An Analysis of the Nature and Internal Structure of a Black Hole

by

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Abstract: This paper makes use of the theories presented in my first paper, "Relation of the Internal Structure of the Photon with Field and Charge" (https://vixra.org/abs/2301.0148), to analyze the probable internal structure of a black hole, so please read through that first paper before proceeding; any references involving that paper will be referred to as "my first paper". Also, another paper of mine, "Calculating the Size of any Stable Particle", is referenced at one point (https://vixra.org/abs/2303.0167). Brief reference is also made to my Cosmology paper ("Relationship of the Photon to Cosmology and Origin of the Universe", at https://vixra.org/abs/2303.0083). First will be given a new perspective on viewing what a black hole is, then a deeper dive to determine the composition and density of a black hole, a comparison to show how that connects up with the theories given in my first paper, confirmation that the measure of the Schwarzschild Radius is still applicable, and finally the minimum density of a black hole.

Introduction

In my first paper, I set forth a theory behind the nature of particles and fields. If this is truly the nature of things then it should be possible to use what was set up to determine the full properties of a black hole, including the internal structure and density. Then further, if these results are correct then we should also be able to generate the same equation for the Schwarzschild Radius that we know as normal. Let us begin.

What is a Black Hole?

When you think about it, a black hole can be treated as one large particle, like a proton or electron. Whereas the photons in a particle are confined by mutually attractive forces on the order of the near-field so-called Strong force, stars are subject to the far weaker macroscopic gravitational force, which is 10^{39} times weaker. Thus it would take a field roughly that many times stronger to entrap and entangle photons within it in the same way as they would in a proton or electron. It's the same physics, just scaled up to a far greater scale.

A particle is only visible when it interacts with something or crashes into another particle, causing it to emit photons or particle debris. Thus it is with black holes; they cannot be seen except how they interact with other phenomena, including the emission of photons in response to other passing particles (Hawking Radiation).

The other difference is that, being far larger, everything particles do is far slower and over far longer time periods. Also, the bulk of matter in a black hole would be bound up interacting with itself in internal motions and not contribute to any motion of the black hole, unlike for all photons in a particle. Any motion a black hole does have from the Brownian motion within its interior would be far slower when compared to its microscopic cousins.

In all respects, a black hole is a type of particle, just on a different scale.

Treating it like a particle now, according to the theories presented in my first paper, that means it has its own Field Density and corresponding resonant frequency just like for protons and electrons. For this case that would obviously be the Field Density for gravity. However, if you put the Gravitational Field Density through the equation I derived for the resonant/entanglement frequency, then the resultant frequency would be quite high (5.3547×10^{42} Hz, specifically); not something normally obtainable without getting creative (I can think of a couple of ways but that's for another paper). If you had three particles of this frequency then a particle would form and it would be far smaller than any observed particle. However, to achieve this frequency in Nature would require enough stellar mass to compress the particles and photons close enough so that they will combine again and again for higher and higher energies until they reach that required gravitational resonant frequency.

Because it requires so much gravitational pressure to compress the photons enough to pump them up to this frequency, by that time we're talking masses on the order of several stars. When a stellar mass does achieve this energy level for all its mass/photons, matching up to the Gravitational Field Density's frequency, then all such photons within this stellar body will become entangled and form a very large particle: a black hole. At that point light does not escape simply because– like in any particle– it is bound up within the particle.

Thus, physics does not break down within a black hole as people think, it simply follows the same rules but on a far larger scale.

Additionally, it should be possible to use this to calculate at what point such gravitational pressure will be enough to compress the frequency of the photons to that required and form a black hole, then match that calculation up with both other calculations and currently observed data for black holes.

*Side note on Hawking Radiation: I briefly mentioned Hawking Radiation, so let me expand upon my interpretation of that here. Hawking Radiation need not involve any virtual particles. It's simply a matter of when a photon (or particle) grazes by a black hole, we have a case of the field of the particle rubbing across the field of the black hole and the interaction resulting in new photons being created from the force involved and at the same frequency as those in the particle; just like happens in particle accelerators (as covered in my first paper). Or the other possibility of said photon becoming briefly entangled with one of the black hole's trapped surface-photons enough to draw it out; again, just like passing photons interacting with photons on a normal basis. All I'm pointing out here is a different interpretation of the mechanism behind Hawking Radiation.

