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SERVICES FOR SCIENCE AND EDUCATION

Singularity Sphere in The Heart of a Black Hole

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ABSTRACT

In the present work, radius, density of a black hole singularity and escape velocity of an object from an external surface of singularity sphere will be determined by using original mathematical equations to solve the mystery of a singularity. The singularity is white and smooth ball of steeply compressed particular type of matter and energy in the point same as the size of atom or subatomic particles. The Singularity is a big mystery and illusion in the history of Astronomy and black hole's theory. Scientist believed that the singularity has zero radius and infinity density when mass divided to the size of singularity by using density law. In fact, everything in the Universe has its limit radius, size, and density according to genuine equations of Physics. The radius of an event horizon, or black hole radius that named Schwarzschild radius can be calculated, but escape velocity from an external surface of a black hole is constant equal to the speed of light travel in the vacuum. The radius, density, spinning speed, angular momentum of a singularity ball, and escape velocity from external surface of a black hole's singularity is changeable according to dynamic of a singularity creation and an environment of the formation of a singularity. Singularity is denser than any well-known celestial object, and denser than any type of matter that contained in structure of a black hole.

Keywords: Black hole Structure, *Black hole Singularity, Singularity Radius, Singularity Density, Escape Velocity from Singularity.*

INTRODUCTION

Scientists generally divide black holes into main three categories according to their mass and size: stellar mass black holes, Supermassive black holes, and intermediate mass black holes. Black dwarfs and Stellar mass black holes are formed from ultimate death of Low mass Stars and high mass stars. In the heart of a galaxy contained a supermassive black hole [1][2]. Mass of black holes ten times or million times the mass of Sun [3]. All types of Black holes were formed when sufficient amount of mass was collapsed and squeezed inward urgently under powerful gravitational pressure and strong collision of energetic particles in the heart of any collapsed Stars. Nuclear fusion sphere in the heart of dead stars will collapse inward violently to produce singularity ball after its contraction gravitationally into very tiny point with a density about ($2\,x\,10^{60}\ kg/m^3$). The radius of a black hole singularity is not zero, and its density not infinity, the radius of a black hole singularity very small such as the radius of atom or subatomic particles, and its density incredibly high according to methods of singularity formation and amount of mass and energy compacted into such tiny point. The density of a singularity incredibly high that exceeded the density of any detected objects which existed in the nature. Singularity has different radius and density according to its spinning speed and angular momentum. Spinning speed and angular momentum of a black hole singularity

changeable that lead to increase and decrease the radius and density of a singularity automatically. Spinning speed and angular momentum of a singularity ball will increase strongly that lead to decrease the singularity radius and increase its density. Sometimes, the radius and size of a singularity sphere will increase, but its density will decrease and its spinning speed may calm down slowly. Singularity ball has different size and density according its rotational energy and momentum.

All main sequence stars may die in the future when their fuel of fusion was vanished, the star may become a red giant or red supergiant or explode as huge and luminous explosion that named supernovae in the final steps of star's lifetime [4][5]. The remnant core of dead star may become white dwarf, neutron star or black hole according to mass of dead and exploded star. [6] Death of solar mass star will give birth to black dwarfs, but high mass black holes were formed from ultimate death of high mass stars. All types of black holes contained a dense ball of compacted matter and energy that named a singularity. Singularity is the machine and mechanism of black holes; an event horizon is distorted sphere of dark matter and energy that covered the singularity in all directions. Black hole has a great density and gravity, as a result of a cosmic fabric that distorted steeply around the singularity ball. The boundary between singularity and accretion disc named an event horizon region. The surface of singularity ball much covered and hidden beyond compacted fabric of an event horizon. An event horizon is a dark region of a black hole where photon particles are attracted and accumulated for a long time. The light particles can't leave singularity surface or pass through the thickness of an event horizon easily, because the distance between dark matter particles is very narrow and combined. Wavelength of photon particles much higher than such tiny and critical vacuum that remained inside the structure of a dark fabric matter. High mass black hole has dense singularity ball at its heart, and larger event horizon [7][8]. Singularity is the heart of a black hole, and event horizon is an external boundary of a black hole. All types of black holes consist of two main regions are singularity and event horizon.

Main objective of this study to calculate Radius, Density of a Black hole Singularity, and Escape velocity of particles from its surface by using genuine equations of Physics and Mathematics.

DARK MATTER PARTICLES

Dark Matter Particles are magic particles in the structure of a dark matter beside subatomic particles that build up the structure of an ordinary matter. General structure of a visible Universe, Stellar system, galaxy disc, and event horizon of a black hole is filled with dark matter particles. [9] The space of a Solar system is filled with dark matter particles that make a bridge and gravity among whole structure of a solar system, and effect on its evolution and its dynamical balance. The visible Universe will tear into infinity space rapidly when lost a dark matter effect. The space of a Universe is not an empty region as whole, it is filled with such fantastic particles, normally the vacuum of a Universe is completed by dark fabric matter and dark energy that named a Cosmic fabric matter and energy, visible Universe consists of an ordinary matter and ordinary energy which connected together via dark matter particles. [10] Evidence for the existence of dark matter confirmed during survey deals: gravitational lensing studies or galactic and stellar dynamics. Universe is not space and vacuum as a whole, it is completed and filled with dark matter particles beside subatomic particles, and photon

particles. The whole structure of a visible Universe is not built up by only subatomic particles or an ordinary matter and energy.

