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Particle Theory: A New Theory that may Reconcile General Relativity and Quantum Theory

By Dino Martinez

Abstract- In an attempt to reconcile General Relativity and Quantum Mechanics, Particle Theory is a concept that may try to address this issue. This theory explains the effects accurately calculated by General Relativity in an alternate and real, physical way, and is therefore an alternative to GR. The theory states that indivisible atomic particles are instead divided into even smaller particles (called “EM particles”) held together by a central potential, the speed of light being the limit to their velocities. The “shedding” of these particles are responsible for the static and magnetic fields we observe. This also creates a “screening” effect that, for an atomic particle at rest, blocks about half of what this theory defines as the “true gravitational potential”, which is just twice the Newtonian value (mediated by what this theory defines as “gravity particles”). When an atomic system of particles starts moving in a certain direction, the act of shedding and the internal movement decreases as the particles orient themselves in the direction of the velocity, which reduces the screening effect, where we start to observe the relativistic effects of General (and Special) Relativity.

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I. Introduction to PT Mechanics

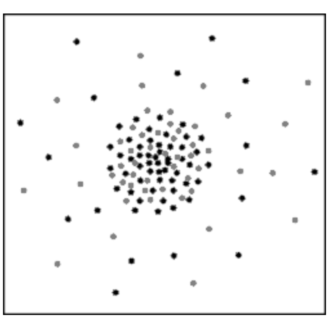

Fig. 1: An example of an atom according to Particle Theory [1].

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There are currently a few conceptual theories trying to reconcile quantum mechanics and general relativity. Currently, Newtonian gravity cannot produce the results given to us by Einstein's general relativity such as the correct values of gravitational lensing, and Mercury's perihelion precession, to name a few. Particle Theory (PT) is able to explain these relativistic effects, without the use of a curved spacetime fabric, but through the screening effect. A good portion of what is discussed will be conceptual, although we'll also be deriving solutions from GR using formulas derived from Particle Theory. But before getting to that, we must discuss the basic mechanics of PT.

Particle theory is, according to [1]:

The theory proposes that indivisible particles of non-zero mass are instead made up of even smaller particles called EM (electromagnetic) particles of non-zero mass (shown in Fig. 1). The EM particles themselves are made up of gravity particles (shown on the right of Fig. 2). They are tangled together with other gravity particles to make up the two different EM particles both shown to the left of the gravity particle (in Fig. 2) [1].

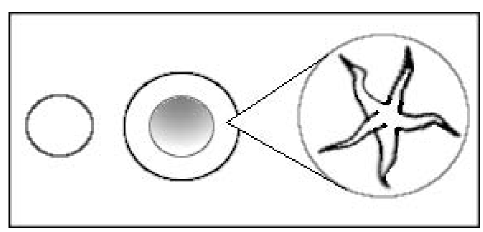

Fig. 2: EM particles shown on left, gravity particle shown magnified on right [1].

The entanglement of the gravity particles cause a vibration, which also leads to shedding of these particles off the surface of the EM particles. The EM particles contained in these atomic system of particles shown in Fig. 1 move and collide with each other at light speed, which shakes loose a lot more gravity particles than it does so with normal shedding. The freed gravity particles make up the central potential that keep the EM particles bounded in an atomic system of particles, and any residual gravity particles that escape or shed at the

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surface account for the gravitational force. The magnitude and source of this central potential will be discussed in greater detail Section III.

I will briefly go over how these particles work in the dynamics of attraction and repulsion of these particles shown in Fig 2. Keep in mind that up to this point we are now talking about hypothetical modeling when discussing the structure of the individual particles that make up an atom. According to [1]:

Starting with the EM particles, they come in two varieties, EM+ and EM-, responsible for the differences in charge. Two EM particles of the same charge would naturally collide elastically, which would cause repulsion when, for example, a negatively charged particle is within an EM- particle field from a point source. But when two different EM particles (shown in Fig 2) come into contact, they merge, forming an EM± particle, coming into a complete stop. So when a field of EM+ particles (from a point source) comes into contact with an atomic system of EM- particles, such as an electron, for example, they merge on the surface of the electron and prevents that side of the electron to shed EM particles momentarily. Since the other side of the electron continues the shedding process, this propels the electron forward, towards the source of the EM+ particle field (as shown in Fig. 3) until the source field ceases and the merged EM particles themselves shed from the electron.

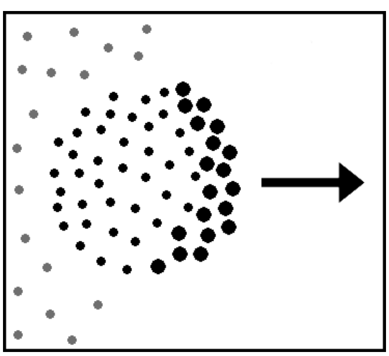

Fig. 3: Merged EM± particles on right surface ceases shedding, causing propulsion towards the right.

It is very important to note that these particles that are released from the shedding process can be reused in the attraction and repulsion action, especially in macroscopic systems like two charged plates in close proximity to each other. Since the shedding process does infer that these system of particles are slowly decaying, the reusing of EM particles is important as this indicates that the amount shedding of an isolated electron, for example, cannot equal what would be expected from Coulomb's law, as the decay rate would be so high that no such system of particles would exist today. The reusing aspect implies that the shedding process and as such the decay rate is much less especially for an isolated atom [1].

This means that an isolated electron, for instance, will shed at a rate less than what is required by Coulomb's law. Only with a collection of charged particles will you see the amount of charge required by Coulomb's law as the EM particles will be reused, as shown in Fig. 4.

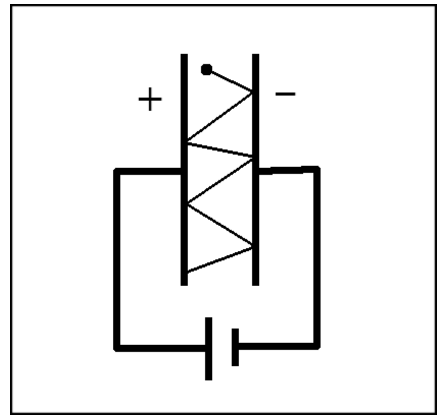

Fig. 4: Same EM± particle being reused between charged plates.

