

# GALACTIC REPULSION

(According to 'MATTER (Re-examined)')

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

*Keywords:* Gravitational attraction, gravitational repulsion, 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 tendency to approach each other. Cause of this phenomenon has so far eluded logical explanations. 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' on empirical evidence.

It is observed that macro bodies 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 universe, however large or endless the universe may be. Discovery of gravitational attraction raised further logical questions. If macro bodies have tendency to approach each other, at some stage of universe, all 3D matter in nature should coagulate to form a single macro body 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 total 3D matter in universe widely and more or less evenly spread throughout infinite extent. In the past, many theories (like; cosmological constant, big-bang creation of universe, expansion of space, etc.) were devised to justify wide-spread presence of macro bodies in universe, irrespective of gravitational attraction between them. Unfortunately, none of them gained acceptance as a logical theory. As long as cause of gravitation remains elusive, logical mechanism that can overcome gravitational attraction will evade discovery.

Alternative concept, presented in book 'MATTER (Re-examined)', envisages that certain distortions in universal medium (structured by quanta of matter) about 3D matter-bodies produce phenomenon of gravitation. Gravitation and gravitational attraction are different phenomena. Gravitational actions on different 3D matter-bodies cause their simultaneous displacements towards each other and produce an apparent (gravitational) attraction between them. Gravitational attraction between 3D matter-bodies is a minor by-product of separate gravitational actions on each of the 3D matter-bodies. If distortions in 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 macro bodies, which do not exhibit these peculiar physical properties. It is the nature and magnitude distortions in universal medium about 3D matter-bodies, which dictates nature of apparent interactions between them. This article gives very brief description of causes and mechanisms of gravitational attraction and its annulling. All conclusions expressed in this article are from the book, 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

### **Universal medium:**

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

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 all-encompassing universal medium. 2D energy-fields, intersecting at a point, co-exist. Parts of 2D energy-fields, within spatial dimensions of a macro body, contain sufficient distortions (and corresponding energy) to sustain macro body's integrity and stability in its current state. This part of universal medium is macro body's 'matter-field'. Distortions in a macro body's matter-field are 'work', existing about it.

All apparent interactions between 3D matter-bodies take place through universal medium. Universal medium is in direct contact with every basic 3D matter-particle in nature. Simultaneous and direct actions by universal medium on two different 3D matter-bodies appear as an interaction between them. This avoids 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 'push nature'. A free macro body is free from all external influences other than efforts/actions considered.

Tendency of a 2D energy-field to attain serenity does not allow static distortions in it. Transfer of distortions in matter-field of a macro body carries its constituent 3D matter-particles and thus produces its motion. This inertial action, about a macro body, 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 universal medium. Change in inertial actions about a macro body produces its acceleration. If certain magnitude of additional-work is invested into or removed from a macro body's matter field, its state of motion will stabilise only after inertial delay, during which additional-work within its matter-field stabilizes. This is true even after action of external effort is terminated. Matter is inert; it has no ability to move or act on its own. Associated distortions in matter-field of a macro body produce all apparent actions, presently assigned to it.

Presence of 3D matter-particle, in a 2D energy-field, breaks its continuity. Discontinuity causes imbalance in its latticework-structure. Pressures applied by latticework-structure from sides, in an attempt to restore its own continuity, compress 3D matter-particle present in the gap. This is gravitation. [Basic 3D matter-particles (matter-cores of photons) are of uniform radial size and they constitute all superior 3D matter-bodies]. If 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).

Extent of universal medium between two 3D matter-particles is always less than extents 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 between them. Motions of constituent 3D matter-particles move whole macro body. Gravitational attraction between two macro bodies is, relatively, a minor by-product of gravitational actions on them. Gravitational attraction takes place between spinning and disc-shaped matter-cores of photons (in two macro bodies), whose disc-planes coincide at given instant. Gravitational attraction between two macro bodies, 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 matter-cores happen to be in same plane at any instant. Contrary to present belief, gravitation is enormously stronger, compared to other manifestations of efforts ('natural forces'). Its dynamic action, observed as gravitational attraction between macro bodies is only very minute fraction of gravitation on each of photons, constituting macro bodies.