The large space and vacuum of whole Universe is built up by an ordinary matter and energy with other matter named dark matter and energy. The density of an ordinary matter and energy, or the density of subatomic particles is higher than the density of dark matter particles. Dark matter particles can make bridge and connection between electrons and nucleus of atoms to build up the atomic structure, also dark fabric particles can make the connection between stars and planets to build up the stellar systems as solar system or build visible Universe during powerful gravitational waves and tunnels in the fabric of Universe. Dark matter Particles run the role of a fabric for atoms and Universe it can be named a dark fabric particle. The dark fabric matter or dark fabric particles much needed to new name is named a Fabriton, (Fabriton means Fast Actively Binding Reacting in Total Objects Naturally). Fabriton particles are dark matter particles, they are participating in rebuild naturally the structure of atoms, stellar system, planetary system, galaxies, whole Visible Universe, black holes, stars, planets, satellites, and any objects formed in the nature. An event horizon of a black hole consists mostly of Fabriton particles that named dark fabric particles or dark matter particles. An accretion disc and singularity of a black hole contained mostly of an ordinary matter and energy. Singularity of a black hole was formed mostly from violently inward collapse of an ordinary matter and energy during a core collapsed stars named a supernova.

TYPES OF BLACK HOLES

Black holes are much compressed and well-known celestial objects in the history of science and education. Astronomers divide black holes into two types, are Low mass black holes, and high mass black holes. Most types of black holes were formed from the remnant cores of dead stars, Low mass black hole was formed from the death of a low mass star, especially solar mass star, and high mass black hole was created from the remnant core of a high mass star when it was exploded violently and rapidly that named a supernova. When a fuel of star exhausted, the stellar death will start at final moments of its life, its atmosphere will expand outward, and its heart will shrink inward to become much denser and darker object that named a black hole. [11] Tiny black hole or primordial black hole are low mass black holes were formed during radiative era of an early Universe when a big bang started as a violent explosion, and expanded actively at the first steps of Universe evolution. Black Dwarf is a low mass black hole which formed from a dead core of solar mass star; the radius of a solar mass black hole is only three kilometers. Stellar mass black holes were formed from the dead core of a massive star when exploded as supernova, the radius of stellar mass black holes exceeded to hundreds, thousands, and even millions of kilometers. High mass black holes are swallowing materials and radiation from outside to grow, and expand in the next steps, Supermassive black hole will develop in this method.

In fact, black hole is a great gravitational region, where all types of matter and energy attracted, squeezed and fall down actively into its centre to collide directly with a black hole singularity. Singularity is a very compacted sphere of a weird material, and energy that hidden in the centre of black hole.[12] High mass black hole has higher mass and larger radius. Supermassive black hole is a high mass black holes, its mass, radius, and density exceeded low mass black holes,

most of galaxies are contained at their hearts a supermassive black hole, it can tide and swallow stars and dust particles urgently [13]. Supermassive black hole is much powerful types of black holes that kept the dynamical and statical balance of a galaxy, for any absent of a supermassive black hole, the galaxy will rip and evaporate quickly. Stars, gas, and dust particles are much luminous in the region where much closed to very centre of a galaxy. Milky way galaxy contained at its centre a powerful supermassive black hole that named Sagittarius A*. Sagittarius A* is the supermassive black hole which located at the Centre of a Milky Way galaxy. Distortion and balance of a galaxy disc was occurred inward under an effect of a Supermassive black hole. Supermassive black hole responsible on a formation, evolution and dynamical balance of a galaxy disc.

BLACK HOLE STRUCTURE

Black hole is amazing System of a compacted matter and energy that distorted steeply around a black hole Singularity. Black hole regions start from compacted singularity that located at the centre of a black hole to accretion disc in the edge of a black hole. Black hole has Five different regions are: a Rigid Singularity Ball, Singularity Tunnel or Perfect Singularity Vacuum, Black hole Sphere or Event Horizon, Photon Sphere or ergosphere, and Accretion disc. First region of a black hole structure named a Singularity Sphere, Singularity is a rigid and compacted sphere of a dense and collapsed matter and energy that squeezed inward steeply and stabilized inside the heart of a black hole. More than 99% the mass of entire black hole is combined inside the sphere of a singularity. Singularity is a centre and nucleus of a black hole, such as protons and neutrons were become nucleus of atoms, and Sun as the heart of a whole solar system, everybody has a heart, the singularity is a heart of a black hole. Second region of a black hole structure named a Singularity Tunnel or a perfect vacuum of the singularity sphere, singularity has great density and higher angular momentum for that reason a perfect vacuum will appear around the black hole singularity. Condense Materials will pass through the vacuum that surrounded a singularity with an infinity speed to collide directly with a singularity sphere and collapses entirely. Singularity has higher angular momentum to build a pure tunnel and vacuum around itself as a result of that quick rotations. Third region of a black hole structure named a black hole sphere or an event horizon. Event horizon is a compacted shell of a matter and energy that distorted under the stress of a singularity. The density and gravity of an event horizon is so high even light can’t escape from it or leave it directly, for that reason the event horizon has a dark and black colour. It is a gravitational sphere of compressed matter and energy that curved steeply around the singularity.

Four region of a black hole structure named a Photon sphere, the photon sphere is a spherical boundary of tiny or close to zero thickness in which photons that move on tangents to that sphere would be trapped in a circular orbit about the black hole. The ergosphere is a region located outside a rotating black hole's outer event horizon, the size of the Ergosphere is the distance between the ergosurface and the event horizon. Five and final region of a black hole structure named an accretion disc, an accretion disc is an external shell of a black hole, it is a ring of a hot plasma or narrow belt of excited materials that orbits the black hole actively. Accretion disc was formed temporary when a new materials, gas, and dust particles are fall down into the black hole. Materials, gas, and dust particles are in rapid motions, collisions, and frictions which increased largely the temperature and the luminosity of an accretion disc.

Accretion disc may glow more when maximum amount of matter fall down into the capture of a black hole. An accretion disc is a place where Light and radiation particles can runaway directly from a black hole, because the density and gravitational field of a black hole are not so high in the edge of a black hole, especially in the accretion disc region. Photonsphere and accretions disc are appeared instantly and temporary in that moment when some materials are fall down directly into the black hole.