As for the gravitational particles, the hypothetical structure shown in Fig 2 on the right makes it so that their interaction will always cause a merging and produce an attraction, as their collisions will always cause an entanglement when interacting with both types of EM particles.

II. The Screening Effect

The dynamics of an atomic system of particles, as we will see, will derive the effects of both special and general relativity. The key mechanism involved is what this theory defines as the "screening effect." As an atomic system of particles sheds EM particles, they absorb gravity particles originating from a gravitational mass. This effect for an atomic particle at rest blocks approximately fifty percent of the true gravitational potential (this is an assumption based on already observed phenomena interpreted by GR), which is twice the Newtonian value: $\frac{2GM}{r}$, where G is the gravitational constant, M is the gravitational mass and r is the radius [1]. Another attribute that may contribute to this effect is the rapid movement of the EM particles themselves, as the gravity particles may have a hard time attaching to them due to their rapid oscillations in an atomic system of particles.

When an atomic system of particles starts moving in a certain direction, lets say the z-axis, and given that the limit to the velocities of the EM particles is always the speed of light, the internal motion perpendicular to the z-axis of the system decreases, which reduces the shedding of EM particles as well as the frequency of their oscillations, reducing the screening effect and making the system more susceptible to the true gravitational potential $\frac{2GM}{r}$ as the EM particles orient themselves toward the direction of the velocity [1]. As we will see in the next section, we will easily be able to derive solutions from GR using the mechanism of the varying screening effect. This paper will assume that as a system of particles approach the speed of light, the shedding and internal movement, and in turn the screening effect, approaches zero [1]. But such a system of particles may still shed EM particles and produce a electromagnetic field as the system may reduce to a shrinking, flat disc of rotating particles (to preserve its spin), shown in Fig 5 [1].

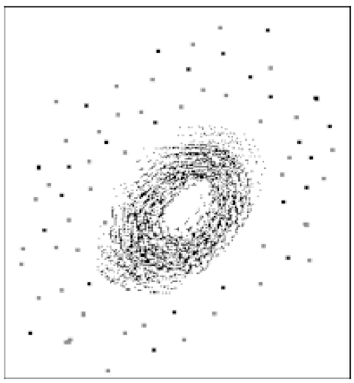

Fig. 5: An atom near or at light speed may reduce to a small, flat disc of rotating particles [1].

If so, the shedding only occurs perpendicular to the axis of rotation, so most of the system will still be exposed to the true gravitational potential, so the screening effect, or the lack thereof, still applies. In this paper as in [1], we will assume that the screening effect approaches zero as the system of particles approach the speed of light.

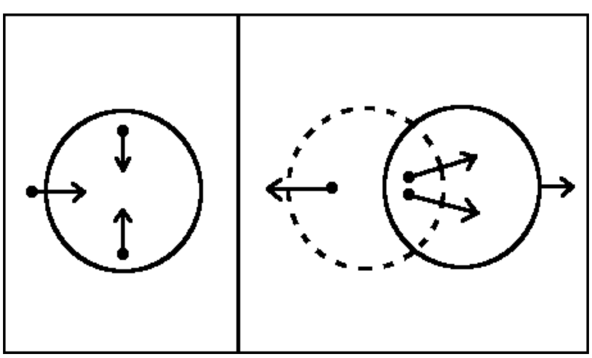

Fig. 6: 2-D momentum exchange of atom at rest with outside particle (arrows not to scale)

In Fig 6, where we have a model of an atom consisting of two particles bounded by the circle, we see how movement in the vertical direction is reduced from a momentum exchange with an outside particle at an angle a little more than 45 degree impact with the horizontal. In fact, with any angle between but not equal to 0 and 90 degrees, we will see a decrease in vertical movement in exchange for horizontal movement, (although the diagram may look different in other cases) which would signal a decrease in the screening effect as we defined earlier.

In a section which will be discussed in end of this paper, I will discuss the possibility of increasing the screening effect through the emission of high energy photons towards the source of gravity, which may produce anti-gravitational effects.

In the next section we will see how the screening effect explains the relativistic effects of General Relativity and derive solutions such as the general relativistic potential and gravitational lensing.

III. Derivation of GR Effects

a) *General Relativistic Potential*

According to Particle Theory, for an atomic system of particles at rest, the screening effect blocks half of what is the true gravitational potential that this theory predicts, which is twice the Newtonian value [1]:

$$\frac{2GM}{r} \tag{1}$$

When a particle with a structure that produces a screening effect approaches the speed of light, the screening effect approaches zero and the potential the particle feels is the totality of the true Newtonian potential (1) as explained in the last section. To demonstrate this I will reproduce the gravitational potential energy unique to General Relativity using this concept of the varying screening effect by using a modified, inverse Lorentz factor squared: $\gamma_+^{-2} = 1+\frac{v^2}{c^2}$, which uses a plus sign instead of minus sign and which has a maximum value of 2 when the particle reaches the speed of light, having the screening effect reduced to zero. Therefore, we obtain the full equation for the gravitational effect from a gravitational mass M on an atomic system of particles m [1]:

$$\frac{GMm}{r}\left(1+\frac{v^2}{c^2}\right) \tag{2}$$

For a two body problem we have: $v^2=r^2\left(\frac{d\theta}{dt}\right)^2+\left(\frac{dr}{dt}\right)^2$ and $L=\mu r^2\frac{d\theta}{dt}$. Looking at the radial velocity in the second term of the velocity squared, and comparing it to the average speed of the orbital speed of 47.4 km/s for Mercury (the average radial velocity being 6.3 km/s):

