BLACK HOLE

According to 'MATTER (Re-examined)'

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Abstract: The physical parameters of stable galaxies produce sufficient mutual repulsion by their halos to overcome gravitational attraction between them. However, those very large galactic clouds (or central regions of stable galaxies), which do not develop sufficient spin speeds to develop into stable galaxies, succumb to gravitational collapse and form very large single macrobodies of very high 3D matter density. Their huge size and very large 3D matter content give them certain logical properties, one of which is to reduce and prevent outward radiation of 3D matter (of light) from the zone of their existence. This phenomenon makes them invisible, hence the name 'Black Hole'. An alternative concept, presented in the book 'MATTER (Re-examined)', envisages removing all mysteries about the black holes and explaining the logical sequences of their birth, life, and death.

Keywords: Gravitational attraction, universal medium, galaxy, black hole, photon, radiation of light, galactic spin, entropy.

Introduction:

From the observed parameters of cosmic bodies, certain regions of space appear to influence the patterns of their motions. Apparently, no physical bodies could be detected in these regions, causing intense gravitational attraction to emanate from the region. As gravitational attraction was assumed to be a property of 3D material bodies, the presence of a macrobody in this region was the only logical conclusion. It was common knowledge that even those macrobodies, which caused much lower gravitational attraction, radiated heat, light, and other forms of radiation of 3D matter and associated energy. The absence of any sort of radiation from the region of the assumed macrobody (that caused intense gravitational attraction on nearby macrobodies) was the reason for the name 'black hole' for this region. Contradictions between current physical laws and the behaviour of 'black holes', determined by observation of near-by macro bodies, lead to many illogical assumptions, mysterious phenomena, and mathematical theories rather than an advance in research for logical explanations on the intense gravitational attraction and the mysterious properties of radiation.

A 'black hole' is usually defined as 'a region of space from which nothing, not even light, can escape', intact. It is assumed to be a region occupied by a huge, invisible, and very dense macrobody. Smaller macrobodies, alleged to have the mathematical properties of black holes, as described in a few modern theories, are mere fantasies.

A black hole, except for its volumetric size and quantity of 3D matter it contains, is an ordinary macro body. It has no illogical, mystical, or magical properties (like infinite 3D matter-density, event horizon, singularity, cause of spatial curvature, gravitational time dilation, etc.). It obeys all physical laws applicable to all other 3D material bodies in nature, under all conditions. It is the peculiar behaviour of radiation emanating from the region of a black hole that makes a black hole invisible. Different stages in the natural development of a galactic cloud (depending on its spin speed, 3D matter content, and radial size) result in the formation of a static, spinning, and stable galaxy with a black hole at its centre or as a single black hole, moving freely in space.

The 3D matter content and 3D matter-density of a 'black hole' are so great that gravitational attraction on its constituent parts prevents their escape from the main macro body. The 3D matter-density of a black hole is raised to a very high magnitude not by fusing elementary and fundamental matter-particles but by brining them very close to each other and reducing inter-particle spaces in the macrobody. Only corpuscles of light (or similar radiation), which are the lightest and smallest three-dimensional matter particles, may be radiated outward from a black hole. However, during their motion away from a black hole, the 3D matter contents of corpuscles of light (or other radiation) are progressively disbursed into the surrounding universal medium (space) until, in most cases, the whole of their 3D matter contents and the light itself disappear before moving far out from a black hole. This is misunderstood as the prevention of light from escaping from a black hole.

Contemporary theories generally assume that light is gravitationally attracted to fall back into a black hole, and intense gravitational attraction towards a black hole prevents it from escaping farther into open space. This is in spite of the fact that gravitational attraction is strictly restricted to entities with masses (3D matter contents), and light is considered to have no mass. Alternatively, it is also assumed that an action similar to the gravitational attraction on light is made possible by the curvature of space-time around a black hole, etc.

Actually, black holes do not prevent light from escaping from their region. 3D matter contents from corpuscles of light are disbursed into the surrounding universal medium (space) due to very high gravitational attraction towards the black holes. Light is lost during its radiation, away from the black hole. The role of the black hole is only to provide sufficient gravitational attraction for this process. Because of this phenomenon, astrophysicists searching for black holes have to rely on indirect observations. A black hole's existence can sometimes be inferred by observing its apparent gravitational interactions with other macrobodies near its surroundings.