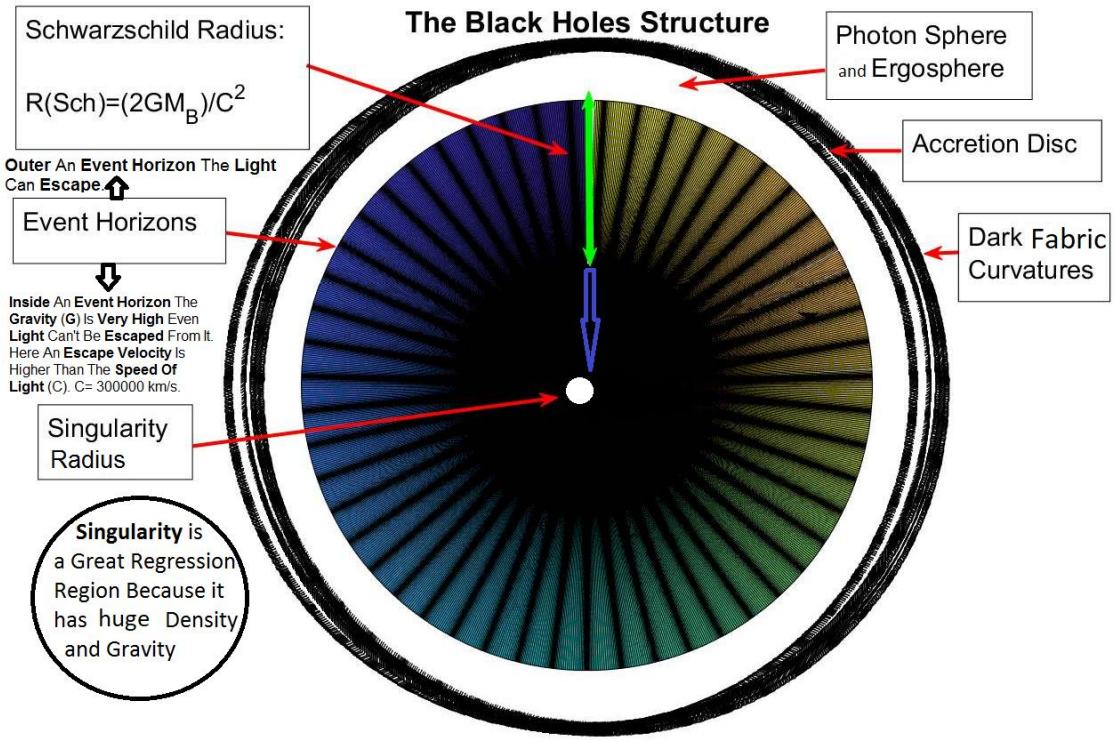


Figure 1: Black Hole Structure

Singularity and event horizon are two main and condense regions of a black hole structure. Cosmic fabric matter and energy is squeezed and condensed steeply in the structure of black hole, particularly in the structure of singularity and event horizon. The Light has limited energy, frequency, and larger wavelengths, for this reason is so difficult for light particles or any electromagnetic waves to pass easily through the compacted fabric of a Singularity and an event horizon. Radiation particles will move through the body of an event horizon slowly after many collisions, absorptions, refractions, and reflections. Event horizon has high density and larger refractive index. Possible travel through event horizon is larger than the speed of light, for this reason light can't escape from internal event horizon easily. Photon particles are much required to speed higher than the speed of light in vacuum to pass through event horizon. Following wave equation of light speed:

$$c = f\lambda \tag{1}$$

Where $\boldsymbol{c}$ is a speed of light in m/s, speed of light in vacuum very high and equals to $3\ x\ 10^8$ meters per second, $\boldsymbol{f}$ is the frequency of electromagnetic waves in Hz, $\boldsymbol{\lambda}$ is a wavelength in meters.

Furthermore, Black hole has a bizarre structure, there are two basic and stable parts to a black hole structure: the singularity and an event horizon. The singularity is a compacted sphere of a collapsed matter and energy that located at the centre of a black hole. Nuclear fusion ball of star was compressed and converted into a singularity ball during stellar explosions such as supernovae stars. The event horizon is a distorted shell of a dark and ordinary matter and energy around the singularity. The radiation particles can't escape directly from a singularity surface and inside event horizon, it is a reason that so difficult to see a singularity sphere or what is happening inside an event horizon. The radiations have larger wavelengths than the narrow distances and vacuums which existed among Fabriton particles in the distorted and compressed dark fabric that covered the singularity of a black hole.

The light can't pass and escape directly throughout the compacted fabric of matter and energy inside an event horizon. Light transition needs to long time to leave singularity throughout an event horizon. In fact, Event horizon is a distorted shell of compressed matter and energy around the compacted sphere of a singularity. Event horizon is a compacted fabric of dark matter around the singularity sphere. The light can escape directly from the surface of stars, planets, and any normal celestial objects, because the dark fabric matter and energy has lower distortions and compressions under an effect of such low dense objects. Accretion disc is a luminous and temporary shell of captured an ordinary matter, dust, gas, and particles around the black hole. The luminous accretion disc will appear instantly around any type of black holes when any celestial objects or any type of matter and energy were fall down directly into a black hole. Accretion disc of a black hole may become an external shell of a black hole structure during tearing and eating any type of matter and energy. The accretion disc was formed temporary when a black hole tears some gas from the surface of stars, planets, or any other celestial objects. [14] Supermassive black holes have powerful gravitational field and stronger tides on neighbour stars and planets to tear higher amount of gas and materials from their surfaces. Scientists detected an accretion disc of black holes when different electromagnetic radiations such as Gamma rays and X-rays were collected by space technology and radio telescopes. [15] Materials inside an accretion disc in rapid motions, frictions and collisions that lead to increase the luminosity and temperature of a black hole. The luminosity of accretion discs is clear evidence on the existence and detection of such dark and compact objects. The gravitational waves, and electromagnetic waves were come from a black hole are only successful methods to detect and describe such fantastic object. Supermassive black hole powered the accretion disc to glow and radiate different types of radiations. Supermassive black hole with a mass $6\ x10^9$ times the mass of a Sun stabilized in the heart of M87 galaxy. [16] For first time scientists could detect a supermassive black hole at the centre of M87 galaxy by using event horizon telescope EHT. Black hole consists of two main and stable regions are: Event horizon and singularity sphere. The radius of a black hole or event horizon was determined that named a Schwarzschild radius. Unfortunately, singularity doesn't have clear radius or still not discovered by any scientist and astronomers in the world. In this study people will know the radius and density of a singularity.

