. Varghese, *MATTER (Re-examined),* https://www.matterdoc.in/

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