Black holes are routinely produced by extremely large galactic clouds, formed in the intergalactic region of space. Super-sized galactic clouds may condense into either a single black hole, an unstable galaxy, or a stable galaxy with a black hole at its centre. Accidental collisions between unstable galaxies may form a super galaxy with the possibility of a set of binary black holes at its centre. A black hole continuously radiates away its 3D matter content in the form of photons (corpuscles of light or other radiation). This tendency gradually reduces its total 3D matter content. Depending on the total 3D matter content of a black hole, the rate of loss of 3D matter content may vary and cause different phenomena, leading to its death.

Matter cannot be compressed to infinite matter-density or to zero volume. The highest 3D matter-density is that of the 3D matter-core of a corpuscle of light, which is the same as that of a quantum of matter in the universal medium. Macrobodies, under high internal pressure, radiate away their 3D matter contents. Under high external pressure, superior 3D matter particles breakdown into constituent fundamental or primary 3D matter particles rather than fuse together. Therefore, it is impossible to create a macro-body of infinite 3D matter-density.

All conclusions expressed in this article are taken from the book 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

Gravitational collapse of a macro body:

In all macrobodies, the inter-particle gravitational attractions continuously attempt to bring their 3D matter particles closer. Consequently, all large macrobodies gradually reduce in volume. This process may be called 'gravitational collapse'. The gravitational collapse of the macrobody is a gradual process that will continue until the body's volume is reduced sufficiently so that collapsing efforts are compensated by its internal pressure, provided by inter-particle 'apparent repulsions'. Gravitational collapse acts as external compression on each of the constituent components of the macrobody. The magnitude of external compression gradually increases towards the macrobody's centre.

During the gravitational collapse of a large macrobody, all of its 3D matter particles tend to move towards the macrobody's centre. However, depending on the relative positions of the 3D matter particles within the macrobody, especially in a macrobody with an uneven distribution of 3D matter particles, each of them may have gravitational attraction of diverse magnitudes in directions different from the radial lines of the macrobody. The resultant uneven directions of gravitational attraction on the 3D matter particles give them not only a radial motion but also an angular motion about the centre of the macrobody. As a result of the angular motions of constituent 3D matter particles, the whole macrobody develops rotary motion during gravitational collapse around its centre of mass.

Internal pressure within a macrobody acts as external pressure on all its constituent 3D matter particles. External pressure compels them to discard parts of their 3D matter contents. Lowered 3D matter content levels gradually change the physical state of the macrobody into a gaseous state. If the 3D matter content, discarded from 3D matter particles is small, they may be absorbed by the surrounding universal medium and expand outward. Outward displacement of the universal medium appears as 'gravitational repulsion' (which may create repulsive inertial motion).

When the number of quanta of matter discarded from the 3D matter particles is greater than that which can be readily absorbed by the surrounding universal medium, they are converted into photons, which radiate away from the region. Large macrobodies (black holes, stars, large planets, etc.) radiate 3D matter and associated energy in this manner, due to their gravitational collapse. They do not require hydrogen fusion or other nuclear reactions to produce 3D matter and associated energy radiation from them, as is believed today.

The development of a galactic cloud depends on the total 3D matter content in it and the nature of its gravitational collapse. Depending on the physical size of the galactic cloud and the parameters of its spin motion, it may develop into a single macrobody or into a number of separate macrobodies of various sizes in a group, or it may disperse all of its 3D matter particles in a few parallel planes in space. In due time, a galactic cloud with low or no spin speed collapses and condenses (under the action of gravitational attraction between its constituent matter particles) to form a large macro body, called a 'black hole'.

Black hole:

The approximate spin speed, ω, of a stable galaxy, as given by equation (16/2) in the book 'MATTER (Re-examined)' is:

$$\omega = \mathrm{Tan}^{-1} \frac{MG}{4R^2c}$$

where ω is angular speed, M is the total 3D matter content (mass) of the galaxy, G is the gravitational constant in the 3D spatial system, R is the radius of the galaxy, and c is the speed of light.

Should the magnitude of the angular speed, ω, or radius, R, of a galactic cloud become comparatively lesser (even in a galactic cloud that forms a stable galaxy, its central region has a relatively lower angular speed with a smaller radius) or if the galactic cloud has no spin motion during its formation, the outward (centrifugal) radial motion of 3D matter particles is too slow to compensate for their inward radial (centripetal) motion due to gravitational collapse. The galactic cloud or its central part shrinks at an accelerating pace to form a single, very dense macrobody called a black hole, with low spin speed or no spin motion at all. This macro body has no protection from gravitational attraction towards other macro bodies in space, as in the case of a stable galaxy. A black hole at the centre of a galaxy acts as an integral part of the galaxy. Since a stable galaxy has no translational motion, the black hole at the centre of the galaxy maintains its steady state in space.