$$\frac{(dr/dt)^2_{avg}}{v^2_{avg}}=\frac{6.3^2}{47.4^2}=.018$$

it only accounts for 1.8 percent of the total velocity squared. So omitting the radial velocity we have:

$$v^2 \approx r^2 \left(\frac{d\theta}{dt}\right)^2$$

and using $L = \mu r^2 \frac{d\theta}{dt}$ and $\mu = \frac{mM}{M+m}$ and focusing on the second term of (2) we obtain:

$$\frac{GMm}{r}\left(\frac{v^2}{c^2}\right)$$

$$\frac{GMm}{r}\left(\frac{L^2}{\mu^2 r^2 c^2}\right)$$

and expanding out one μ factor gives us (3):

$$\frac{G(M+m)L^2}{\mu c^2 r^3} \tag{3}$$

The attractive potential energy from (3) is the same result as the potential unique to General Relativity from the Schwarzschild solution that is responsible for accurately calculating the observed Mercury Perihelion Procession value. We can see how easily we obtained this just from using the concept of the screening effect in accordance with Particle Theory, without usage of the Schwarzschild solution.

For elliptical orbits where the major and minor axis differ greatly, or for faster orbits due to high gravitational systems, using the radial velocity for further correction may be necessary, especially if the higher orders of the binomial expansion of the perihelion precession [2] obtained from (3) is not sufficient.

b) Gravitational Lensing

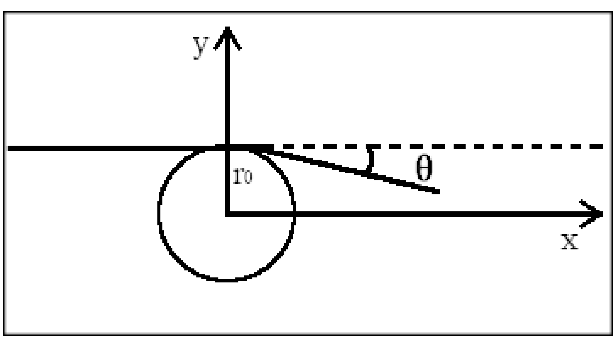

Fig. 7: A photon being deflected by a gravitational mass at an angle of θ

For a collection of EM particles (photon) emitted by an atomic system of particles, and since EM particles are affected by gravitational fields (gravity particles), one can calculate the deflection of light as follows:

From Fig 7, we initially have $y = r_0$, where $r^2 = r_0^2 + x^2$ is the distance between the photon and the Sun. We have the acceleration due to the Sun's gravity, using the effective y-component of it r_0/r, we obtain $a = GMr_0/r^3$. Using the relation: $y = (1/2)at^2$ and for a photon: $dx = cdt \rightarrow t = x/c$ we get $y = (1/2)a(x^2/c^2)$. The angle is then derived as: $dy/dx = ax/c^2 = tan\theta \approx \theta$. Differentiating once again for θ we obtain $d\theta/dx = a/c^2$ where we finally obtain:

$$\theta = \int \frac{GMr_0}{c^2(r_0^2 + x^2)^{3/2}} dx$$

Integrating from $-\infty$ to $+\infty$ and setting $r_0 \rightarrow r$ gives us:

$$\theta = \frac{2GM}{c^2 r} \tag{4}$$

This is only half of what is observed and what is correctly calculated from Einstein's field equations. But a photon under Particle Theory does not have an internal movement or mechanism to produce a screening effect. We can imagine a photon being a sinusoidal string of EM particles shown in Fig 8:

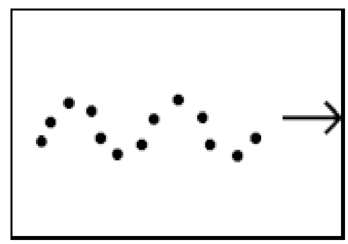

Fig. 8: Photon as sinusoidal string of EM particles with velocity of c

Another way to imagine a photon would be as a very tiny atomic system of particles just like in Fig. 1. But since it would be traveling at the speed of light, and using (2):

$$a = \frac{GM}{r^2}\left(1 + \frac{c^2}{c^2}\right) = \frac{2GM}{r^2} \tag{5}$$

the screeening effect is gone and the true gravitational acceleration obtained in equation (5) must be used:

$$\theta = \int \frac{2GMr_0}{c^2(r_0^2 + x^2)^{3/2}} dx$$

That means that the angle of deflection obtained from Particle Theory is:

$$\theta = \frac{4GM}{c^2 r} \tag{6}$$

which is the correct result for the deflection of light!

As we can see, we were able to easily obtain the correct solution for gravitational lensing using Particle Theory and the concept of the screening effect, or the lack their of, as it would be when dealing with a photon.

We have now completey obtained the basic solutions for inertial objects that involve tangential/angular movement around a gravitational mass using Particle Theory. So far these solutions are exactly what is obtained from General Relativity and was done so effortlessly and without the concept of a curved spacetime.

c) Rest Energy and Electron Radius Approximation

According to [1]

For an atom composed of a system of particles with a total mass m with each particle having an average speed of c (300,000,000 m/s), the kinetic energy becomes T = $\frac{1}{2}mc^2$. In order to contain this, the potential energy, which is carried by the gravity particles in the system, must also be $\frac{1}{2}mc^2$. The total energy of the system, is of course $E = mc^2$, the same as in Special Relativity [1].

According to the observations of a binary neutron star merger, and the detection of both the gravitation waves and gamma ray burst that were both recorder simultaneously [3], it is with great certitude that the speed of gravity is almost exactly that of the speed of light. So it probably can be assumed that half the mass of a bounded atomic system of particles are completely composed of free gravity particles. These particles are almost all absorbed and re-emitted by the EM particles, with a small residual amount escaping and being responsible for the particle's own gravitational force on other particles. We will see how this holds with the approximate calculation of the electron radius.