Universal medium stores work, in the form of distortions in its latticework-structures. Distorted regions in universal medium, about 3D matter-particles are 'distortion-fields'. Distortion-fields of all 3D matter-particles in a macro body, together, form its matter-field. When distortion-fields of two 3D matter-particles overlap, distortion-density in the region varies. Inherent property of universal medium, to maintain homogeneity, causes translational transfer of distortions in latticework-structures in the region. This tendency produces 'field-forces'. Transfer of distortions carries any 3D matter-particle, which happens to be in the region, along with distortions. Movements of 3D matter-particles convert 'field-force', into inertial actions of 3D matter-bodies. Depending on nature of distortions, distortion-fields are classified into linear (magnetic field), angular (electric field) and radial (nuclear field) distortion fields. Electric field, 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 gap, create matter-core of basic 3D matter-particle. Gravitation, by distorted region of universal medium, mould matter-core into segmented-spherical disc, move it at highest possible linear speed (without causing own breakdown) and spin it about one of its diameters at spin speed proportional to its 3D matter-content. Linearly moving, spinning matter-core, together with associated distortion-field (equivalent electromagnetic wave) is a photon (corpuscle of light or other radiations). Matter-core and associated distortion-field cause and support each other to maintain stability of photon.

Under suitable conditions, gravitational actions help two complimentary photons (of high 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 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 positron 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 same circular path create common distortion-field around biton, in its plane of rotation. By virtue of its structure and movements of constituent photons, a biton has angular distortion-field around common path of its

photons. This is 'primary electric field'. Electric field is an angular distortion-field, whose direction may be indicated by imaginary, circular 'lines of force' with arrows in direction related to inertial action, it may cause. Face, where lines of force are in clockwise direction, is 'positive electric charge' and the face, where lines of force are in 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 planes of their existence. While moving in a linear path at considerable speed, bitons orient themselves so that resistance to their motion from universal medium is least. To achieve this, 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 direction of linear motion. In all cases, where bitons have 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 distance between them. Interaction between two electric fields at 'zilch-effort distance' [1] between them, causes no inertial action. Direction of inertial actions, on either side of 'zilch-effort distance' between them, reverses. If two electrical fields of certain relative orientation, at less than 'zilch-effort distance', apparently attract each other, same electric fields have no inertial action between them, when they are placed at 'zilch-effort distance' and same electric fields apparently repel each other, when distance between them is increased beyond 'zilch-effort distance'.

Magnetic fields are distortion-fields in universal medium, where lines of force of distortions have linear nature (or of angular nature with low curvature). Electric field has angular distortions. As there are no means to produce linear distortion-fields, combination of electric fields in proper array is the only way to create magnetic fields. Increase in curvature of lines of force increases distortion-field's electric nature and reduces its magnetic nature. Reduction in curvature of lines of force reduces distortion-field's electric nature and increases magnetic nature. Electric field with lines of force of low curvature behaves as 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 gradual change in magnetic field-strength, orients itself so that its interaction with magnetic field becomes apparently attractive towards the region with higher magnetic field-density. If 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 attractive (interactive) phase towards higher-density region of magnetic field. Details of these actions are given in [1].

### **Stable galaxy:**

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

Due to very large size of spinning galactic cloud, linear speeds of 3D matter-particles situated towards its edge are extremely high and is comparable to linear speed of light (photons). No 3D matter-particles, larger than photons and bitons (with planes perpendicular to direction of their motion), can survive at this linear speed. Therefore, all 3D matter-bodies along periphery of a galactic cloud disintegrate in to their constituent bitons. Dismembered photons radiate into free space. Bitons, in this region, orient themselves to minimize resistance to their motion, from universal medium by keeping their planes

perpendicular to direction of their motion [1], so that moving bitons experience minimum resistance from universal medium. Independent bitons, moving in this fashion, fill outer edge of galactic cloud. Peripheral region of a spinning galactic cloud, occupied by free bitons, is its 'halo'. Effect of gravitational attraction between bitons in halo and matter-content of rest of galactic cloud is balanced by outward motion (centrifugal action) of bitons due to their linear motion in circular paths around galactic cloud.