Event Horizon Radius

Event horizon is a shell of distorted matter and energy around the singularity. The event horizon is the raised ceiling covering the entire singularity. Singularity is hidden sphere of a collapsed matter inside the gravitational shell of an event horizon, event horizon was shifted partially from the surface of a singularity. The singularity and event horizon have tiny vacuum and distance between them, the event horizon never touch the singularity surface directly. The event horizon could be a ceiling, shell, sphere and cave around a singularity. The density of an event horizon is so high, and much difficult to see the singularity surface inside event horizon too. Light particles that escaped from the surface of a singularity couldn't break or pass the event horizon shell easily, most particles will collide with a ceiling of an event horizon and will back up again to collide with the surface of a singularity. Most particles are failed to leave a singularity surface through the event horizon, because an event horizon has powerful potential energy and very compacted dark fabric of matter and energy.

Dark matter particles are colliding and pushing one another in critical distances that very narrow to let photons pass through it. Radiation particles may stay inside an event horizon arrested and accumulated for a long time to leave it entirely or fall down into a singularity after many collisions and reflections with dark fabric particles. The Schwarzschild radius or the gravitational radius of a black hole sphere is a physical parameter in the Schwarzschild solution to Einstein's field equations of space time curvature that corresponds to the radius called the event horizon of a Schwarzschild. Superdistortions occurred under the effect of a black hole, it is a main reason that only escape velocity from the surface of a black hole is equal to the speed of light particles is 300,000 km/s, the radius of a black hole is a Schwarzschild radius [17][18].[19] Any type of black hole has same escape velocity is a light speed. The Schwarzschild radius of a black hole as written as below:

$$R_{Schwarzschild} = \frac{2GM}{c^2} \tag{2}$$

Where

- c = escaped velocity of an object with the speed of a light,
- G = Gravitational Constant,
- M = the mass of an Object when shrinking to become a black hole,
- $R_{Schwarzschild}$ = the Schwarzschild radius that named an event horizon's radius of a black hole.

An event horizon of a Black hole has great size, radius, and lower density as compared to the size, radius, and density of a singularity. The singularity has very tiny radius and size, but its density much higher than the density of a black hole sphere that named an event horizon. Singularity is a very distorted and compacted materials, but event horizon is only distorted sphere of a dark fabric matter, some accumulated electromagnetic particles, and other particles that surrounding a singularity from outside. In fact, the Singularity is a perfect and white smooth sphere that squeezed in the heart of any black hole, all types of matter and energy are distorted and warping around it. Singularity is an active and powerful machine of a black hole. The singularity sphere is feeding an event horizon and accretion disc of a black hole with much

powerful gravitational waves and energy to vibrate and transfer energy into Universe in the shape of waves and ripples. Both of an event horizon and accretion disc are dense, protective outer layers of two distorted and accumulated types of matter and energy around the surface of a singularity. Furthermore, very tiny and thin region of perfect empty was formed around the singularity of a black hole, it is become the separation region between a singularity surface and an internal surface of an event horizon. The singularity and event horizon of a black hole are two different regions of very distorted matter and energy, and never touched one another directly because of the existence of a pure and thin vacuum that located between them and separate them particularly. Singularity in the great rotations, it has very giant angular momentum and energy are common reasons of the formation of such pure vacuum and tunnel between the surface of a singularity and an internal surface of an event horizon. Dense and energetic Particles of matter and energy are fall down through an event horizon of a black hole to collide with a singularity directly and being crashed entirely forever. The density and gravity of a singularity and black hole will increase automatically when bombarded with huge number of such particles in the next times.

Singularity Radius

Scientists believed that the radius of a singularity is zero, and its density is an infinity, actually it is an illusion and heartbreaking. The concept of zero radius and infinity density of a singularity sphere are two hopelessness in the history of science and education. [20] The singularity is a sphere of collapsed matter inside the core of a black hole, analytic information is crucial for understanding the nature of collapse and spacetime singularities. The zero radius of a singularity means nothing here, if nothing here, which thing makes strong distortions in the fabric of a Universe. What is making event horizon to be distorted to trap light particles. This concept makes most people to confuse about the structure and dynamic of a black hole. Black hole has a singularity at its heart without any debt. Singularity is dense and smooth sphere of a collapsed and combined matter. The radius of a Singularity is not zero, it has very tiny size, in the size of atom or smaller according to location where black hole formed there, and the method of how black hole created. Singularity radius is very small as compared to the radius of an event horizon. Singularity radius has limited length, it is less or equals to the radius of atoms. Black dwarf with a mass of a Sun has a radius 3000 meters, and its singularity has a radius equals to or less than the radius of a hydrogen atom, but its density is very high and incredible. The radius of an event horizon and singularity are right and acceptable. The event horizon is the shadows and distorted shell of matter and energy around the singularity. The singularity has huge density and very tiny size, for this reason it is deeply drowning into the fabric of a cosmos. Singularity is a compacted sphere of a crashed an ordinary matter and energy, the escape velocity from the surface of a singularity is exceeding the speed of light and all known speeds in the nature. Singularity radius could be determined, as black hole radius calculated, but the radius of a singularity sphere is very small, and escape velocity is very high and differently. The singularity has very tiny size and huge velocity, an escape velocity from the surface of a singularity is exceeding the speed of light. The Singularity radius and escape velocity of an object from surface of a singularity ball determined by following equations:

$$R_{Singularity} = \frac{2GM}{v^2} \tag{3}$$

$$v = \sqrt{\frac{2GM}{R_{Singularity}}} \quad (4)$$

Where

- v = an escaped velocity of an object or particle from the surface of a Singularity exceeded the speed of light,
- G = Gravitational Constant, G = 6.673 x 10^{-11} N m^2/kg^2.
- M = the mass of an Object when shrinking steeply to become a Singularity Sphere,
- $R_{Singularity}$ = the Singularity radius.