Using the relation of a particle in a box as a crude approximation:

$$E = \frac{n^2\pi^2\hbar^2}{2\mathrm{mL}^2}$$

where we obtain:

$$L = \sqrt{\frac{n^2\pi^2\hbar^2}{2\mathrm{mE}}} \tag{7}$$

where n = 1, ħ = 1.05x10^{-34} J·s, m = 9.11x10^{-31}kg and E = mc^2 we get the approximate radius for an electron of 8.5x10^{-13}m [1]. Particle Theory assumes that atoms are not point particles, and that they have a finite radius and a structure, which makes interactions like elastic collisions possible. Consequently, interactions like neutrinos with electrons which can't interact through the electromagnetic force can do so through collisions, where intermediate bosons like the Z boson is not necessary under Particle Theory.

The potential that contains an atomic system of particles, which involve only gravity particles emitted from the EM particles themselves, is orders of magnitude more than what we would obtain if we used just the gravitational potential equation to formulate the potential using the radius calculated from (7) [1]. This is due to the fact of the collisions at light speed of the EM particles, which shake off a lot more of the gravity particles within such a system [1]. But there is a limitation to this. From (7), we see that with the increase in mass, there's a decrease in the radius, and the higher in density the atomic particle becomes. The frequency in oscillations and collisions would become too large leading to the decaying of massive particles.

Another explanation concerning atomic decay can be the fact that the potential of an atomic system of particles can bound only so many EM particles. Massive particles would eventually decay into more stable masses. This makes sense for the Standard Model, where the more massive the atom, the faster it tends to decay.

d) Schwarzschild Radius

For a massive system of particles in a bounded system, each particle having mass m, colliding at light speed within a radius r for a total kinetic energy T=1/2Mc^2 and using the true gravitational potential and the Virial theorem:

$$<T> = -\frac{1}{2}\sum_{k=1}^{N} <F_k * r_k>$$

obtaining:

$$2<T> = n<V>$$

and for the total potential $V_{TOT,}$ as defined by the Virial theorem, using the total mass M and the total radius r of the entire system, while using the true Newtoniani potential (1) (since, as we will determine, individual EM particles do not produce a screening effect) [1]:

$$<V> = -\sum_{k=1}^{N} <F_k * r_k> = -2\mathrm{GM}\sum_{k=1}^{N}\frac{m_k}{r_k} \approx -\frac{2\mathrm{GM}^2}{r}$$

and with n = -1, since $V = \alpha r^n$, we obtain:

$$2\left(\frac{1}{2}\right)Mc^2 = \frac{2\mathrm{GM}^2}{r}$$

which will give us the Schwarzschild radius:

$$r = \frac{2\mathrm{GM}}{c^2} \tag{8}$$

Since the Schwarzschild radius is a feature of black holes, this implies, according to Particle Theory, that when a black hole is formed, all the distinguishable atoms break down into a collection of EM particles, just like that for an atomic system of particles [1]. But an important note: when working with atomic sized particles, usage of the wave equations in quantum mechanics should be used, where in the case of macroscopic bodies like black holes, formulations such as the Newtonian gravitational potential should be used [1].

Since the gravitational potential in black holes are meant to hold particles that are moving at the speed of light, the distinct feature of emitting no light is possible under Particle Theory as the potential is strong enough to hold particles of light speed within its body [1]. But this does not mean that shedding, like in atomic particles, does not occur. It could do so due to internal screening which may allow particles on the surface to escape just as in an atomic system of particles [1]. To what extent it may vary, but this may give some credence to Hawking Radiation under this model [1].

e) Time Dilation

The velocity dependency of the screening effect and in turn the varying internal movement of an atomic system of particles is also the cause of the relativistic effects such as time dilation.

In Section VII of [1] there is two possible ways time dilation is possible according to Particle Theory. One way involves the reduction of the shedding affect when an atom has a directional velocity. The reduction in shedding reduces the potential of the nucleus, reducing the orbital speed of the electron.

Another possibility is that the orbiting electrons themselves require a reduction in orbital speed as the electron orients itself toward the direction of the velocity. As it approaches the speed of light, the orbital speed approaches zero since the limit to its velocity must be the speed of light.

The slow down in the orbit, or angular frequency of electrons, which govern both atomic and macroscopic systems such as electrical and mechanical processes (and as a result biological processes), would result of a slow down in these processes themselves [1]. The proper time then being inversly related to the velocity and as such the angular frequency of bounded electrons is the time of an observer at rest multiplied by the inverse Lorentz factor as in Special Relativity:

$$\gamma^{-1}=\sqrt{1-\frac{v^2}{c^2}} \tag{9}$$

and the proper time being:

$$d\tau=dt\sqrt{1-\frac{v^2}{c^2}}$$

For a bounded atomic system at rest but under a gravitational potential, time dilation is also the result of a reduction in angular frequency [1]. As an example, a quantum system under a perturbation of a non-zero potential gives us $E_n \approx E^0_n - V$ where $V=\frac{GMm}{r}$ (half the true Newtonian value for an atomic system at rest). For a particle in a box, where $E_n \approx \hbar\omega_n - V$, where h is the reduced Planck's constant and ω is the angular frequency, and making $E_n = E' = \hbar\omega'$ and $\hbar\omega_n \rightarrow \hbar\omega$ we obtain: $\hbar\omega' = \hbar\omega - V$ which means $\omega' < \omega$ [1]. To find the correct solution, we use the inverse Lorentz factor (9), and equating the kinetic and potential energy change, $(\Delta v)^2 = 2GM/r$, where $\Delta v \approx r\Delta\omega$, and since $\omega' = 0$ means $d\tau=0$ at the Schwarzschild radius as we will explain in the next subsection, we have:

$$\gamma_{GR}^{-1}=\sqrt{1-\frac{2GM}{rc^2}} \tag{10}$$

the same as it is obtained from the Schwarschild solution.

f) Gravitational Redshift

In the last section we determined that time dilation, as a result of a gravitational force, was the result of the reduction of the angular frequency of electrons in a bounded system. This would also affect the wavelength emitted from such a system, as the energy levels are shifted due to the presence of a gravitational acceleration.