The main difference between a black hole and a galaxy is in the distribution of their 3D matter contents. In a black hole, the whole of its 3D matter content is concentrated in a single, relatively small region, but the total 3D matter content of a galaxy is distributed over a wide region in space in the form of small macro bodies and dust clouds.

Matter-density of a black hole:

The 3D matter-density of foundational 3D matter particles (in all spatial dimensional systems) is of the highest and constant value. All-encompassing universal medium, together with basic 3D matter particles in it, form a single 'block of matter' of this (highest and constant) matter-density. However, when we consider superior 3D matter particles or macro bodies separately, we consider only their constituent basic 3D matter particles and ignore the universal medium in inter-particle space. Thus, depending on the concentration of its constituent basic 3D matter particles, a macrobody's 3D matter-density is much less than that of its constituent basic 3D matter particles. Basic 3D matter particles, constituting the fundamental particles of a macrobody, cannot be moved closer without disastrous results. Therefore, it is impossible to increase the 3D matter-density of a macrobody so that it approaches or exceeds the 3D matter-density of a basic 3D matter particle [1].

The gravitational collapse of a non-spinning galactic cloud (or slow spinning galactic cloud or central region of a spinning galactic cloud) brings its constituent atoms and molecules nearer and increases its internal pressure. We shall call this type of macrobody a 'proto-black hole'. As internal pressure increases, its constituent primary 3D matter particles discard parts of their 3D matter contents in the form of free quanta of matter into the universal medium. If discarded quanta of matter are few, they are absorbed into the latticework structures of the surrounding universal medium. If discarded quanta of matter are available in sufficient quantity, they form new photons, which radiate in various directions. The frequency (3D matter content) of photons radiated from this zone gradually increases as gravitational collapse continues to increase with a proportional increase in the proto-black hole's internal pressure.

Fundamental 3D matter particles (like electrons and protons) or primary 3D matter particles (bitons) cannot merge their 3D matter contents to form different types of 3D matter particles (like neutrons). Each 3D matter particle has its own definite structure and form, which are controlled by the universal medium during its development. Primary 3D matter particles may combine to form superior 3D matter particles (like electrons, positrons, protons, neutrons, etc.), but their 3D matter contents cannot merge to form 3D matter particles of higher 3D matter-density. The possibility of the merger of 3D matter-particles to form a macrobody of infinite 3D matter-density (and resulting singularity) is a baseless imagination.

The loss of 3D matter content from primary 3D matter particles, results in their expansion. The expansion of 3D primary matter particles, in turn, increases the volume of all atoms and molecules in the proto-black hole. Therefore, as a proto-black hole loses its 3D matter-content during gravitational collapse, the expansion of its constituent 3D matter particles tends to reduce the sum total reduction in its (radial) size. Gravitational collapse tends to bring constituent 3D matter particles of the proto-black hole nearer. As inter-particle gravitational attraction depends on the distance between 3D matter particles, gravitational collapse tends to accelerate. Inter-particle gravitational attraction, during gravitational collapse, brings the proto-black hole's constituent 3D matter particles nearer to increase its 3D matter-density and reduce its (radial) size. No external effort can merge the 3D matter contents of two 3D matter particles, however large the effort may be.

Inter-particle distance in a proto-black hole is reduced due to gravitational collapse and the expansion of primary 3D matter particles. Both of these actions tend to increase the internal pressure of the proto-black hole. The internal pressure of the proto-black hole acts as an external pressure on its own 3D matter particles. A gradual increase in external pressure on primary 3D matter particles causes them to discard part of their 3D matter content and expand in size. The expansion of primary 3D matter particles causes the expansion of the proto-black hole itself. This is against the size reduction of the proto-black hole by gravitational collapse. Empirical laws show that both gravitational attraction and 'field forces' are inversely proportional to the square of the distance between two 3D matter bodies of corresponding natures. The magnitudes of these efforts may vary due to differences in the values of constants of proportion in equations.

3D matter particles / bodies cannot be compressed beyond a certain pressure and yet maintain their identity as 3D matter particles / bodies. The highest 3D matter density is that of the 3D matter-core of a photon (same as that of a quantum of matter). It is impossible to produce compression greater than gravitational pressure on the 3D matter-core of a photon. Because that is the ultimate pressure that can be applied by the universal medium. The 3D matter-density of superior 3D matter particles, structured by photons in various formations, is only a minute fraction of the 3D matter-density of their constituent photons. In this case, we ignore the presence of the universal medium in inter-particle space and consider only 3D matter within the region to determine 3D matter-density.