Singularity radius is less than or same as the radius of atoms and particles according to an environment where singularity created inside it and method of creation it. The radius of a singularity is related to an environment where singularity formed there or the dynamic of its creation. Singularity radius is less or equals to the radius of atoms, or greater and equals with the radius of Particles as shown as below:

$$R_{particles} \leq R_{singularity} \leq R_{atom}$$

Where $\boldsymbol{R_{Atom}}$ is the radius of Atoms, $\boldsymbol{R_{Singularity}}$ is the radius of a Singularity Sphere that located at the centre of any type of black holes, $\boldsymbol{R_{Particles}}$ is the radius of Subatomic particles, protons, neutrons, electrons, Positrons, neutrino, and Quarks. The Singularity or that named a Singularity sphere has a very tiny radius and size equals to the radius and size of atoms or particles according to the steps of formation and evolutions, and places where singularity created there for that moment. Singularity has a tiny size, but it has great density and gravity higher than any well-known objects in the nature. Tiny black holes, black dwarfs, stellar mass black holes, supermassive black holes, and supergiant black holes have singularity with very tiny radius and size in the size of atoms or particles, but density and gravity of any form of singularity are very high and condensed. All types of matter will collide and crash instantly when collided with a surface of a singularity directly.

SINGULARITY DENSITY

Singularity has greater density that quantized in a tiny point, but its radius is not zero, and its density not infinity anyway. Singularity of a black hole has very small radius and huge density. The mass of all types of a singularity is squeezed into very tiny point in the size of atoms or particles. The singularity of a solar mass black hole has a mass and density which compressed into the size of a hydrogen atom or subatomic particles, the singularity of a solar mass black hole has great density equals to ($10^{60}\ kg/m^3$). Furthermore, the radius of a Singularity is equal to the radius of atoms or particles, but its density incredibly increased very high for any type of black holes. The singularity of a Stellar mass black hole has mass and density much higher than the mass and density of a solar mass singularity, because the singularity of a high mass stars was formed in much violently explosions that named supernovae. During supernovae explosion most Atoms and particles inside the structure of a nuclear fusion ball will face much powerful pressure and temperature that make them to collide together quickly and violently to produce a singularity much denser and stronger than the singularity which formed from the death of a

low mass stars. Fusion ball of star is a place where light mass atoms are fused together to produce heavy atoms under high pressure, temperature, and gravity. Main sequence star has stable nuclear fusion sphere where new atoms, particles, and radiations are forming inside it. The fusion ball of a high mass star is squeezing inward steeply under the effect of higher pressure and gravity that formed during powerful explosion of star. Most Excited and energetic particles will collide together quickly to form a singularity ball and black hole. An external shell of star will tear outward into space, and an internal shell of a star will squeeze inward to form the singularity during violent explosion of star in the final steps of a star's life. An internal explosion of star will convert its fusion ball into a singularity ball as a result of high pressure, gravity, and collisions that occurred strongly among the particles of a crashed material inside the fusion ball. Materials in a Stellar atmosphere may runaway into space, but accumulated materials, particles, and hot plasma inside a fusion ball of stars will collapse inward during violent explosion of stars. Singularity sphere will form from such violent explosion of stars.

Singularity may spin up quickly to capture additional material, and to grow more. Singularity may tear all types of matter and energy in its edge because of its powerful gravitational field and higher rotation. The singularity will rotate on itself very quickly to capture and accumulate any types of matter and particles in its edge to grow rapidly, and to increase its density and gravity. The singularity has a smooth surface and prefect spherical shape. The density and gravity of a singularity ball are very high even light can't leave its surface easily, because Singularity ball is spinning quickly to build a pure tunnel around itself, and Fabriton particles are in violent collisions and distortions inside the structure of an event horizon as a result of singularity effect. Photon particles have larger wavelength than the vacuum that remnant among Fabriton particles. Fabriton particles that named dark matter particles will push one another in critical distances that obstacle light particles to escape from the singularity surface. An event horizon is a compacted gravitational sphere that squeezed violently under the mass, density, stress and pressure of a singularity ball. Singularity will press on Fabriton particles to combine together and become strong obstacle for light particle that tried to leave a singularity surface, much light particles will reflect back into the surface of a singularity after several collisions with an internal surface of event horizon. The temperature and the density of a singularity sphere will increase in the future after collecting much enough amount of mass and energy without releasing anymore radiation particles. Singularity is a place of freezing particles where few number of particles can leave the surface of a singularity during bombardment of a singularity with energetic particles. The density of low mass and high mass singularities of all types of black holes can be calculated mathematically by following equation:

$$\rho = \frac{M}{V} = \frac{M}{\frac{4}{3}\pi r^3} \tag{5}$$

Where $\boldsymbol{\rho}$ is a density of any spherical objects and Singularity ball, $\boldsymbol{M}$ is the mass of Singularity, $\boldsymbol{V}$ is the volume of Singularity Ball.

$$V = \frac{4}{3}\pi r^3 \tag{6}$$

Where **r** is the radius of singularity sphere, especially stars have spherical shapes. The singularity has a perfect spherical shape, smooth surface, and great density. All types of matter and energy will crash immediately after collided with a singularity directly. The crashed matter inside the singularity will increase the density and gravity of a singularity to generate a denser singularity and much powerful black hole that named a supermassive black hole. [21] Singularity may connect the interior of a black hole with a newly born Universe, according to the theory of black hole and white hole, the density of an early Universe was so high.