Depending on its parameters, it is possible for a galactic cloud to become stable galaxy during brief period in its life. As magnitude of angular speed or radius of a galactic cloud increases, inward radial motion of 3D matter-particles due to gravitational collapse becomes too less to compensate for their outward displacement due to centrifugal action. Matter-contents of galactic cloud continue to spread outwards in planes of its spin. Halo, formed around spinning galactic cloud, tends to arrest whole-body linear displacements of galactic cloud towards any other similar galactic cloud and keep it steady in space, to form 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 'Nebular hypothesis'. These smaller clouds further condense into separate macro bodies but simultaneously being constituents of same group. In this case, total matter-content of combined macro body is distributed over a wider region and hence there is no concentration of matter-content in a place, as in the case of 'black hole'. Photons, escaping from the region of galactic cloud are not slowed down very much and hence these types of groups of macro bodies, called 'galaxies', are visible to outside observers within universe.

However, macro bodies in central region of galactic cloud (where centrifugal actions on them are lesser) tend to coagulate and form central 'black hole' of the galaxy. Gravitational collapse of black hole gradually increases 3D matter radiation from it. Gravitational attraction between the black hole and radiating photons revert all their 3D matter-content into quanta of matter. Free quanta of matter, available from this reversion, migrate into latticework-structures of 2D energy fields and cause outward expansion of universal medium from central region of galaxy.

Galactic stability, which is related to translational motion of one galaxy towards another, is a short lived phenomenon. Except for its translational motion, a galactic cloud never reaches stable state. A galaxy is a combined macro body, whose constituent macro bodies continuously move and evolve, within. Galaxy, itself, changes its parameters continuously, until whole of its matter-content is disbursed or reverted into 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 macro bodies. Depending on magnitude and direction of their spin motions, this type of collisions may help to form super-galaxies or cause total disintegration of both galaxies.

### **Gravitational repulsion:**

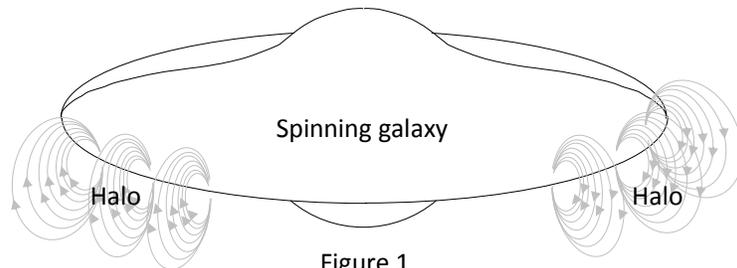
Outward expansion of 2D energy-fields from central region of galaxy creates relative movement in universal medium. This acts to carry all 3D matter-bodies outward from the region. All macro bodies in a galaxy tend to move away from central galaxy and overcome gravitational attraction on them towards central black hole. Relative outward movement of universal medium is carried even outside perimeter of galaxy and acts to produce gravitational repulsion between neighbouring galaxies.

### **Electromagnetic repulsion:**

Each biton has a primary electric field. Primary electric fields, being very small in size, act within 'zilch-effort distance' with other distortion-fields, in their immediate neighbourhood. Orientation of biton, along periphery of galaxy is a mechanical activity. Therefore, in the beginning, they orient 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. In any region, there are some surviving primary electric fields, which produce resultant electric field in any one direction.

Surviving primary electric fields (in any region of halo), together, make resultant doughnut-shaped (toroid) electric field along outer edge of 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 behave like magnetic field. Therefore, there are strong magnetic fields around edge of a (spinning) galaxy, perpendicular to its plane of spin. Lines of force of magnetic fields at two places on periphery of a galaxy are shown by grey arrows in figure 1. They are in opposite directions. Directions of magnetic fields, appearing on periphery of galactic-disc, are with respect to an external reference. Each biton, contributing to this magnetic field, is also capable to interact on its own, with any other external distortion-fields. Two galaxies, moving towards each other under gravitational attraction, may have strong magnetic fields about their periphery, perpendicular to their plane of spin.

Galaxies, in space, apparently attract each other due to gravitation. Galaxies tend to move towards each other. If they are near enough, gravitational attraction between them is partially neutralised by gravitational repulsion. As and when galaxies approach each other, magnetic fields about their periphery interact with each other. There are two possibilities. Their magnetic fields can be in repulsive phase or in attractive phase with each other.