From the calculation of the Schwarzschild radius we did previously, we determined that a black hole's gravitational strength can contain particles (like photons) within their bodies. This would indicate that the wavelength of a photon from it should be infinite such as predicted in GR. In Particle Theory, this is interpretated as the angular frequency being zero for the electrons in an atom. Since:

$$\lambda_\infty \propto \frac{1}{\omega'}$$

and using (10) for the angular frequency:

$$\omega' = \omega\sqrt{1-\frac{2GM}{rc^2}}$$

we have:

$$\frac{\lambda_\infty}{\lambda_r}=\frac{\omega}{\omega'}=\left(1-\frac{2GM}{rc^2}\right)^{-\frac{1}{2}}$$

and defining the change of wavelength z as:

$$z=\frac{\sqrt{1-\frac{2GM}{r_2c^2}}}{\sqrt{1-\frac{2GM}{r_1c^2}}}-1 \tag{11}$$

and since $\lambda_\infty \rightarrow r_2 = \infty$ and making $r_1 = r$ we obtain:

$$z=\frac{\lambda_\infty}{\lambda_r}-1=\left(1-\frac{2GM}{rc^2}\right)^{-\frac{1}{2}}-1$$

for the red shift from the surface r of the gravitational mass for an observer infinitely far away (λ_∞), which is the same for the gravitational redshift according to GR. For the calculation of the blueshift, such as in the Pound–Rebka experiment [4], equation (11) would be used to obtain the theoretical result, as the angular frequencies, or in the relativistic sense, the “clocks” of both the transmitter r_1 and receiver r_2 of differing heights must be taken into account.

Another approach to explain the gravitational redshift is the gravitational force acting on the photon itself, slowing it down and increasing the wavelength, not by stretching its length, but by decreasing the frequency due to the deceleration of the photon itself due to the gravitational force. But since the the speed of gravity is the same as that of light [3], the only way for this to possibly occur is by gravity particles coming ahead of the photon, or light corpuscle, at its sides as shown in Fig 9.

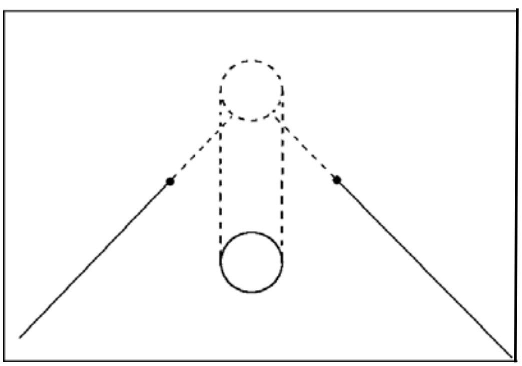

Fig. 9: The path of a light corpuscle and two gravity particles approaching from its sides

But that sets even more limitations for this approach, as the gravity particles approaching from the sides is cut by a fraction of which depends on the angle made with the path of the photon. Stronger gravitational fields may have a heavier influence by this approach.

Another problem with this approach as explained in [1]:

With the previous instances such as with the two body problem and gravitational lensing, both involved the particles moving around the gravitational potential. For small particles moving away from a potential, especially with photons which have such small amplitudes, the gravitational flux such that of a weak field would have much less influence on photons than much more stronger fields, especially when the separation of the gravitational particles emitted by a body can eventually equal the amplitudes of these photons shortly after leaving the surface of a stellar body as (shown in Fig 10) [1].

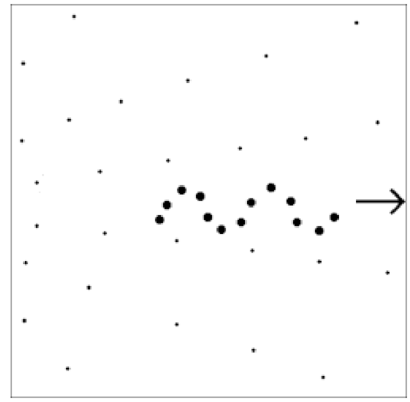

Fig. 10: Photon moving away from a gravitational particle field [1]

IV. Alternative to Relativistic Mass

In this section I will quicky go over the concept of how Particle Theory explains the results of relativistic scattering and provide an alternate to relativistic mass. For further details of this and this theory's interpretation of the Klein-Gordon equation, refer to [1].

According to [1]:

Particle Theory provides a different interpretation to relativistic mass proposed by Special Relativity. Under Particle Theory, the structure of a system of particles is retained by the collisions that create a gravitational potential many orders of magnitude normally obtained by the law of gravitation. When a system of particles are moving in a specific direction, these collisions starts to reduce in intensity and frequency, and consequently in the reduction of this inner potential.

Due to the reduction of this potential as the system of particles orient themselves in the direction of its velocity, the structure itself weakens. As such, the influence of any external electric or magnetic potential is reduced as the internal structure weakens especially at relativistic speeds. Another interpretation that can be made is that a reduction of the internal potential increases the radius of the entire system of particles, where the particles from EM fields have more of a chance of going straight through the system without any interaction. Or the opposite may be the case, that is, a shrinking in size of relativistic particles due to the reduced impact of internal collisions may also explain the reduced influence from an external EM field. This also may explain how deep inelastic scattering is possible in electron-proton scattering, since the size of the relativistic electron must be small enough to be able to strike the constituent quarks of a proton.

This is not the case with a gravitational potential, as the gravitational acceleration's inertial mass invariance, where, due to the size of gravity particles being orders of magnitude smaller than that of an EM particle, the permeation of such a field through a system of particles is far higher than that of an EM field.

Another concept not yet discussed is relativistic inelasticity. For a non-relativistic particle approaching a wall of atoms, exchange of EM particles (static field) between the particle and the wall slows down the particle, and then accelerates it away from the wall (elastic), if not slightly penetrating it (inelastic). But for an atom approaching the wall at relativistic speed, the shedding from the atom itself is reduced significantly, where most of the EM particles used to slow down the atom would come from the wall. Also add to that the reduced influence on the static field on a relativistic atom, as mentioned earlier, the atom penetrates the wall much farther if it doesn't elastically bounce back towards the opposite direction. This relativistic elasticity make it seem as if the atom has increased mass and therefore increased energy, similar to the concept of relativistic mass.