Attempts to compress 3D matter bodies beyond reasonable limits cause their disintegration into primary and fundamental 3D matter particles. At the level of a primary 3D matter particle, compression of a 3D matter body tends to increase its volumetric size and revert part of its 3D matter content back into the universal medium. Hence, the notion that matter can be compressed to infinite 3D matter density (as is believed in the Big Bang theory and other similar theories) is not reasonable. A very large macrobody, under gravitational collapse, cannot compress its 3D matter content indefinitely. As external pressure on its 3D matter particles increases, they lose more and more 3D matter content and expand to greater sizes. Expansion of a macrobody reduces the effective 3D matter density of 3D matter in it.

Stability of a black hole:

During certain stages of the life of a black hole, the expansion of its body due to the loss of 3D matter content may equalise or overcome the size reduction due to gravitational collapse. This stage may extend over a long period of time, and the black hole may be considered a stable macrobody during this period. Due to the gradual increase in gravitational collapse, a black hole continues to lose 3D matter content from all of its primary 3D matter particles. However, (disregarding additions from external sources), the total number of constituent primary 3D matter particles (hence the total number of atoms in the body) remains steady until 3D matter particles at its equatorial surface start to disintegrate due to very high linear speed.

Irrespective of its very large size or total 3D matter content, a macro body remains a stable black hole as long as the linear speed of 3D matter particles at its equatorial surface (due to spin motion) does not have sufficient centrifugal action on them to overcome gravitational attraction towards the centre. Centrifugal action on these 3D matter particles may vary as the black hole expands due to the loss of its 3D matter content. As and when the linear speed of 3D matter particles on the black hole's surface reaches the speed of light, they break down into constituent photons and radiate in various directions.

A black hole, being a 3D matter body, is continuously under gravitational attraction towards various other macrobodies in space. A black hole, formed in the centre of a galaxy, remains more or less steady without translational motion. Gravitational attractions on this black hole, towards numerous macrobodies in the galaxy in various directions, nullify and produce no resultant translational effect of the black hole. All other black holes move in space.

Invisibility of a black hole:

As the gravitational collapse of a proto-black hole progresses as a single macro-body and its internal pressure reaches high values, a large quantity of quanta of matter is available in its central region (where the internal pressure is highest) at a very high rate. They form very high-frequency photons and radiate away from the region of their creation. Since the proto-black hole is a single macro-body, it has all its 3D matter content (represented by rest mass) concentrated in one region of space. Therefore, the magnitude of gravitational attraction between the proto-black hole and the photons, radiating away from the region of the proto-black hole is very high.

A photon, from the instant of its creation, is an independent basic 3D matter particle. A photon moving away from the region of a black hole is gravitationally (apparently) attracted towards constituent photons in the black hole, as and when their disc-planes of their 3D matter-cores coincide. This gravitational attraction is an external effort on an outward-moving photon to slow it down in its linear motion. An attempt to slow down a photon's linear motion reduces its 3D matter content (frequency) rather than its linear speed [1].

Since the black hole is very large, it has numerous photons, disc-planes of whose 3D matter cores may coincide with the disc-plane of the 3D matter-core of an escaping photon at any instant. Because of the very large size of the black hole, the disc-plane of the 3D matter-core of an escaping photon coincides with the disc-planes of the 3D matter-cores of the constituent photons of the black hole for a larger fraction of its spin angle. This increases the duration of the effective gravitational attraction between the black hole and the photon. These two factors, together, ensure that a photon moving away from a black hole is under greater gravitational attraction towards the black hole for considerable time during every turn of its spin, compared to a photon moving away from a smaller or less-dense macrobody.

Gravitational attraction between a black hole and a photon that is moving away from the black hole acts against the photon's linear motion and attempts to reduce its linear speed. It is an inherent nature of the universal medium to sustain the linear speed of a photon at a critical constant value. External action on the photon to reduce its linear speed lets the photon's 3D matter-core gradually lose its 3D matter content [1]. Due to very high gravitational attraction, most of the photon's 3D matter content is lost before it moves much farther from the black hole. Even if the photon was of very high frequency at the beginning of its journey, its 3D matter content will be lowered to such an extent that it is below the visible (observable) range before long. Frequencies of all photons (escaping or moving away from the region of a black hole) reducing below the visible range make the region of the black hole invisible to all outside observers.

