# Title: The Mechanics of Gravity

(Version 6 - 2025)

Author: Francois Zinserling (B.Sc. Eng)

(Bachelor of Electronic Engineering – University of Pretoria – 1987)

Date: 2025-December

Email: francois@designtech.co.za

ORCID: https://orcid.org/0000-0001-6166-5717

LinkedIn: https://www.linkedin.com/in/francois-zinserling-55173a3a

ResearchGate: https://www.researchgate.net/profile/Francois-Zinserling

Academia: https://independent.academia.edu/FZinserling

Keywords: push-gravity, photon pairs, dynamic aether, quantum vacuum inertia, gravitational constant, exponential decay of gravity, inertial mass, gravitational mass, Fatio, Le Sage, mechanics of gravity.

## Abstract

A conceptual analysis is presented for space as a dynamic aether, a primordial omnidirectional flux of photon-pairs with very specific discrete energies. A gravity model is offered which is based on a Fatio / Le Sage pushgravity model, whereby now all the objections from prior models seem to have been overcome.

The ‘Quantum Vacuum Inertia’ of Alfonso Rueda and Bernard Haisch offers an electrodynamic model for the dynamic aether, its strength, origin of mass, equating inertial mass with gravitational mass, as well as explaining how the Lorentz factor ‘γ’ represents additional aether energy accumulated onto the mass. The energy, even in the equation $E=mc^2$, is always from the aether.

The ‘Photon Pairs’ of Patrick Grahn, Arto Annila, Erkki Kolehmainen allows for matter to be mostly transparent to the neutral E and B fields of the aether and thereby offers a transformation mechanism whereby the ‘energy problem’ is avoided.

Newtonian gravity will be shown to be the simplified version of this model, with revelations to why gravity appears ‘instant at a distance’. Gravity, and gravitational waves, propagate at ‘c’.

Further analysis of our exponential model shows plausible solutions for anomalous density regions such as neutron stars (electron degenerate matter) and galactic disk rotation curves without the addition of dark matter. An argument is presented for the Hubble effect which does not require an expansion of the universe.

A relativistic solution is not offered here but rules of relativism and causality are not violated. Results of this document are narrowed down to show locality variations in the gravitational constant G. The findings might be directly applicable to improve existing gravity models, including relativistic models.

Further research is encouraged into the shielding of gravity, as were experimentally shown by Quirino Majorana in 1920. Other properties of the aether need to be explored.

# Introduction

Push-gravity has previously been proposed in many forms; notably by the publication of Le Sage [1748], which was based on the original idea (non-published) of Fatio [1690]. These, and other 'push-gravity' and 'flow-of-space' or 'shadow-gravity' theories have been met with resistance and thus far valid objections by many renowned scientists[1-17]. Edwards' book[5] in 2002 revived significant interest into the study of the subject from which Paul Stowe[17], one of the co-authors of Edwards' book, has also recently presented a host of excellent new arguments in favour of aether and pushgravity.

Newtonian gravity [1687], with its 'Instant action at a distance' has been superseded by what is now our best current understanding of gravity, given by Einstein's General Relativity (GR) [1916][18], also described by Wheeler as: 'Space tells mass how to move, and mass tells spacetime how to curve'. Daniel Faccio's representation of 'space flows into earth' in his river model[19], or Einstein's own interpretation of 'earth is accelerating upward like an elevator' all provide usable abstracts, but do not give a reasonable description as to what causes gravity. One can intuitively imagine how curved space could create a path for matter to move, but no explanation is available for how matter bends space, or what space consists of.

Even though the theory (GR) has been thoroughly tested and has proven that its accuracy is renowned[20], a fully functional mechanistic explanation for the workings of gravity still does not exist.

For simplicity of reading and for presenting the concept and model, this work will show limited use of vector or tensor notations. It will soon be evident though that 'G' is the Newtonian radial vector, and this work must be expanded into relativism and proper notations.

We begin in section 1 by presenting a model of the dynamic aether, building on the works of others and defining some specific required parameters. In section 2 we derive the mechanics of Newtonian gravity from an absorption/transformation model. In section 3 we revisit the previous equations to derive our final equation which reveals anomalous gravitational effects. In addendum A we analyse a few scenarios to demonstrate how the model may reveal anomalous gravity effects. In addendum B we revisit the problems that plagued historical Fatio / Le Sage pushgravity mechanisms and we lay them all to rest.

## Introducing the dynamic aether

### The ZPF of Alfonso Rueda and Bernard Haisch

From the above authors and their 2005 paper 'Gravity and the Quantum Vacuum Inertia Hypothesis'[21] we build on the following findings and principles:

- A dynamic aether, or in their words, a quantum vacuum, or Zero Point Field (ZPF), exists which consists of an omnidirectional sea of photons which pervades all of space.
- The full strength of the aether is undetermined and only fractionally observed as inertial and gravitational mass. We expand on this. Gravitation will also be shown to only be a fractional effect of mass interaction with the aether. Even though these two effects only involve a small (<<1) fraction of aether, anomalous large masses and gravitational effects may create and reveal local weaknesses in the aether.
- Mass arises when objects of charge, including neutral particles with fundamental charge subcomponents, are accelerated within the aether. We expand on this: In a weakened (local) aether the same object will appear to have less mass.
- Inertial mass and gravitational mass are exactly equal, and both are the same effects of interaction with the aether.
- Energy, even in the equation $E=mc^2$, is confined with the particle but originates from the aether. In this case E does not represent the full strength of the aether but only the fraction that interacts with the object to reveal mass 'M'. Rueda and Haisch place a limit on this interaction with the fraction η where $0 \leq \eta \leq 1$. We further conclude that since mass shielding is not an obvious phenomenon that $\eta << 1$. Only a tiny fraction of aether interacts with an object to reveal mass; the remaining large fraction passes undisturbed. Zinserling's aether concept[22] confirms this from a Doppler analysis.
- The Lorentz factor 'γ' represents additional aether energy accumulated (absorbed) onto the mass. In a dynamic changing universe, it is unlikely that any mass has zero velocity relative to the aether frame, thereby each object already has its own 'γ' which represents its own reference frame, and all others are scaled against this by relativistic effects. It is just as unlikely that there exists a vicinity where the aether is perfectly symmetric in all 4 dimensions. Even though this model proposes an absolute reference frame relative to the dynamic aether, it does not strongly contest the relativism of Special or General Relativity.
- The energy absorption for an accelerated object is not instantaneous, but limited to the size of the force, or the gradient of aether asymmetry; the object will absorb energy at a limited rate while there is an asymmetry. This appears as a gradual accumulation of energy (acceleration) when a force is applied or when the object is

falling in an asymmetric aether, e.g. a gravitational field. We expand on this. Mansuripur[23] and Pfeiffer[24] write that photons do not apply a force but impose a velocity (or transfer some momentum). In an asymmetric aether such as a gravitational field this imposed velocity equals the opposite vector of the escape velocity from that point, but the rate of energy transfer is limited by the gradient of the aether asymmetry and thus velocities are not attained instantaneous.

We differ from the proposals of the authors in that while we acknowledge the aether must contain random collections of left-over or distant radiation, their proposed photon mode does not lend to transparency of ordinary matter and cannot lead to the concept of mass and gravity for composite masses.

Gravity cannot be a direct result of electromagnetic radiation, with EM as spin=1 photons:

EM radiation does not have enough penetration into matter, and most of it will be absorbed in the surface of an object and re-emitted as heat. Even X-Rays have limited penetration, and at higher energies the collisions would be catastrophic and very visible. If gravity were to be of pure EM origin, it's force effect would also drop off rapidly underground.

A very very low frequency of EM has some promise of transparency to matter, but just not enough energy to cause what we know as gravity. Also, gravity is very predictable, and varying frequencies of photon energies may be shown as noticeable fluctuations in gravity.

An EM wave can only affect momentum transfer via a push - as far as we know. We know of no mechanism where a photon can transfer a negative momentum. Then by extension 'primordial' gravity as a pure EM wave cannot be emitted by e.g. the sun, or even earth, as we would be pushed away, and not attracted.

We thus propose the primordial photon flux to consist of neutral photon pairs of a specific discrete energy, such to observe consistent charge, mass and gravitation from its interaction with objects of mass.

### Photon pairs of Patrick Grahn, Arto Annila, Erkki Kolehmainen.

The void of space, ‘the vacuum’ contains a dynamic aether, an ocean of omnidirectional photon-pairs, for which the aether particles (photon pairs) have spin=±2, charge=0, and have ‘boson-like’ particle and wave qualities.

Consider 2 right-hand polarised photons, where R1+R2 are not seen as two photons in tandem but are parallel and both existing within the same space and time, with condition:

$$\psi_1 = |R_1) + |R_2) = 0 \qquad \textit{Eq1}$$

And similarly, 2 left-hand polarised photons:

$$\psi_2 = |L_1) + |L_2) = 0 \qquad Eq2$$

Building on the photon-pair concept of Grahn, Annila and Kolehmainen[25], Zinserling[26] describes in Eq1 and Eq2 two sets of parallel coupled photons, perfectly out-of-phase, which present no measurable E and B fields for charged particles to interact with. The photon pairs have great penetration depth and with a small cross section determined by the density ρ of atomic matter, probability of spin interaction remains which is extremely low. This makes atomic matter nearly transparent to the aether, except for the small fraction as shown by Rueda and Haisch to reveal mass, and the same small fraction as we will show to result in gravitational effects.

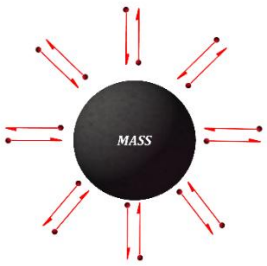



*Figure 1: Mass is stable in a symmetric aether. If not disturbed by external forces, acceleration = 0.*

Consider [Figure 1]. Thought experiment with a much-simplified image: A composite mass is 'at rest' in a dynamic aether, with 'at rest' understood as there being no asymmetry in the flux from any direction, i.e. the energy flow is macroscopically equal from all sides, and no net momentum is imposed on the mass. Since mass is mostly transparent to aether, aether flows into a composite mass from all directions, and each undisturbed aether particle flows out the opposite side.

The proposed aether is a dynamic background, and not to be confused with the static aether theory of Lorentz[27], nor with the corpuscles of the push-gravity theories of Fatio and Le Sage[1-17], although the latter provided much inspiration toward this hypothesis.