V. Black Holes

Previously we've stated that a black hole consists of what was distinct and distinguishable atoms, such protons and electrons, that have been broken down into a very dense collection of individual EM particles all moving at the speed of light, just like an atomic system of particles but in a massive, macroscopic scale. This is in contrast with black holes being a singular, point-like mass.

Using the energy for a particle in a box (7) we calculated the electron radius to be roughly $8.5\text{x}10^{-13}$m. Instead, using the gravitational potential (2) to find the radius we can compare the difference in density. Now we have for an electron $mc^2 = 2\text{GMm}/r$ and since this is a self bounded system, $m = M$ we have $r = 2\text{GM}/c^2$ which is just the Schwarzschild radius. Using m = $9.11\text{x}10^{-31}$ kg for an electron, we obtain a radius of $1.35\text{x}10^{-57}$. This is over 20 orders of magnitude smaller than if using the quantum equation. Such a system of particles such as an electron would most likely immediately evaporate since the frequency of collisions due to its great density would be massive.

But for macroscopic systems like black holes, the massive mass would make such a system stable. We can think of such a macroscopic system of particles have continuous gradient of decreasing pressure the further from the center of the black hole you go. But to simplify things we will treat as a two layer system, a core and an outer layer shown Fig 11.

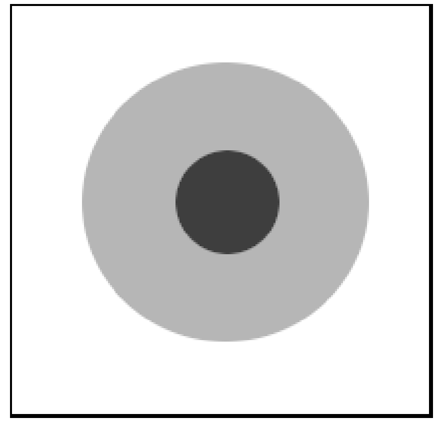

Fig. 11: A black hole with a core (in black) and an outer layer (in grey)

We will now consider the possibility of emissions of EM particles from black holes that do not fall back in as suggested by Hawking [5]. If the screening effect solely consists of emissions of particles aborbing gravity particles as it leaves the system, then radiation of particles from black holes is necessary, since just like for atoms, a macroscopic system of EM particles such as black holes must have a varying screening effect to produce the effects of General Relativity such as the relativistic perihelion precession of a binary system of black holes [2]. Although, keep in mind, as stated in a previous section, the screening effect could also be the result of the internal movement of the system itself, where gravity particles might have a hard time connecting with EM particles due to the rapid oscillations of these particles. Whether its either/or, or if they both play a role to some degree is uncertain.

Two possibilities concerning particle emissions from black holes, if such a thing occurs, will be discussed here: the first one involves the outer layer (Fig 11) shrinking due to the emission of particles, and the second one involves the shrinking of the core from a loss of momentum due to a drop in frequency of the oscillations. The shrinking of the black hole is assumed since the Schwarzschild radius asserts that the radius decreases as the mass of the black hole decreases.

In the first case, the outer layer of a black hole acts as a padding that limits the momentum transfer to the surface of a black hole from the high rate of particle collisions of the core. The momentum transfer results in the emissions of EM particles from the surface of the black hole. This also causes the the speed and frequency of collisions in the core to slow down. This results in a momentary shrinking of the core, but then regains its size and pressure as the outer layer falls in due to the prior reduction of pressure and strength of the core. With the size and pressure of the core restored, the final result is a reduction in thickness of the outer layer, reducing the padding effect which increases the momentum transfer from the core to the surface of

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the black hole, and as a consequence increases the particle emissions from its surface.

In the second case, as the core transfers momentum to the surface, the core shrinks, maintaining its pressure but reducing in size, while the outer layer retains its thickness. Due to the reduction in size of the core, the number of collisions at high frequency of the core is reduced, ultimately reducing the amount of gravity particles released from such collisions. As the core is a major source of gravity in a black hole system due to its intense pressure, the gravitational pull of the outer layer due to a shrunken core weakens, which also, as in the first case, increases the emission of particles from the black holes surface.

In both cases, the emission of particles increases with the decreasing mass of a black hole. This is in line with Hawking's prediction according to (12) [5], where $M_{\odot}$ is the solar mass, and M is the mass of the black hole, with $^{\circ}$K being the temperature in degrees Kelvin.

$$T = 10^{-6}\frac{M_{\odot}}{M}\,^{\circ}K \qquad (12)$$

With a decreasing mass there is an increase in temperature, or an increase in particles emitted from a black hole, according to Particle Theory, if such a process occurs, falling in line with Hawking radiation [5]. Although, regardless of whether or not EM particles can escape the surface of a black hole, gravity particles obviously can and must leave a black hole, which evidently would also reduce the mass of black holes, as for any other system, but to a degree much less than whole EM particle emissions from its surface.

The next sections will quickly go over certain topics in physics and their possible explanations of these phemomena under Particle Theory.

VI. Dark Matter

Dark matter is the substance that consists of approximately 85% of all matter in the universe which is theorized to explain the observed rotational velocities of galactic systems. In a previous paper [6], I've proposed the idea of dark matter as being concentrated macroscopic singularities outside of galaxies rather than a halo of not yet defined particles permeating all throughout galactic clusters. But the problem with this concept is that such macroscopic systems would create internal gravitational lenses that would be noticeable if true. Instead, I am proposing a new concept that is quite similar to the halo model, but defines the particles that make up this halo.