Photons, escaping from the region of a black hole, continue to lose their 3D matter contents even after they become invisible. This process continues until the whole of their 3D matter contents are reverted to the universal medium and their 3D matter-cores cease to exist. All through the process of losing its 3D matter content, an escaping photon continues to move at its critical constant linear speed. The quanta of matter reverted from the 3D matter-cores of escaping photons are dispersed in a very large area of space and are easily absorbed into the universal medium instead of forming new photons.

Until the quantity of 3D matter in a black hole has come down to a reasonably low level, the 3D matter contents of all photons radiated from its region of space are reverted into the universal medium before they can escape gravitational effects between them and the black hole. These photons are not returned to the black hole; instead, their 3D matter-cores are disbursed into quanta of matter and absorbed by the surrounding universal medium. No photons of visible range from the region of a black hole reach observers in space until the 3D matter content of the black hole has diminished to a small magnitude. Until such times, the black hole will remain invisible to all outside observers.

Photons, which are radiated in directions slanting away from the vertical to the surface of a black hole, may not always move away from the black hole. Gravitational attractions on them may compel them to orbit around before they are gradually pulled back into the black hole. During their return journey towards the black hole, gravitational attraction tends to accelerate them. The tendency to increase the linear speed of a photon increases its 3D matter content (with a corresponding increase in its frequency) rather than raising its linear speed. Therefore, these photons are blue-shifted. However, as they move towards the black hole, outside observers cannot see them, and the black hole maintains its invisibility.

Back ground radiation:

Gravitational attraction tends to slow down all photons radiated away from the region of a black hole. They continuously lose their 3D matter contents to the surrounding universal medium until they cease to exist. Towards the end of its life, a photon's 3D matter content and its frequency are very low. Associated structural distortions in the universal medium, surrounding the 3D matter-core of low-frequency photons, resemble very low-frequency electromagnetic waves. At this instant, when the last of the 3D matter content of a photon's 3D matter-core is reverted into the universal medium, only a very low-frequency EM wave in the universal medium survives as a residue of the dead photon.

This low-frequency EM wave continues to radiate in the original direction of the photon's linear motion. Residue EM waves from dead photons (due to other reasons as well) in space appear as 'background radiation' from space. As all photons at the end of their existence (as basic 3D matter particles) contain somewhat similar amounts of 3D matter, their frequency is nearly the same. Because of this, the EM waves appearing as background radiation are of constant frequency. 3D matter is more or less evenly distributed in space, to the infinite extent of the universe. The distribution of dying photons is also on the same basis. Therefore, the magnitudes of background radiation received from all directions in space are the same.

Evaporation of 3D matter:

A reduction in the total 3D matter content of a black hole, due to radiation in the form of photons, may be understood as its evaporation. Gradually, evaporation reduces the 3D matter content of the black hole and the energy associated with the lost part of 3D matter. However, the total number of primary and fundamental 3D matter particles in the black hole remains, more or less, constant. These 3D matter particles would regain their lost 3D matter content and associated energy as and when they were dispersed from the black hole into free space, for any reason. This phenomenon prevents large-scale destruction of 3D matter particles from nature, even during recycling of 3D matter from its three-dimensional status (where entropy gradually increases) to its one-dimensional status in the universal medium (where the magnitude of entropy is nil).

An evaporating black hole, towards the end of its stable life, increases in radial size, corresponding to a reduction in total 3D matter content. Its 3D matter-density decreases, and radiations of various frequencies start escaping its gravitational influence. As the macrobody becomes visible, it will lose its status as a black hole. It may then evolve into different types of macrobodies, currently considered mysterious.

Conclusion:

Very large galactic clouds or central regions of stable galaxies, which have relatively lower spin speeds, condense to become 'Black holes'. They are so named because of their invisibility due to the non-survival of radiation from their region of space to reach the observers far from them. Except for their large bulk and size, black holes are perfectly normal physical macrobodies in the cosmos. They have neither mysterious properties nor strange behaviour. Every physical law is applicable to a black hole under all conditions, as it is for any other physical body in nature. Black holes are mechanical necessities of (galactic) formations of macro bodies in space. Black holes perform very important functions to preserve the perpetual steady state of the universe by recycling matter between its three-dimensional state (where entropy increases) and one-dimensional state in the universal medium (where entropy is zero) in both ways during different stages of their lives. Black holes, during different stages of their development, are called by different names.

Reference:

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

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