## Photon-pair conversion

All objects of mass, which include all subatomic particles of charge, and composites there-of, transform a fraction of the total flux energy as the flux transitions the object. We also conclude from Rueda and Haisch that this fraction η of transformation is what gives the object the property of mass. Transformed flux energy is shown by Zinserling to be radiated as modified photon pairs - electrostatic fields - with little or no heat transferred to the object. The study of electrodynamics needs no introduction and what follows from photon pair

transformation will not be pursued in this document. A premise is that the transformed mode of photons (electrostatic fields) reduces the intensity of the inflowing primordial flux, through transformation by the mass, which then flows out as mostly neutral electric fields for larger composite masses. This gives the appearance that primordial flux has a net flow, or is absorbed, into objects of mass.

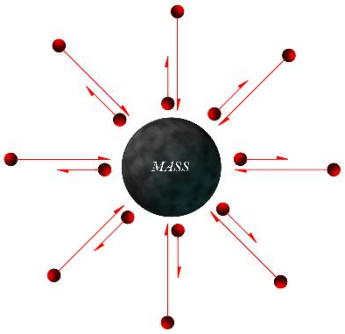



*Figure 2: A small fraction of primordial flux is transformed in mass, resulting in a flux exit energy being reduced from the incident flux.*

Consider [Figure 2]. Thought experiment with a much-simplified image: A small fraction of incident flux is transformed to a different photon pair mode in mass, creating a symmetric imbalance of (in/out) primordial flux around the mass. However, a composite mass remains 'at rest' if the net flux symmetric. No net momentum is imposed on this mass.

## Measurement and Units of G

Analysis of the SI units of G[28], which can also be shown as 'N*m$^2$/kg$^2$', shows the units as required to balance Newton's (and Einstein's) equation and in Newton's formula would result in a unit of force, measured in Newton. (1 N = 1 kg*m/s$^2$). The combination of units of G, directly reveals the inverse of what Newton's equation does, in that mass (M) interacts over the square of distance (r$^2$) but is not otherwise descriptive as to its mechanics.

Acquiring an accurate and reliable measurement value of G has been problematic, compared to the accuracy obtained for other physics constants. A comprehensive review on the history of measurements of G, and difficulties encountered, is presented by C. Rothleitner and S. Schlamminger[29,30], and also by Junfei Wu et al[31], and others[32,33].

## Strength of the primordial aether

Recalling equation (13) from Rueda and Haisch,

$$m_i = m_g = \frac{V_0}{c^2} \int \eta(\omega)\, \rho(\omega)\, d\omega \qquad \textit{Eq3}$$

This is recognised as a form of m=E/c$^2$. We interpret $V_0$ as the volume of object interaction, and η(ω) as the probability of interaction, and ρ(ω) as the energy density of the zero-point

fluctuations. Because our proposal is for fixed discrete energies of aether photon-pairs, neither η nor ρ of the flux are now a function(ω) and thus no integration required if we substitute ρ(ω) as the energy density per volume $E_v(I_0)$ of the primordial flux. We can deduct that for the mass energy:

$$m_i c^2 = V_0 \eta * E_v(I_0) \qquad Eq4$$

Lorentz factor γ intentionally left out to focus only on presenting a simplified concept.

Acknowledging that the mass $m_i$ fills the volume $V_0$, we can deduct that for the primordial aether, energy intensity per volume equates to:

$$E_v(I_0) = \frac{\rho_i}{\eta} c^2 \; in \; [\frac{J}{m^3}] \qquad Eq5$$

, where $\rho_i$ is the mass density in the volume $V_0$. We know typical densities of composite and atomic matter (excluding electron degenerate matter for now) range from very dilute gases $0 < \rho \leq 22.59$ kg/m$^3$ for osmium, and we can conclude that since mass shielding is not a common and known phenomenon that the interaction factor must be of the order $\eta << 1$. The fraction η represents the portion of aether that interacts with the volume of the object which remains a variable in the equation, and we argue that the right side of Eq3 refers to an object's volume but has no reference to the object's density, only ZPF or primordial flux density. We thus argue η is hiding the proportionality to the density of $m_i$, and since $E_v(I_0)$ is a constant in Eq5, and $c^2$ is certainly constant, we agree on $\rho_i/\eta$ to be a vacuum constant. Then we can now set an expectation on the lower limit for the energy of primordial aether in a volume of 1m$^3$:

$$E(I_0) \gg \rho_i c^2 \; in \; [J] \qquad Eq6$$

Which show that the aether energy is expected to be a large mismatch for the extreme low value of Lambda Λ in Standard Cosmology.

In Eq7 we determine the flux of the primordial aether $I_0$ from Eq5 by dividing by the photon pair momentum (unknown) to get number of particles per m$^2$ per second.

$$I_0 = \frac{\rho_i}{\eta} c^2 * \frac{\lambda}{h} \; in \; [\frac{\#}{m^2 s}] \qquad Eq7$$

## Defining the flux and interactions with mass

For simplicity and clarity, we analyse the effects of flux in one dimension, where we divide any object under scrutiny into a +x and -x section, as shown in Figure 3.