Consider an atomic system of particles, like a proton or electron, which are composed of individual EM particles colliding with each other. Now imagine them collapsing into itself, creating a singular ball of entangled gravity particles shown in Fig 12:

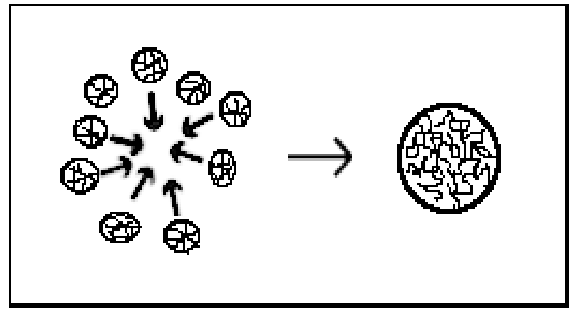

Fig. 12: EM Particles collapsing into a single ball of entagled gravity particles

Since all the EM particles have been broken down into a single ball or particle, no longer can this particle be influenced by or produce an electromagnetic force. It can only be influenced by or produce the gravitational force. And since these small EM particles, which are also balls of gravity particles but smaller, converged into one giant body of entangled gravity particles, the vibrations are more intense and of higher frequences. This results in the intense emissions of gravity particles compared to just an atomic system of particles of the same mass. But whether or not these particles can be created from collapsed atoms, or only from or shortly after the big bang, will not be discussed here.

VII. Gravity Particles

In the introduction, I described and provided an illustration (Fig 2) of what a gravity particle may look like. Of course, if such particles existed, we may never know what they look like, or the possible mechanics they obtain. The theory in PT goes as far as defining atoms like electrons or quarks as not being indivisible, but being made up of a collection of smaller, and still divisible particles. The shapes or structures of these particles as I describe them only serve as a hypothetical model to explain all the different phenomena involved in the electromagnetic forces and gravity.

If we recall from gravitational lensing, where we defined a photon as a sinusoidal string of EM particles with velocity of c, in order for such a structure to be affected by the gravitational force, the vibrations of the entanglement gravity particles must still hold even if the EM particles are traveling at light speed. This is in contrast with EM particles that make up an atom, as their internal movement decreases as its velocity increases, approaching zero at light speed, where it can barely, if not at all, be affected by an external electromagnetic field.

But because the vibrations of entanglement gravity that make up EM particles are preserved, it may be possible to accelerate an atom beyond the speed of light using just the gravitational force. How much faster all depends in how long these vibrations are preserved as with the increasing, faster than light velocity. It may

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even be possible for the internal movement of the EM particles in an atom to be preserved as long as the acceleration is caused only by the gravitational force.

VIII. Background Independence

General Relativity, unlike quantum theory, is background independent, which means it has no fixed background. In a quest for quantum gravity, this is one of the problems one must face. Some schools of thought say that a theory of quantum gravity should be background independent.

But because Particle Theory can explain the relativistic effects of gravity through the internal mechanism of atoms, then spacetime curvature is no longer needed to explain such phenomena. It is a property inherit to the atom itself just like the charge or spin of the atom. Although this property is dynamic and not static, relativistic field theory has no problem in dealing with dynamic properties, like the relativistic mass, for example. Therefore, under PT, background independence is not necessary in describing the relativistic effects of gravity.

Relativistic theory also describes interactions of particles through exchange of bosons, while PT explains these interactions through particle fields and elastic or inelastic collisions due to the fact that atoms under PT are not point particles. But this is no reason to replace or modify the mathematics of quantum field theory, as it accurately describes three of the four fundamental forces. Even with its limitations of treating atoms as point particles, renormalization fixes these issues quite successfully. Whether other limitations arise from treating atoms as point particles, then the treatment of atoms as a system of particles may become necessary.

IX. Gravitational Waves

General Relativity predicts the phenomena of gravitational waves and was confirmed by LIGO [3] quite recently. Under Particle Theory, this is interpretated as a varying particle field emission of gravity particles created by a binary star merger shown in Fig 13, although the proper emissions should look light a spiral. The varying density of the particle field emission as it travels out from the source gives it its wave-like quality. Einstein's field equation has accurately calculated different variations of these events, whether it involved two black holes, two neutron stars, or one of each. GR as a model is always useful as far as macroscopic phenomena such as these are concerned.

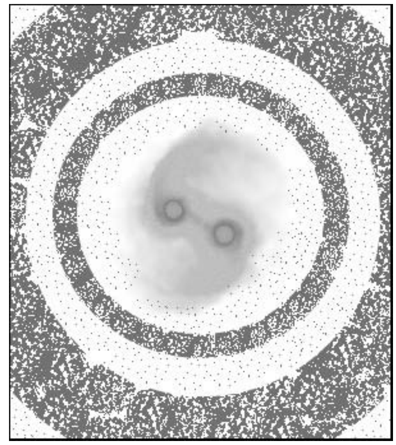

Fig. 13: Varying density of gravity particle emission emitting from a binary star merger

X. Dark Energy

Particle Theory may provide an explanation to Dark Energy, which is the name given to the mysterious energy that is causing the accelerated expansion of the universe. An atom at rest will shed EM particles equally at all angles. But for an atom with a non-zero velocity, the shedding might not be uniform. Since the velocity of EM particles must be the speed of light, the EM particles leaving the direction of the velocity must be slower than the particles leaving the back of the atom. This is shown in Fig 14, which shows a velocity change under a center of momentum change during the shedding process.