SINGULARITY AND WHITE DWARF

Singularity is a dense and compact celestial object; an event horizon of a black hole was created from Superdistortions of a cosmic fabric matter and energy under the pressure and density of a black hole singularity. The distortion in the structure of a cosmic fabric is very high and violent, even light particles can't leave the surface of a singularity or move easily through the thickness of an event horizon. Particles are freezing and accumulated inside the structure of a black hole for longer time. Black hole was formed from such compression and contraction in the fabric of a cosmos around the singularity ball, it is a clear reason to produce a black hole and dark sphere of a black hole. Event horizon is a shadow of compacted and distorted matter and energy that surrounding a singularity. We can't see directly the surface of a singularity, and what is going on inside an event horizon of a black hole, both of them are two compacted regions of a cosmic fabric, even light can't pass through them or leave them instantly. Light particles may be trapped and accumulated inside a black hole for longer time to leave it out or fall down into the surface of a singularity. The density and gravity of a singularity sphere is higher and stronger than any well-known objects in the Universe, its density and gravity much higher than the density and gravity of white dwarf stars, neutron stars and particles.

Furthermore, white dwarf is a perfect and dense sphere of an ordinary matter and energy, especially degenerate matter. The density and mass of a white dwarf is not high enough to become a singularity and a black hole. White dwarf is a remnant core of a planetary nebula that formed from ultimate death of a low mass star, particularly solar mass stars. The density and gravity of a white dwarf star not powerful as singularity to capture light particles for a long time. Light particles can escape from the surface of a white dwarf stars easily and directly. We can see the surface of a white dwarfs by naked eyes or by any type of telescopes. Photon particles can escape from the surface of a white dwarf easily, because its density and gravity not much greater to capture or accumulate light particles. Black hole singularity is drowning deeply into the fabric of Cosmos as compared to the white dwarf stars. Dark fabric matter and energy was distorted and vibrated slightly under the effect of a white dwarf star as compared to an effect of a singularity. White dwarf star has a larger radius and lower density as compared to a singularity. Singularity is drowning deeply into the fabric of cosmos, and white dwarf is floating or orbits the black hole when fall down directly into the gravitational field of high mass black holes. Powerful tornadoes, ripples, and gravitational waves will appear around the singularity of a black hole that strongly attract and repulse materials with higher speed and great angular momentum. Singularity has high angular momentum and angular velocity that the object would destroy itself before reaching it [22]. White dwarf is a dense celestial object, it will face powerful tidal disruptions and gravitational waves, its angular momentum will increase rapidly to evaporate quickly when orbits the black hole in critical distance from the

centre of a black hole. Following the formula of an equation that used to draw the effect of a black hole Singularity and White dwarf star on the formation of much powerful distortions in three dimensions in the structure of a Cosmic Fabric:

$$z = \frac{\coth(x^2+y^2) * \tan(x^2+y^2)}{2000} - \frac{1}{\cosh(x^2+y^2)} \tag{7}$$

Where Suppose (-pi < x < pi, -pi < y < pi), or it can be written in following mathematical form:

$$-\pi < x < \pi, -\pi < y < \pi.$$

By using MATLAB Program, and using Eqn. (7) to draw the effect of a Black hole and singularity on the forming tiny tunnel and powerful curvatures in the fabric of a Universe. Dark fabric matter is vibrating actively under the stress of a Singularity. Singularity in the heart of a black hole is a white compacted sphere of a collapsed total matter and energy, it is rotating rapidly and making powerful distortions, ripples, and tunnels in the fabric of Cosmos to capture much amount of matter and energy from its surrounding. Stellar Black hole has mass and density much higher than mass and density of a white dwarf star. The speed of white dwarfs may increase rapidly in the edge of a black hole, the white dwarf will orbit the black hole quickly, and it will make normal distortions and curvatures in the dark fabric of Universe. Dark fabric matter consists of dark matter particles that named a Fabriton.

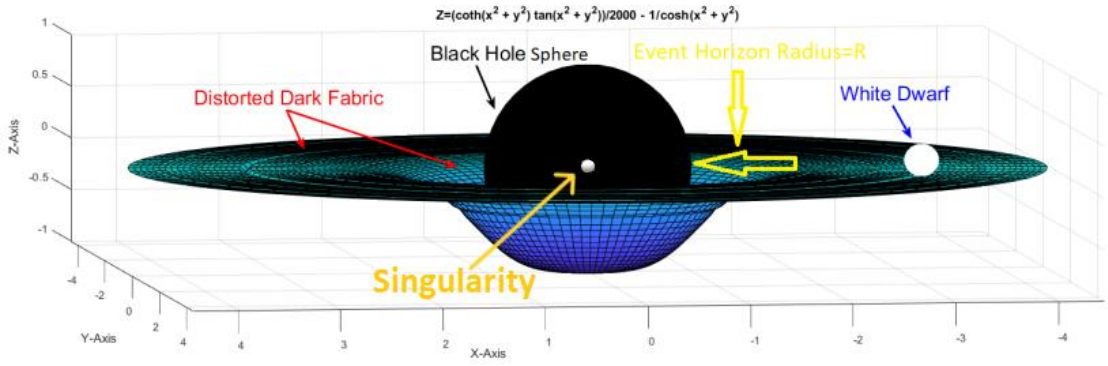


Figure 2: Black Hole Singularity and White Dwarf Star

RESULTS AND DISCUSSION

Black hole singularities have different, mass, density, gravity, radius, and escaped velocity according to method and dynamic that black hole and singularity formed by. Black hole has a singularity ball inside its heart, the singularity properties are different from black hole properties, both of them are two different things. The radius of a black hole was calculated by speed of light that escaped from its surface, but the radius of a singularity was determined by variable escaped velocity of an object from its surface according to the mass, radius, and density of a singularity. The radius of a black hole sphere or an event horizon sphere will increase with an increment of its mass, but the radius of a singularity sphere doesn't change largely, it is in the size of atom or subatomic particles, but its density, gravity, and escape velocity from its surface will increase rapidly with an increment in its mass and decrement of its radius. Solar