Comparison to Schwarzschild

If a black hole can truly be treated as a particle, then it should be possible to relate this mathematically using the theories and equations presented in my first paper (again, if you have not yet read it, go get it from https://vixra.org/abs/2301.0148 and read through that first to familiarize yourself both with my equations and nomenclature used) and draw a comparison to the Schwarzschild Radius. Let us thus begin with the assumption of the Schwarzschild Radius of a black hole and work from there using what is presented in my first paper.

$$R_s = 2MG/c^2$$

Knowing now that the Gravitational Constant, G, is equal to c^2F_{DX}, we can expand that into

$$R_s = 2M(c^2F_{DX})/c^2 = 2MF_{DX}$$

The mass, M, is that of the black hole, but we can also represent that in another way, as

$$M = N(h/2\pi)\nu/c^2,$$

where N here is the total number of photons in the black hole. Expressing this in terms of wavelength instead and inserting,

$$R_s = 2(N(h/2\pi)(c/\lambda)/c^2)F_{DX} = Nh(c/c^2)/(\pi\lambda)\ F_{DX} = (Nh/(\pi\lambda c))F_{DX}$$

For the wavelength we can use my formula for the entangled wavelength of a given particle:

$$\lambda = \{(6hF_{DX})/(c\pi)\}^{1/2}$$

Substituting this in, then moving everything but the 'N' under the square root, we get

$$\begin{aligned} R_s &= [NhF_{DX}/(c\pi)]/\{[(6hF_{DX})/(c\pi)]^{1/2}\} \\ &= N\ \{[F_{DX}h/(c\pi)]^2/[(6hF_{DX})/(c\pi)]\}^{1/2} \\ &= N\ \{(F_{DX}^2/F_{DX})\ (h^2/h)(c\pi/(c\pi)^2)/6\}^{1/2} \\ &= N\ \{F_{DX}\ h/(6c\pi)\}^{1/2} \\ &= N\ \{(6/6)F_{DX}\ h/(6c\pi)\}^{1/2} \\ &= N\{6F_{DX}\ h/(36c\pi)\}^{1/2} \end{aligned}$$

But part of this looks very familiar, being my formula for λ. Thus,

$$R_s = N\{\lambda/(36^2)^{1/2} = (N/6)\lambda.$$

Now, in another paper of mine, "Calculating the Size of any Stable Particle" (https://vixra.org/abs/2303.0167), I present a formula for calculating the radius of any given particle; this radius above is very close to the formula I derive in that other paper, it being:

$$R = eN\lambda/(2\pi),$$

except here we have 6 instead of 2π, and the 'e' is missing; this latter can be explained by assuming that since these photons are so closely packed together there is little room left for the normal spacing between them and so the photon fields overlap. The point is, there seems enough similarity to say that if the black hole radius essentially follows the same mathematics as that of the radius of a particle, then a black hole *is* a particle– just a particle in resonance with the entanglement frequency that corresponds to the Gravitational Field Density. The only reason why black holes need to be so large is because the high entanglement frequency it needs to achieve is so excessively high that it necessitates an equally high stellar mass to squeeze all of its photons up to that energy.

It is, however, essentially a particle.

Now let us work it the other way and begin with the assumption of the equations from my first paper to figure out the radius of a black hole. In the derivation in my original paper, I equated the gravitational energy against the kinetic energy of a passing photon. Thus

$$(GMm/R^2)R = mc^2/2$$

After a little canceling, we get

$$GM/R = c^2/2$$

Then rearranging in terms of "R".

$$2GM/c^2 = R$$

Which is the Schwarzschild radius of a black hole.

Internal Structure and Density of a Black Hole

Now that we are reasonably convinced that treating a black hole as a large particle is basically the correct methodology, we can proceed with determining in detail its structure and density.

The general structure is now not too difficult to figure out. At the resonant frequency of the Gravitational Field Density photons can entangle and form particles as normal, but since they will all be the same size and type then no orbitals can form and hence no atoms. Instead you would get a sort of atomic lattice of these small particles. Additionally, since these particles form from photons of a frequency that does not stem from the other two normal Field Densities, they shall have neither positive nor negative charge but instead will have an all-attractive gravitational charge.

Basically, the internal structure of a black hole is a crystal matrix of particles that would be a lot smaller than a proton or anything else. With this in mind, we can dive deeper still.

I spent a while trying to find out if anyone had anything on the minimum gravitational force of a black hole only to encounter lots of hand-waving; in comparison I remember reading years ago that the gravitational field of a neutron star ranges from 10^{12} to 10^{14} times Earth's gravity. I could find no such value for a Black Hole to compare my calculations to, so I took a different approach and decided to try and figure out the *density* of a black hole. This involves the theories in my first paper as well as my other paper on how to calculate the radius of any given particle– in this case the radius of the predicted diminutive particle that results from the gravitational field density's resonant frequency.

First the set up:

F_{Dg} = the Gravitational Field Density, as calculated in my main paper = $7.4256485 \times 10^{-28}$ (J/Kg)/N.

ν_g = Frequency resulting from the gravitational field density, F_{Dg}, = $\sqrt{\{c^3\pi/(6F_{Dg}h)\}}$

$\lambda_g = c/\nu_g$ – the corresponding wavelength, naturally.

m_g = the mass of a single photon at $\lambda_g = (h/2\pi)\nu_g/c^2$.