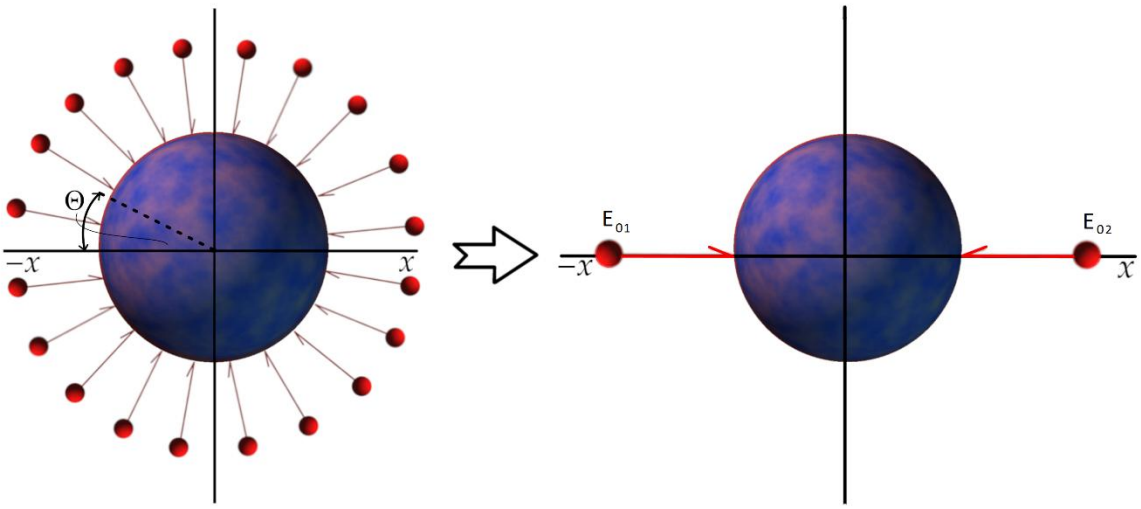



*Figure 3: For this exercise, only the x-direction components of all inward aether photon pairs are summed up over all directions of space and then represented as ±X components.*

The total sum of the energies $E_{0i}$ of the initial photon pairs entering the object in a symmetric aether (flat space) will approach to zero.

$$\overrightarrow{E_0}\hat{x} = \sum_i \overrightarrow{E_r} * sin\theta_i * cos\varphi_i\hat{x} \simeq 0 \qquad \textit{Eq8}$$

By splitting vertically, the net flux in [**Error! Reference source not found.**, image on the r ight] is presented as two single x-momentum (tensor component) non-zero boson composites approaching the object. The object does not gain any momentum from these bosons combined if conditions remain that flux $E_{01} = E_{02}$.

It is known that absorption of electromagnetic rays, as per example, x-rays[37,38] follows an exponential decay curve (Beer-Lambert law) as shown in [Figure 4] and [Eq9]:

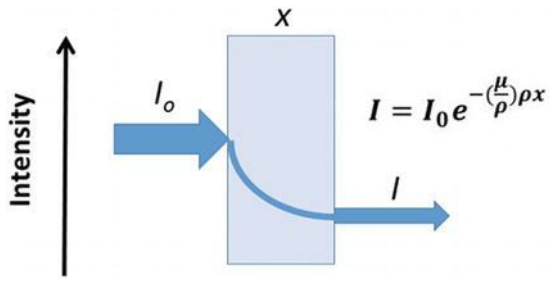



*Figure 4: Typical X-Ray absorption curve over a distance x. Picture adapted from: http://physicsopenlab.org/2018/01/20/x-ray-absorption/*

$$I_{(\pm x)} = I_{0\pm x} * e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]} \qquad \textit{Eq9}$$

where ρ is the density of the element (kg/m$^3$) and μ/ρ is the mass attenuation coefficient given in m$^2$/kg. The term 'x' in the exponent indicates the width of the object, in that this is a linear absorption equation which is converted to volume absorption by multiplying with the area of effect.

We can define $I_0$-I represents the transformed fraction $I_a$:

$$I_a = I_0 - I \qquad Eq10$$

, then from Eq9:

$$I_a = I_0\left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right)\ in\ \left[\frac{\#}{m^2 s}\right] \qquad Eq11$$

Since $I_a$ is the linear absorption of particles per $m^2$, per second, absorption through a surface area (A), will be the absorption multiplied by area (A), resulting in the total absorption of flux into a cubic volume; through an area A, across distance x, resultant $I_{a(vol)}$ has units of 'number of particles/s'. See [Figure 5].

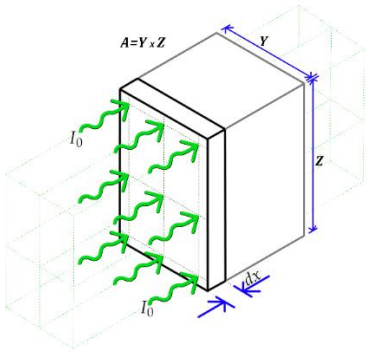



*Figure 5: Representing absorption of a measure of flux across an area A, through a distance x*

Absorbed/transformed flux for the volume can now be calculated:

$$I_{a(vol)} = I_0 A\left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right) \qquad Eq12$$