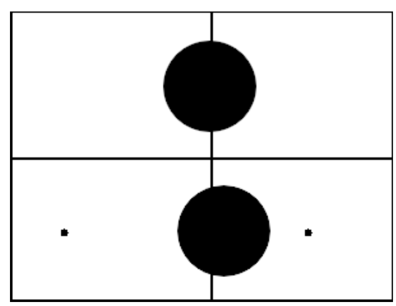

Fig. 14: Center of momentum frame of an atom with a non-zero velocity in the x-direction with the resulting, shedding in the bottom frame after a time transition

So this acceleration is the result of the exchange of the internal movement and internal energy of an atomic system of particles to the directional velocity of the atom itself. Of course as the particle reaches the speed of light, the internal movement, or the motion of the EM particles perpendicular to the directional velocity, will approach zero. The acceleration then may be proportional to $v\sqrt{1-v^2/c^2}$ shown in Fig 15:

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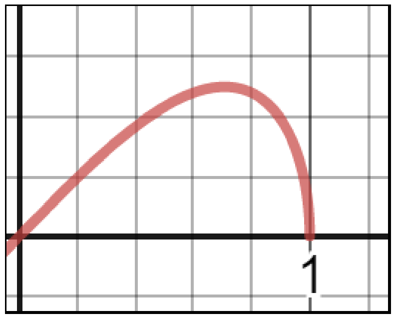

Fig. 15: Acceleration vs. Velocity where speed of light c=1

XI. Magnetism

We will quickly go over how magnetism works under Particle Theory. Picture two proton and electron pairs over each other. Fig 16 shows only the electrons from both systems.

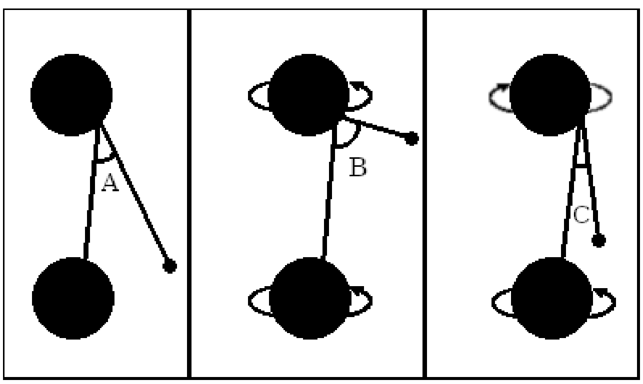

Fig. 16: Two electrons shown without spin, with same spin, and with opposite spin and an EM particle emission and collision and the resulting angles

In the left frame of Fig 16, an EM particle from the bottom electron elastically collides with the top one, an angle of A, the momentum exchange in which we will consider this to give a full repulsion effect. If we calculate the total charge interactions, between the electrons and protons in all instances, we obtain (13):

$$Q_{TOT} = q_{ep} + q_{pe} - q_{pp} - q_{ee} \tag{13}$$

Where ep and pe is the proton-electron attraction charges and pp and ee is the proton-proton and electron-electron repulsions.

For the first example in Fig 16 we have:

$$Q_{TOT} = 1 + 1 - 1 - 1 = 0$$

which suggests no magnetic attraction or repulsion due to no spin of the electrons. But in the next frame of Fig 16 (middle), due to the electrons spinning in the same direction, an angle of B is made which is wider than A. The momentum exchange in this case reduces the momentum in the y-direction given to the top electron compared to first case, having it not produce a full repulsion effect. If we interpret this as having a charge (or repulsion factor) of less than one, say $q_{ee} \approx 0.95$ and using (13) we obtain:

$$Q_{TOT} = 1 + 1 - 1 - 0.95 = 0.05 \tag{14}$$

As we see from (14) there is a non-zero, positivie charge left over, which is interpreted as an attraction force between the two proton-electron systems as it should be for the magnetism of two same spin electrons.

In the last frame (right) of Fig 16 we have both electrons spinning in the opposite direction. This causes an angle of C being made for the path of the EM particle. Since the angle of C is smaller than in the non-spin case A, the momentum exchange creates a repulsion factor bigger than in the non-spin case. Using (13) and setting $q_{ee} \approx 1.05$ we have:

$$Q_{TOT} = 1 + 1 - 1 - 1.05 = -0.05 \tag{15}$$

Now the total left over charge being a negative would be interpreted as a repulsion force between the two systems, as it should for two opposite spinning electrons.

We see now how we can explain the magnetic affect using Particle Theory in a very understandable way. When compared to the static field, one must remember that due to the spin, the divergence of the field of a magnetic dipole is not constant at the spin axis, which will vary the field by distance much higher than a static electric field.

XII. Anti-Gravitational Applicalion

The screening effect for a particle at rest, according to Particle Theory, blocks and absorbs half of what is the true gravitational potential which is just twice the normal (1). If one can increase the shedding of EM particles that produce such an affect, through very high oscillations, or in simple terms, "shaking" an atomic system of particle shown on the right of Fig 17, one can reduce the influence of the gravitational potential by more than half. This would manifests itself as the emission of high energy photons.

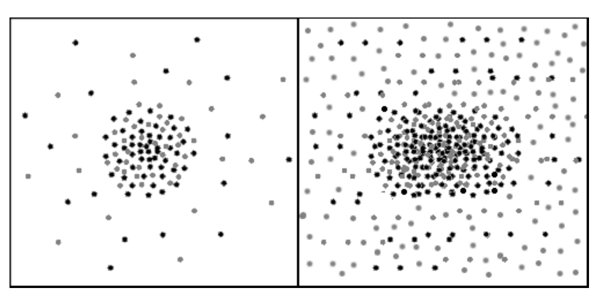

Fig. 17: Left shows an atom shedding at rest. Right shows an atom with increased shedding by oscillating at a high frequency

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These emissions can be produced through Bremsstrahlung scattering. Such a system must produce these high energy photons directed towards the gravitational mass, which would create an anti-gravitational effect due to the increased screening effect as the photons absorb gravity particles from the gravitational source as it travels towards it.

XIII. Conclusion

We've reviewed many aspects discussed in my last paper [1] but mentioned briefly many more aspects pertaining to the subject of Particle Theory. But we've only scratched the surface. The future scope of this research would be in using the concepts of PT to solve the problems purposed by quantum gravity, but also to tackle other aspects, such as the strong force under PT, which I have not mentioned here but will be discussed in detail in its own paper. Confirmation of experiment results given in [1] as well as confirming any anti-gravitational effects through high energy photons must also be ventured upon. Confirmation of these phenomena predicted by PT may prove some, if not all aspects of this theory.

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