M_g = the minimum mass of a single particle of such photons = $3m_g = 3\{(h/2\pi)\nu_g/c^2\}$.

r_g = radius of the particle formed by the photons at λ_g (using my other paper, "Calculating the Size of any Stable Particle") $=3\lambda_g e/(2\pi) = 3ce/(2\pi\nu_g)$.

V_g = volume of a particle at $r_g = (4/3)\pi(r_g)^3$.

To compute the density of a black hole, we need only compute the density of one of its constituent particles, since with all the particles being of the same attractive "charge", the result would be a tightly-packed crystal matrix. The second step would then be to adjust for the packing density of such a matrix.

Figuring the density of a single small such black hole particle resonating at ν_g (got to give this particle a proper name, but I refuse to use 'graviton') is now simplicity itself. Thus:

$$\text{Density, } d_g, = M_g/V_g.$$

At this point we just need to fill in the values and grind it out.

$$d_g = [3(h/2\pi)\nu_g/c^2]/\{(4/3)\pi(r_g)^3\}$$

Substituting in for r_g then gives us the following.

$$[3(h/2\pi)\nu_g/c^2]/\{(4/3)\pi[3ce/(2\pi\nu_g)]^3\} =$$
$$3h\ (3/4)\nu_g\{(2\pi\nu_g)/3ce\}^3/[2\pi(\pi)c^2] =$$
$$(9/4)h\ \nu_g\ (8\pi^3\ (\nu_g)^3)/\{(27c^3e^3)\ (2\pi^2\ c^2)\}$$

Collecting our terms and canceling then yields:

$$(9/27)(8/(4\bullet 2))\ h\ \nu_g^4\ (\pi^3/\pi^2)/(e^3c^5) =$$
$$(1/3)h\ \nu_g^4\ \pi/(\ e^3c^5).$$

To continue and express this as a function of F_{Dg}, we must now substitute in for ν_g. Thus:

$$\{h\pi/(3e^3c^5)\}\ \nu_g^4 =$$
$$\{h\pi/(3e^3c^5)\}\ [\sqrt{\{c^3\pi/(6F_{Dg}h)\}}]^4 =$$
$$\{h\pi/(3e^3c^5)\}\ [c^3\pi/(6F_{Dg}h)]^2 =$$
$$(h/h^2)\ (\pi\bullet\pi^2)\ (c^6/c^5)\ /\{e^3(3\bullet 36)\ F_{Dg}^2\}=$$
$$\pi^3\ c/(108\ he^3\ F_{Dg}^2).$$

Now we just need to substitute in some values.

$$d_g = \pi^3(299{,}792{,}458)/[108\ (6.62606957X10^{-34})\ (2.7182818285)^3\ (7.4256485\ X\ 10^{-28})^2\ ] =$$
$$1.1728388761X10^{94}\ \ Kg/m^3, \text{ or}$$
$$1.1728388761X10^{85}\ g/cm.$$

Now for the second step, the packing density. I mentioned that the arrangement is essentially like a matrix of tightly packed particles. Since all particles involved have the same composition, density, strength, and what not, we can treat them as incompressible as compared to each other. This allows us to treat them as perfect incompressible spheres. Then because of their mutual attraction to one another, they would form a lattice with the highest possible packing density, which would be a *close-packed structure.* The density of such a structure is known to be equal to $\{\pi/(3\sqrt{2})\} = 0.7404804897$. Multiplying this by the above then, we get:

$$d_g = 0.7404804897\ (1.1728388761X10^{85}) = 8.6846430523X10^{84}\ g/cm^3,$$
$$\text{or } 8.6846430523X10^{87}\ Kg/m^3.$$

This, then, is the *minimum* density required to form a black hole.

We can then use this to figure the gravity, g, of a black hole of a given radius, R, and mass, M, by using the following:

$$g = GM/R^2,$$

where

$$M = Vd_g,$$

V being the volume of the black hole = $(4/3)\pi R^3$. Combining, yields:

$$g=G((4/3)\pi R^3 d_g)/R^2 = (4/3)G\pi R d_g,$$

where d_g is as previously computed and R is the radius of the given black hole. 'G', of course, is the standard Gravitational Constant.

We can even use this to figure the gravity inside the smallest possible black hole, which would of course be the particle formed at that ν_g resonance. Using the radius of such a particle, which we can now easily compute to be $7.2664350358X10^{-35}$ m, as our R, then g for a single such particle turns out to be: $1.7641591774X10^{50}$ m/s^2.