A Taylor expansion for $e^{-\mu\rho x}$, for $\mu\rho x << 1$ gives to the first order,

$$e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]} = 1 - \left(\frac{\mu}{\rho}\right)\rho X \qquad Eq13$$

$$I_{a(vol)} = I_0 A\left(1 - \left(1 - \left(\frac{\mu}{\rho}\right)\rho X\right)\right) \qquad Eq14$$

$$I_{a(vol)} = \rho * X * A * \left(\frac{\mu}{\rho}\right) I_0 \qquad Eq15$$

, which XYZ equates to a volume of a cube, and where ρ is the average density, hence it follows logically:

$$I_{a(vol)} = \left(\frac{\mu}{\rho}\right) I_0 * M \qquad Eq16$$

We then substitute $I_0$ into Eq16 from Eq7, normalised to an area A = $1m^2$:

$$I_{a(vol)} = \left(\frac{\mu}{\rho}\right) * \frac{\rho_i}{\eta} c^2 * \frac{\lambda}{h} * A * M \qquad \textit{Eq17}$$

For the new components in Eq17 we argue as follows: Measured fluctuations for known values of μ/ρ (for atomic material), at different frequencies, are due to photonic interactions (photoelectric effect, Compton scattering, pair production), which will not be present with neutral photon-pairs, and for a specific frequency μ/ρ will narrow to a constant. We have argued at Eq5 to use $\rho_i/\eta$ as a constant. Wavelength of the photon pairs are unknown but from our proposal of fixed-frequency photons we are assuming this as a constant. We set a consolidated coefficient, which includes the normalised area A = 1m$^2$:

$$\mu = \left(\frac{\mu}{\rho}\right) * \frac{\rho_i}{\eta} * \lambda * A \; in \; [m^2] \qquad \textit{Eq18}$$

And simplifying Eq17:

$$I_{a(A)} = \frac{\mu c^2}{h} * M \text{ in } [\frac{\text{m}^2}{\text{s}}] \qquad \textit{Eq19}$$

To convert from flux to flux-density we multiply by the speed of the wave 'c'. We don't multiply by area again for this because have already normalised to 1m$^2$:

$$I_{a(\psi)} = \frac{\mu c^3}{h} * M \text{ in } [\frac{\text{m}^3}{\text{s}^2}] \qquad \textit{Eq20}$$

Due to net inflow of primordial flux into the mass(M), and less outflow, an asymmetry of flux (in vs out) is formed around mass (M).

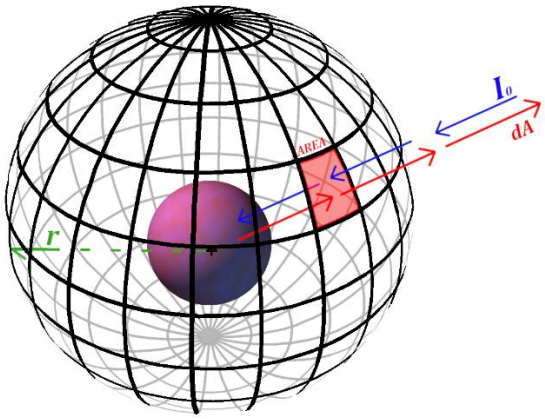



*Figure 6: Gaussian sphere depicting measurement of net flux at distance (r) through an area (A)*

To predict the effect of this interaction over a distance, since the asymmetric flux is a vector field pointing in toward the (centre of) mass(M), invoking a Gaussian sphere, see [Figure 6], to measure potential of the asymmetry at a distance (r) from the centre of the mass:

$$I_{a(\psi)(r)} = \frac{\mu c^3}{h} * M * \frac{1}{4\pi r^2}\ in\ [\frac{m}{s^2}] \qquad Eq21$$

Rewriting Eq21 for clarity:

$$g(r) = \frac{\mu c^3}{4\pi h} * \frac{M}{r^2}\ in\ [\frac{m}{s^2}] \qquad Eq22$$

, which we recognise as the Newtonian limit, with:

$$G = \frac{\mu c^3}{4\pi h}\ in\ [\frac{m^3}{kg.s^2}] \qquad Eq23$$

It should be noted here that the effects of gravity was attained with one mass only, where any small object 'm', approaching mass 'M', will be accelerated at 'g', independent of that small body's mass. Here we have shown pushgravity without a 'shadow' between two masses. If anything, 'g' is the self-shadow of the primordial flux around the mass M.

We can now extend this to two bodies, while remaining in the Newtonian limit.

From [Eq22] and [Figure 7], choosing spheres as interacting objects: Mass (M) creates an asymmetric flux around itself due to flux absorption. The other mass (m) presents itself with a cross-section area ($A = \pi R^2$) through which the imbalanced flux of M will enact an asymmetric absorption, resulting in a push force of m toward M. [This image describes one side of the interaction only]

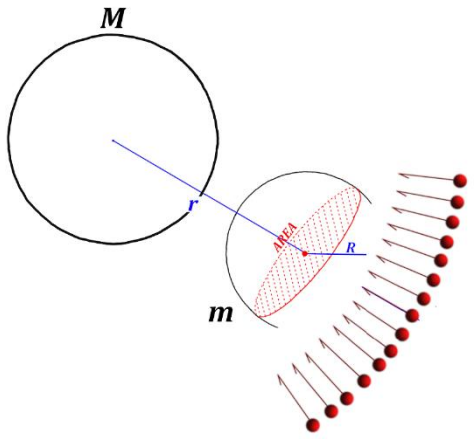



*Figure 7: The red arrows represent the asymmetric aether from mass M only. From the vantage point of mass M, mass m presents to it with a cross-section of surface area: $A = \pi R^2$*