As their magnetic fields interact, each of primary electric fields of free bitons, present about rim of galactic periphery, is also interacting with magnetic field of 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 matter-body of galaxy. Because of great distance between galaxies, there is a gradient in their magnetic field-strength along line joining their centers. Magnetic field-gradient of one galaxy affects primary electric fields of bitons of other galaxy. Each of primary electric field (if required) tends to re-orient itself so that it is in attractive phase towards higher-density region of magnetic field of other galaxy. Many of the bitons succeed to re-orient. Ability of a biton, to re-orient itself, depends on relative strength of re-orienting effort with respect to aligning effort due to its linear speed. 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 magnetic lines of force of two approaching galaxies are of same polarity. Lines of force are parallel and unidirectional. Hence, approaching galaxies apparently repel each other. If their repulsion is strong enough, galaxies come to stay away from each other, at a distance between them, where resultant gravitational attraction and apparent repulsion due to their magnetic fields balance each other. Since galaxies are spinning macro bodies, this balancing is a dynamic action. As galaxies turn, nearest points on their peripheries facing each other, change. Strength of magnetic field at these points may be different. Therefore, variation in strength of galaxies' magnetic fields has to be continuously updated to maintain required balance.

If 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 periphery of one galaxy, are carried into magnetic field of other galaxy. Magnetic fields of galaxies have higher field-density towards galactic centers. Therefore, these bitons (disregarding their movements along periphery of galaxy) are also moving towards a region of higher-density magnetic field. Bitons, moving towards higher-density magnetic region, tend to re-orient themselves, such that their primary

electric fields are in attractive phase with region of higher-density magnetic field. Bitons in both galaxies tend to re-orient and many of them succeed. If approaching speeds of galaxies are faster, more bitons are re-oriented and at a higher rate. Re-orientations of these bitons strengthen magnetic fields of both galaxies to increase their magnetic field-strength and resulting mutual apparent repulsion.

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

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

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

### **Galactic repulsion:**

A multi-body system in space may be an independent group of macro bodies, like a stable galaxy or part of a system of macro bodies, 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 independent existence in space and changes in parameters of their movements depend on external efforts on them. Gravitational attractions between them are the only external efforts. Attractive nature of gravitational attraction can only effect movements of constituent macro bodies towards each other. However, for stable existence of galaxies, it is necessary for gravitational attraction between galaxies (between its member macro bodies, which have no mechanical connection) to create repulsion between them. This, being the case, there is no riddle in repulsion between stable galaxies (or other multi-body systems), which are under gravitational attraction.

Integrity of a spinning multi-body system is sustained by balance between centrifugal action and gravitational attraction on each of its member macro bodies. In case of a macro body on its outer perimeter that moves towards centre of its rotation, by an external effort, centrifugal action on that macro body diminishes and magnitudes of gravitational attraction between displaced macro body and all other macro bodies in the system increases. Overall effect on the system is to reduce its radial size by increased gravitational attraction between members of the system. If the multi-body system is static in space, movement of displaced macro body subscribes to increase magnitude of gravitational attraction on all other macro bodies in the direction of displaced macro body. Every other macro body in the system tends to move towards the displaced macro body. As a result, multi-body system as a whole displaces in the direction of motion of displaced macro body.

Conversely, if a macro body on outer perimeter of a spinning multi-body system is moved away from

centre of rotation, by an external effort, centrifugal action on that macro body increases and magnitudes of gravitational attraction between displaced macro body and all other macro bodies in the system decreases. Overall effect on multi-body system is to increase its radial size, by reduced gravitational attraction between its members. If multi-body system is static in space, movement of displaced macro body subscribes to reduce magnitude of gravitational attraction on all other macro bodies in the system, towards the displaced macro body. Encouraged by centrifugal action, every other macro body in the system tends to move away from the displaced macro body. As a result, multi-body system as a whole displaces in the direction of motion of displaced macro body.