mass star is an average star, its mass equals to 2 x 10^{30} kg and radius 700,000 km, when Sun died and becomes a black hole, a Solar mass black hole has a radius 3000 meters and its Singularity has a tiny radius same as hydrogen radius about 53 pm or less than it slightly, but its density very high about (3.21 x 10^{60} kg/m^3). Solar mass black hole named a Black dwarf. An escape velocity from the surface of a solar mass singularity exceeded the speed of a light particle is about (2244153830532644 m/s). Any type of a singularity has very high gravity and density, even light can't escape from its surface easily. The escape velocity from the surface of any type of black hole is constant and equal to the speed of a light particle is about (300000 kilometers/second). Mass and radius of a black hole will increase together, but an escape velocity from the surface of a black hole is constant and same as the speed of light radiation in space. An escape velocity from the surface of a black hole singularity will increase radically with an increment of Mass and Density of a Singularity, but its radius will stay constant or same as the radius of Atoms or subatomic particles. The Singularity of Black holes has different Mass, Density and Size. Many tiny black holes are formed inside an event horizon of a supermassive black holes under very high gravitation and pressure conditions. Tiny black hole has few mass and small radius, but it has a greater density, gravity, surface temperature, and escape velocity of particles from its surface.

Earth is an average planet with a mass (6 x 10^{24} kg) and radius (6371 kilometer), when Earth becomes a tiny black hole, its radius will shrink into tiny very point about (8.75 mm), and its singularity will shrink inward rapidly to become in the size of an atomic nucleus is about (2 x 10^{-15} m). In fact, the density of a such tiny black hole singularity an extremely high and condense about (1.8 x 10^{68} kg/m^3) as compared to the density of other well-known celestial objects. Tiny black hole same as the mass of our planet the Earth has powerful gravitational field and an escape velocity from its surface is huge about (632755877096372.8 m/s). Singularity Density and escape velocity from the surface of a tiny black hole singularity extremely high, may exceed the density and escape velocity of other black hole singularities, because the density and escape velocity related to the method and environment of such singularities that formed by it. Singularity of a tiny black hole which formed in the edge of a supermassive black hole has a density and escape velocity much higher than the density and escape velocity from the surface of singularities of a solar mass black hole or stellar mass black holes were formed in distant locations from an event horizon of supermassive black holes and supergiant black holes. Supermassive black holes have high pressure and stress effect on the formation of a new black hole that contained a singularity sphere in its heart with high density, gravity, and greater escaped velocity.

The singularity of a Stellar mass black hole has a mass (2 x 10^{31} kg) and radius in the size of atom (231 pm), but its density very low equals to (3.9 x 10^{59} kg/m^3) and escape velocity of an object from its surface about (3.399 x 10^{15} m/s). The density of a stellar mass singularity and escape velocity from its surface are lower than a singularity of a tiny black hole that formed inside an event horizon of a supermassive black holes or formed in the moment of an early Universe that named a Big Bang era. The singularity of a tiny black hole has fewer mass but higher density, gravity and escape velocity, much higher than the singularity of other black hole that contained huge amount of mass, but its gravity, density and escape velocity much lower than a singularity which formed under high distortion and pressure of supermassive black

holes. Tiny black hole has a singularity with greater density, gravity, and escape velocity, because most tiny black holes are formed in a violent environment, especially it was formed inside the edge of a high mass black holes under tough conditions.

Active galaxy contained in its heart a supermassive black hole with mass millions or billions of times the mass of a Sun. Furthermore, the mass of a singularity ball in the heart of a supermassive black hole is very high about (2 x 10^{36} kg), and its radius still very small about 126 pm, but its density is ($2.4\ x\ 10^{65}\ kg/m^3$) and escape velocity of any object from its surface greater than the speed of any known objects in the nature, its escape velocity equal to ($1.455\ x\ 10^{18}\ m/s$) because the density of such as this singularity still high and its radius very tiny. The singularity inside a supermassive black hole in higher rotation that leads to accelerate an event horizon and accretion disc with powerful gravitational waves and vibrations. Gravitational waves were spread out from a supermassive black hole will attract and repulse a galaxy disc actively, especially stars, planets, gas, and dust particles in the edge of a supermassive black hole will orbit it rapidly. Any object orbits the black hole has higher luminosity and larger angular momentum because of an effect of powerful gravitational waves that come from a black hole and its singularity. Supermassive black hole has a singularity with a mass of galaxy about (2 x 10^{41} kg), its radius (60 pm), and it has high density about ($2.2\ x\ 10^{71}\ kg/m^3$). An escape velocity of an object from surface of its singularity is very high equals to ($6.669\ x\ 10^{20}\ m/s$). The density, gravity, and escape velocity of a black hole singularity will increase widely even the radius of its singularity still same as the radius of atom and proton. Radius of a singularity is less or greater than the radius of atoms and subatomic particles, but its density and gravity will change rapidly to increase the escape velocity of an object from its surface.

Visible Universe consists of all galaxies, Planets, stars, dust, and gas particles of the whole discovered Universe, the diameter of a visible Universe is about 93 billion light years. [23] Scientists detected that a Visible Universe has a mass (2 x 10^{53} kg), visible Universe contained an ordinary matter and energy. If a visible Universe converted to a black hole, and the mass of its singularity becomes (2 x 10^{53} kg), and its radius stayed small in the size of an atom about (20 pm), the density of a cosmic singularity equals to ($5.9\ x\ 10^{84}\ kg/m^3$) and escape velocity of any object from its surface incredibly high about ($1.155\ x\ 10^{27}\ m/s$). The mass of a whole Universe was not same as the mass of a present detected Visible Universe, its mass was huge about (2 x 10^{60} kg), an early Universe was a singularity very dense and its density about ($4.8\ x\ 10^{104}\ kg/m^3$), and its radius was very small in the radius of a proton particle (1 fm), but an escape velocity of any object from its surface was incredibly giant about ($5.166\ x\ 10^{32}\ m/s$). The density, gravity, and an escape velocity of any objects from its surface was very high, reasons are all types of matter and energy were squeezed in the size of proton particle. All galaxies, stars, planets, comets, satellites, atoms, particles, and radiation particles were compacted and combined together in the singularity of an early Universe when its size same as the proton particle.