The mean free path of a particle through a sphere[39,40] is equal to:

$$L_{eff} = \frac{4R}{3} \qquad Eq24$$

For this interaction of flux through the mean free path length, across area (A), from [Figure 7], an asymmetric flux is perceived to exist at (m), caused by (M). Mass (m) has radius $R_m$, and density $\rho_m$:

The apparent force on the second mass m is due to a push inward, from the asymmetry around M, taken from [Eq22], and ignoring the component of secondary absorption:

$$F_m = g(r) * L_{eff(m)} * \rho_m \qquad \textit{Eq25}$$
$$= \frac{\mu c^3}{4\pi h} * \frac{M}{r^2} * \pi R_m^2 * \frac{4R_m}{3} * \rho_m$$
$$= \frac{\mu c^3}{4\pi h} * \frac{M}{r^2} * \left(\frac{4\pi R_m^3}{3} * \rho_m\right)$$
$$= \frac{\mu c^3}{4\pi h} * \frac{M}{r^2} * m$$

Which we recognise as the Newtonian force equation $F=GMm/r^2$.

If we were to do this same calculation from the vantage point of the other mass, we get the same equation, with M and m reversed, thus having no effect on the resultant equation. The two masses experience the same force, in opposite directions of course, while still acknowledging that velocity components have been excluded, and relativism need to be considered.

Eq23 shows G as a not-so-constant function of flux transformation, but if we use the agreed value of G from NIST:

$$G = \frac{\mu c^3}{4\pi h} = 6.67 * 10^{-11}\left(\frac{m^3}{kg.s^2}\right) \qquad \textit{Eq26}$$

, with known values of c and h, we can conclude:

$$\mu = \frac{4\pi G h}{c^3} = 2.0626 * 10^{-68}(m^2) \qquad \textit{Eq27}$$

, which came as a mild surprise, is also shown as:

$$\mu = \frac{4\pi G h}{c^3} = 8\pi^2 \ell_P^2\ (m^2) \qquad \textit{Eq28}$$

Where $L_p$ is the Planck length and we appear to have revealed an 'independent-from-G' link to $L_p$ through the new μ of Eq18, albeit still loaded with unknowns.

It also becomes evident now that Newton's equation is a 2-body approximation for 'low' values of G*M, since the term $e^{-\mu px}$ from [Eq9] does not reappear in the equations above but remains simplified. It also needs to be pointed out that this flux absorption/transformation

model is based on ‘standard’ molecular masses and that the model might vary greatly for ‘degenerate’ masses e.g. bare nuclei, neutron stars or black holes. Necessarily, variations in local flux ($Flux_{in}$), or imbalances in local flux, must cause variations in perceived gravity, as further discussed in the next sections.

Here, a note may be inserted to explain the apparent ‘instant action at a distance’ which ensues from Newton’s equation. While the effects of gravity may be compared with the effects of a static field, it has already been established that changes in gravity move at the speed of light[34-36], yet Newton’s equations (with a raw G) does not seem to rely on the speed of light. It is as if the mass and its surrounding ‘static’ field already ‘knows’ where the other mass is.

Understanding now, the asymmetry created by the absorption/transformation of primordial flux, at the speed of light, takes the mysticism out of this effect. A mass can establish an asymmetric flux field over time ‘t’ and distance ‘ct’ without the nearby presence of another mass. When other masses approach, it seems as if there is an instant gravity between the objects. The masses are moving into each other’s asymmetric fields, *which is already there*, and being updated radially outward from the mass at ‘c’, hence the apparent instant action. Even where gravitational aberration is expected, where the masses have a relative velocity to each other, it has been shown that aberration is cancelled by velocity components[24,25]. Notwithstanding the above explanation, it is still necessary to extend this work in future to include relativism and a proper notation involving tensors or gradient vectors.

## Extended Newtonian equation including exponential decay

We revisit Eq12, restated here for clarity:

$$I_{a(vol)} = I_0 A \left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right) \qquad \textit{Eq29}$$

Which we now work on without simplifying the exponential, starting by multiplying by 1:

$$I_{a(vol)} = I_0 A \left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right) * \frac{\left(\frac{\mu}{\rho}\right)\rho X}{\left(\frac{\mu}{\rho}\right)\rho X} \qquad \textit{Eq30}$$

And rewriting to:

$$I_{a(vol)} = \frac{\left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right)}{\left(\frac{\mu}{\rho}\right)\rho X} * I_0 \left(\frac{\mu}{\rho}\right)\rho X A \qquad \textit{Eq31}$$

We recognise the right-hand part of this equation from Eq15, and we thus repeat the steps of the previous derivation, without use of the Taylor simplification, to this concluded equation:

$$G = \frac{\left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right)}{\left(\frac{\mu}{\rho}\right)\rho X} * \frac{\mu c^3}{4\pi h} \; in \; [\frac{m^3}{kg \; s^2}] \qquad \textit{Eq32}$$

Of which the right-hand side is the same as Eq23 and we label the left-hand side as the anomaly factor:

$$Z_X = \frac{\left(1 - e^{\left[-\left(\frac{\mu}{\rho}\right)\rho X\right]}\right)}{\left(\frac{\mu}{\rho}\right)\rho X} \; in \; [unitless] \qquad \textit{Eq33}$$

Analysing Eq33: The variables (μ/ρ)ρX include the original μ/ρ, ρ for material density (typically related to μ/ρ) and X being the linear path of decay (e.g. diameter of earth, sol, football, etc).