The Planck Mass Explained

Similar to how I showed in my first paper that the 'Planck Length' is actually an incomplete derivation of the formula for the entanglement wavelength of light for a given particle, it can also be shown that the 'Planck Mass' is in reality simply an incomplete derivation for the formula for the predicted mass of any given particle (for this as well, Planck simply used pure unit analysis, which leaves out other terms that a proper derivation would uncover). Starting from $m = 3(h/2\pi)\nu/c^2$ then using the formula for calculating frequency from the Field Density involved for that particle (reference my first paper for this), and with $G_x = c^2 F_{DX}$, we end up with

$$m = \sqrt{\{(3/4)[(h/2\pi)c/(G_x)]\}}.$$

Compare with the standard formula for the Planck Mass,

$$m_p = \sqrt{\{(h/2\pi)c/G\}},$$

and you see that they differ only by the (3/4) term and the fact that I have denoted the Gravitational Constant with my more generalized term G_x that varies with the Field Density for the particle in question (i.e.: $G_x = c^2\ F^{DX}$).

But now let us plug in some numbers to see where it takes us. Using my own derived version, and the standard Gravitational Constant for G_x, we get a mass of

$$m = 1.8849\ X10^{-8}\ Kg.$$

But earlier in the derivation, for the minimum mass of a single black hole particle we used $M_g = 3\{(h/2\pi)\nu_g/c^2\}$. Plugging in numbers for this we get

$$M_g = 1.8849\ X\ 10^{-8}\ Kg.$$

An exact match, thus proving that the Planck Mass is actually the mass of a single black hole particle.

Interactions of Black Hole Particles

Black holes are so densely packed that photons will continually be smashing into one another, thus producing photons of double the energy and frequency that got them all entangled in the first place. For such a resulting photon, its new higher frequency will cause it to break its entanglement with the surrounding other photons and it will go shooting off free. However, with so many other photons packed in close, it will not be long before it them bumps into others, shattering itself into several other lower-energy photons; some of these will be of the entanglement frequency and once again entangle with others into the black hole "atoms", while the other lower energy ones can recombine with still other lower energy photons until they *are* of that same entanglement frequency, ν_g, to once again become part of the sea of particles. Such interactions will be ongoing as the internal structure of the black hole thus vibrates about in a constant state of activity.

However, if such a photon that has momentarily broken entanglement by either achieving a higher frequency, or becoming a lower frequency photon after a series of shattering collisions, happens to be near the outer surface of the black hole, then while such photons shooting back in towards the interior of the black hole will be recaptured, any shooting away into the free-space side of that outer border will still be unentangled and may escape into free space to be observed as another source of Hawking Radiation (and again, with no virtual particles required).

You know, sorta like what happens in normal particles.

Some speculation concerning going beyond the Gravitational Field Density

If the stellar mass is great enough, then instead of holding steady at what is needed for the resonant frequency of the Gravitational Field Density, it may keep compressing, increasing the frequency even more. This would disrupt the entanglement forming the particles but the gravitational force involved would be more than enough to keep it all together. Instead, if this system keeps on compressing enough, then the frequency of the photons might be forced high enough to correspond to that of a different Gravitational Field Density for another universe, thus turning the black hole into a portal to that universe.

Thus the gravity of a *dense* enough black hole should be enough to pierce through the barrier of force that separates our own universe from others, collapsing through our universe's background Energy Density, seeing through into either another universe, or into the Core Field (refer to my Cosmology paper) that all universes of our own multiverse (Hyper-Field) sprang from, depending on the intensity of the gravity. The force and mass of the Black Hole would thus leak through this portal, coming out as either a White Hole or another black hole in that other universe, not only traveling through it but also serving to keep the portal open by its very presence.

Well, if the geometry of all this massive force is directed at maintaining the integrity of this portal (being its 'walls'), then the bulk of it would be specifically directed towards its outer multidimensional boundaries. This raises the question, how much of the original force is really left to affect anyone going through this portal? If the bulk of all that gravitational force is focused on keeping the portal open, then there might actually be a whole lot less gravitational force at the Black Hole's boundary and interior than would be thought; enough less for a craft (with only a relatively moderate strength force field around it to maintain integrity) to enter and travel through it, relatively unharmed, and exit through to wherever it may lead.

Final Thoughts

Popular theory states that the gravitational force at the center of a black hole is infinite, however this makes no physical sense whatsoever. You need only remember that force decreases with the square of the distance in all things, but if you start with assuming *infinite* gravitational acceleration then there is *no* distance for which said force will reduce below infinity; the force would never decrease and the entire universe would be experiencing the same infinite force and collapse down into a single cosmic pinprick. Obviously not the case. Furthermore, any experiment that purports to support the conclusion of infinite gravity within a black hole would thence call into question the error and setup of said experiment. While the calculation presented herein shows that the density within a black hole would be quite large, it is still not infinite.

The final result of this paper is a complete picture of a black hole– what makes it, what's inside of it, and its density– without needing to resort to any esoteric physics.