Repulsion between two stable galaxies works similar to second case, mentioned above. Although gravitational repulsion moderates gravitational attraction between two stable galaxies, repulsion between them is initiated by electromagnetic repulsion between their halos. As halo of a galaxy is repelled in certain direction (by halo of approaching galaxy), it is displaced towards its own galactic centre and the action encompasses one or more constituent macro bodies near its periphery. Linear speed of halo's inward displacement is very slow and inward moving distortions in universal medium about halo has little effect of enclosed macro body. However, bitons, constituting the halo are moving (almost) at the speed of light, in circular path around galaxy. Distortions in universal medium about halo are being transferred at this linear speed to move its constituent bitons. Distortions in universal medium, which are being transferred at this linear speed, try to carry any 3D matter-body (trapped within this part of halo) also at same linear speed.

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

This factor, producing apparent repulsion between galaxies, is ability of free bitons to re-orient themselves, irrespective of their direction of motion. Hence, any two macro bodies with high spin-speed and with free bitons at their periphery can develop magnetic fields, which produce apparent repulsion between them. Directions of galactic planes or shapes of galaxies 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 definite distance from each other. Distance between two galaxies, in stable state, depends on magnitude of their 3D matter-contents and parameters of their central black holes. That is, distance between two galaxies is proportional to resultant gravitational attraction between them. Strengths of their magnetic fields are automatically corrected to maintain this distance. A galaxy may have more than one neighbouring galaxies. Distance between a stable galaxy and its neighbours may be different. Similarly, strength of magnetic field or polarity at different points in halo of a stable galaxy towards any of its neighbours may be different to suit parameters of interacting galaxies.

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

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

Since stable galaxy is a spinning fluid macro body, its gravitational collapse and spin acceleration continue, even after it has attained brief period of stability. Increase in internal pressure of galaxy, due to gravitational collapse, causes radiation of 3D matter-content from it, in the form of light, heat and other forms of radiations. Loss of 3D matter-content reduces rate of gravitational collapse. At the same time, spin speed of galaxy gradually increases. These two effects together compel 3D matter-content of galaxy to have constant tendency to spread outward. As diameter of galaxy increases further and linear speeds of peripheral primary matter-particles approach linear speed of light, they breakdown into independent photons and radiate away in various directions. Gradually, most part of galaxy disintegrates into photons and radiate away. Reduced 3D matter-content and increased radius make it impossible for expanding galaxy to satisfy above equation. Therefore, 3D matter-content of such galaxies disburse into space, to reform into new free inter-galactic clouds.

An external effort on a very large fluid macro body, like group of macro bodies in a galaxy, has its immediate effect at the region of action of effort. Rest on 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. Macro bodies in the region that moves towards galactic centre achieve greater linear (and angular) speeds. This phenomenon, along with uneven distribution of macro bodies in galactic clouds, causes uneven equatorial periphery. Therefore, most galaxies acquire spiral shapes (with dissimilar length of arms) during their formation.

Macro bodies, smaller than galaxy (or galactic clouds with no or low spin speed), do not have this protection. Here, it is the size of macro body and its spin speed, what counts and not its 3D matter-content. Many of smaller macro bodies 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 influence of external magnetic field. As a result, they approach each other under gravitational attraction to collide or to be captured-in, to form union of multi-body system.

Mutual galactic repulsion gives stable galaxies their ability to exist independently and static in space (relative to absolute reference). Hence, wherever in space we look, we may find galaxies there. Stable galaxies constitute 3D matter-world to us. This 3D matter-world, on a large scale, is in steady state and perpetual. However, individual macro bodies are not perpetual. Locally in any part of a galaxy (or galaxies themselves) are destroyed and rebuilt in cyclic manner. 3D matter is created from universal medium at cyclically varying rate. At the same time, 3D matter is reverted into universal medium at similar cyclically varying rate. Development of 3D matter and formations of composite macro bodies in nature increases entropy. Reversion of 3D matter into universal medium, which is a highly ordered stable system, reduces entropy of nature. Cyclic conversion and reversion of matter into its 3D spatial state and its 1D spatial status in universal medium keeps entropy of universe within limits. Here, 'entropy' means the measure of disorganization or degradation of 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 macro bodies, even if they have comparable or higher 3D matter-content. This mechanism automatically regulates 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 steady state of a perpetual universe. This is irrespective of occasional local disintegration of macro bodies, necessary to maintain universe's entropy within limits. Gradually, even stable galaxies disburse their 3D matter-contents into universal medium and disintegrate.

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**Reference:**

[1] Nainan K. Varghese, *MATTER (Re-examined)*, <http://www.matterdoc.info>

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