The implications of this anomaly factor are discussed in Addendum A.

## Conclusion

Our main conclusions of this paper must be that we have a convincing argument that Fatio and Le Sage's pushgravity is real, and even more profound that a dynamic aether must exist. We derived an equation for G, the gravitational 'constant', from first principles. Substituting G in General Relativity or Newton's equations appears at first glance to provide solutions to currently known cosmic anomalies such as Sun vs. Mercury, galactic rotation curves, black holes, the event horizon problem of the observable universe, and the Hubble tension. This puts constraints on the need for Dark Matter, Dark Energy, and the expansion of the observable universe.

The derivation of G shows it to be related to the Planck length. It is now evident that G may not be an absolute constant, with variances in cosmic scenarios envisaged. With the inclusion the photon-pair wavelength 'λ' and Planck constant 'h' in the derivation of G, it opens the way toward finding a quantised solution for gravity, and further research into the workings of the aether.

A conceptual analysis has been presented in motivation for space as a dynamic aether of the photon-pairs of Grahn, Annila and Kolehmainen, to which matter is mostly transparent, from which equations of mass, energy, and the mechanics of gravity were derived. Inertial

and gravitational mass has been unified, and incorporated into the ZPF, or dynamic aether, with supported documents and equations from Rueda and Haisch.

## Final thoughts.

Analogy: Compare the aether to a river that flows toward us from as far as we can see. It must be coming from beyond our view, but we cannot see the source. We may bend down here and test the strength of the river flow, surmising at first that it seems just as strong here as it is in the distance. But if we look upriver, we notice there are a multitude of pumps extracting water, calculated as so much that we should be receiving very little water from that distant source. Yet it is not so. The river flows here as strong as it seems to be everywhere else upriver. Further testing shows us that not all our water comes from that distant source, in fact only a tiny fraction comes from the horizon, which means there must be other tributaries that flow into the river, that we have not noticed before.

This analogy attempts to explain our horizon problem, which leads to our confounding conclusion that the aether flux must be replenished from within the visible universe, in a Machian sort of way, except unlikely from ‘all stars’. Possibly from other known structures with yet unknown functions.

## Acknowledgements and affiliations:

The author has no affiliation to any academic institution and has not received sponsorships toward its production.

Thank you Carmen for your love and patience.

Special thanks for critical analysis goes to Louis Marmet, Matt Edwards, Han de Bruijn, and the other members of ACG, A Cosmology Group.

## References:


1. Sage, G.-L. Le (1784), 'Lucrèce Newtonien', Mémoires de l'Académie Royale des Sciences et Belles Lettres de Berlin: 404–432,
2. Andreas Kleinert (2002), Pushing Gravity: New Perspectives on Le Sage's Theory of Gravitation, DOI: 10.1086/376003
3. Hogan, C.J. (1989), 'Mock gravity and cosmic structure', The Astrophysical Journal, 340: 1–10, DOI:10.1086/167981.
4. Edwards, M .R. (2007), 'Photon-Graviton Recycling as Cause of Gravitation' (PDF), Apeiron, 14 (3): 214–233
5. Matthew R. Edwards, (2002), Book: Pushing Gravity: New perspectives on Le Sage's theory of gravitation.
6. WIKI, Website: https://www.wikiwand.com/en/Le_Sage%27s_theory_of_gravitation
7. Barry Mingst and Paul Stowe, 'Deriving Newton's Law from a Le Sage Mechanism', Also within (5) and on website: http://www.tuks.nl/pdf/Reference_Material/Paul_Stowe/Stowe_in_PushingGravity.pdf
8. Danilatos, Gerasimos, (2020), Novel quantitative push gravity theory poised for verification, website: https://doi.org/10.5281/zenodo.3596184
9. Kevin Brown, Historical Assessments of the Fatio-Lesage Theory, website: https://www.mathpages.com/home/kmath209/kmath209.htm
10. Kevin Brown, Lesage's Shadows, website: https://www.mathpages.com/home/kmath131/kmath131.htm
11. Rosamond Woody, Jana McKenney (2016), Fundamental Concepts and Theories of Gravitational Physics, Book: Chapter 11
12. Toir Makhsudovich Radzhabov, Consideration of the Daily Variation of Gravity on the Manifestation of Gravitational Shielding, published by Journal of Geoscience and Environment Protection, Vol.10 No.7, 2022. Website: https://www.scirp.org/journal/paperinformation?paperid=118417
13. Raymond Gallucci, The Allais Effect – Coincidence Between Newtonian and Lesagian Gravity?, Website: https://www.academia.edu/65481036/The_Allais_Effect_Coincidence_Between_Newtonian_and_Lesagian_Gravity
14. M.A.Samokhvalov, A simple physical model of gravity according newton, Website: DOI: 10.13140/RG.2.2.33179.95522
15. Foundations of Science, Poincare's critical Le Sage review - translated, Website: https://en.wikisource.org/wiki/The_Foundations_of_Science/Science_and_Method/Book_3/Chapter_3