Before big bang started to explode, the Universe was a big singularity and huge black hole. The Universe was formed under violent condition of pressure, temperature, gravity, and density. In fact, the big bang is not first steps of Universe creation, before a big bang the Universe was

compacted in the size of proton particle with great density, temperature and gravity. Big bang of our Universe was started as a violent explosion more than 13.8 billion years ago, it is a first step of formation and expansion of our Universe. Big bang is much powerful explosion that occurred in the history of Universe from its formation, and evolution [24]. Universe was formed in violent and condensed world, at that moment all types of matter and energy are combined and compacted together in very tiny point that called a cosmic singularity or cosmic seed. In fact, our Universe that named a visible Universe is not a whole structure of an infinity. There are infinity number of cosmic seeds or cosmic singularities were created and spread out into the edge of an infinity to born new Universes. Our Universe was started before a big bang as a cosmic singularity and expanded it even present time. Galaxies, planets, and stars are formed after an expansion of a visible Universe. The singularity is a cosmic seed of our Universe and all other Universes. The singularity was a first step of a Universe creation and a big bang is its expansion step. The singularity is a first moment of a Universe formation and our creation. The singularity was formed from condensed material and combined energy, and big bang was occurred to distribute matter and energy into a larger vacuum of an infinity. Both of singularity and big bang event are two important factors in the formation and evolution of a whole Universe. Black hole has enough mass, momentum, and energy to build a tunnel in the cosmic fabric to capture additional mass from its surrounding, and it is capable of making gravitational waves in the fabric of cosmos to repulse celestial object by its powerful gravitational waves [25]. Black hole tunnel effect is an astronomical phenomenon that occurred when a black hole with any mass and radius passed throughout the cosmic dark fabric which acting directly on pulling inward all-stars, and materials actively towards the centre of a black hole and pushing neighbour celestial object by its powerful gravitational waves. Singularity itself has enough mass, momentum, and energy to make Superdistortions in the compacted fabric of a black hole to make an event horizon and accretion disc around itself to capture particles from its surrounding. The cosmic fabric matter and energy was distorted steeply under the effect of a black hole singularity that located at the heart of a black hole. Density of a singularity ball and an escape velocity of an object from the surface of a black hole singularity maybe calculated mathematically according to eqn. (4) and (5) as shown in the following table.

Table 1: Singularity Density and Escape Velocity from its Surface

Singularity Mass (M)	**Singularity Radius ($R_{Singularity}$)**	**The Singularity Density $\rho = \frac{M}{V}$**	**An Escape Velocity from Singularity $v = \sqrt{\frac{2GM}{R_{Singularity}}}$**
2 x 10^{30} kg	5.3 $x\ 10^{-11}$ m	3.2 $x\ 10^{60}\ kg/m^3$	2244153830532644 m/s
6 x 10^{24} kg	2 $x\ 10^{-15}$ m	1.8 $x\ 10^{68}\ kg/m^3$	632755877096372.8 m/s
2 x 10^{31} kg	231 pm	3.9 $x\ 10^{59}\ kg/m^3$	3.399 $x\ 10^{15}\ m/s$
2 x 10^{36} kg	126 pm	2.4 $x\ 10^{65}\ kg/m^3$	1.455 $x\ 10^{18}\ m/s$
2 x 10^{41} kg	60 pm	2.2 $x\ 10^{71}\ kg/m^3$	6.669 $x\ 10^{20}\ m/s$
2 x 10^{53} kg	20 pm	5.9 $x\ 10^{84}\ kg/m^3$	1.155 $x\ 10^{27}\ m/s$
2 x 10^{60} kg	1 fm	4.8 $x\ 10^{104}\ kg/m^3$	5.166 $x\ 10^{32}\ m/s$

CONCLUSION

Black hole was formed from ultimate death of Stars, particular high mass star's death or before big bang era when Universe was dense cosmic singularity. Singularity is a dense, white, and

smooth ball of imploded an excited state of matter and energy that located at the deep centre of a black hole. An event horizon was a distorted sphere of dark matter particles that named Fabriton particles, most of the structure of an event horizon consists of Fabriton particles, with an additional amount of radiation particles and subatomic particles were captured and accumulated inside an event horizon region. Singularity radius is not zero and its density, and gravity is not infinity anyway. Singularity has a tiny radius in the size of atom or particles, but its density, and gravity very high, for this reason an escape velocity of particles or any other objects from its surface exceeded the speed of light many times according to mass and density of a black hole singularity. Singularity deeply squeezed inward, and its event horizon, and accretion disc are expanding outward, the radius of a black hole will increase when mass and density of a singularity sphere increased steeply. Cosmic fabric matter was distorted and vibrated strongly under an effect of a black hole singularity to distribute an energy into Universe very actively and quickly. High mass black hole has a denser singularity ball and larger radius of an event horizon. Eventually in this study concluded that Mass, density of a singularity ball and escape velocity of an object from the surface of a black hole singularity will increase sharply with an increment of an event horizon's radius largely. The radius of an event horizon will increase, but escape velocity from a black hole may stay constant same as the speed of photon particles according to Schwarzschild radius of a black hole or event horizon. An escape velocity inside an event horizon or from surface of a singularity ball exceeded the speed of light, but escape velocity from surface of a black hole or outside an event horizon was equal to the speed of light particles. In far distance from a black hole surface an escape velocity is lower than the speed of light particles because of slight distortion or minimum density of a cosmic fabric. Eventually the mystery of a black hole singularity had been solved forever.

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Conflict of Interest
I declare that I have no conflict of interests.

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