16. Frans van Lunteren, Nicolas Fatio de Duillier on the Mechanical Cause of Universal Gravitation, Website: https://www.researchgate.net/publication/46662283_Nicolas_Fatio_de_Duillier_on_the_Mechanical_Cause_of_Universal_Gravitation
17. Paul Stowe, The Kinetic Substrate Model, Website: https://www.academia.edu/144897760/Remembering_a_Forgotten_Past_the_Quest_for_the_Theory_of_Everything_The_Kinetic_Substrate_Model
18. Einstein, A (1916), The Foundation of the General Theory of Relativity, Annalen Phys. 49, 769-822
19. Daniele Faccio (2013), 'Black Holes, With A Twist' - Inaugural Lecture, website: https://www.youtube.com/watch?v=YyMYcqxuZ_I
20. Clifford M. Will, (2014), The Confrontation between General Relativity and Experiment, Living Rev. Relativity, 17 (2014), 4, DOI:10.12942/lrr-2014-4, website: http://www.livingreviews.org/lrr-2014-4
21. Alfonso Rueda and Bernard Haisch, 2005, Gravity and the Quantum Vacuum Inertia Hypothesis, website: https://doi.org/10.48550/arXiv.gr-qc/0504061
22. Zinserling F, (2021) Dynamic Aether – a conceptual speculation, Website: https://www.academia.edu/113905925/Dynamic_aether_a_conceptual_speculation
23. Masud Mansuripur, (2004), Radiation pressure and the linear momentum of the electromagnetic field, website: https://arxiv.org/ftp/arxiv/papers/1312/1312.3259.pdf
24. Robert N. C. Pfeifer, Timo A. Nieminen, Norman R. Heckenberg, Halina Rubinsztein-Dunlop, (Oct 2007), Momentum of an electromagnetic wave in dielectric media, website: https://arxiv.org/abs/0710.0461
25. Patrick Grahn, Arto Annila, Erkki Kolehmainen; (March 2018), "On the carrier of inertia", https://doi.org/10.1063/1.5020240
26. Zinserling, F, (2024) The Mechanics of Electrostatic Attraction and Repulsion, a Speculative Conceptual Analysis, Website: https://doi.org/10.4236/JAMP.2024.1211234
27. Hendrik Lorentz, (1895), Versuch einer Theorie der electrischen und optischen Erscheinungen in bewegten Körper, translation available on website: https://en.wikisource.org/wiki/Translation:Attempt_of_a_Theory_of_Electrical_and_Optical_Phenomena_in_Moving_Bodies
28. NIST, (2014), Newtonian Constant of Gravitation, website: https://www.nist.gov/system/files/documents/pml/div684/fcdc/Newtonian-Constant-proposal-2.pdf and https://www.nist.gov/publications/measurements-newtonian-constant-gravitation-g

29. C. Rothleitner and S. Schlamminger, (2017), Measurements of the Newtonian constant of gravitation, G, website: https://aip.scitation.org/doi/10.1063/1.4994619
30. Stephan Schlamminger, (date), Why is it so difficult to measure the gravitational constant?, website: https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=921014
31. Junfei Wu et al, (2019), Progress in Precise Measurements of the Gravitational Constant, website: https://onlinelibrary.wiley.com/doi/full/10.1002/andp.201900013
32. J.Y. Cruz et al, (1991), A Test of Newton's Inverse Square Law of Gravitation Using the 300-m Tower at Erie, Colorado, website: https://www.researchgate.net/publication/248793354_A_Test_of_Newton's_Inverse_Square_Law_of_Gravitation_Using_the_300-m_Tower_at_Erie_Colorado
33. Jens H Gundlach, (2005), Laboratory tests of gravity, website: https://iopscience.iop.org/article/10.1088/1367-2630/7/1/205/pdf
34. Abbott et al (2017), Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A, website: https://arxiv.org/abs/1710.05834
35. Carlip, S. 2000, “Aberration and the speed of gravity”, Phys. Lett. A, 267, 81–87, website: https://arxiv.org/abs/gr-qc/9909087v2
36. GE Marsh, C. Nissim Sabat, (1999) Physics Letters A 262 (257-260), Website: www.gemarsh.com/wp-content/uploads/SpdGrav-3.pdf
37. Arizona State University, (2000), Mechanism for the Absorption of Light, website: https://www.asu.edu/courses/phs208/patternsbb/PiN/rdg/mechanism/index.html
38. Carl A Carlsson and Gudrun Alm Carlsson, (1996), Basic physics of X-ray imaging, website: https://www.diva-portal.org/smash/get/diva2:276160/FULLTEXT02.pdf
39. Gao, Qiang & Zhang, Yungang & Yu, Jia & Zhang, Zhiguo & Wu, Shaohua & Guo, Wei. (2013). Integrating sphere effective optical path length calibration by gas absorption spectroscopy. Applied Physics B. 114. 10.1007/s00340-013-5521-3, ref 13,16 within, also on website: https://www.researchgate.net/publication/257402157_Integrating_sphere_effective_optical_path_length_calibration_by_gas_absorption_spectroscopy
40. Hodgkinson, Jane & Masiyano, Dackson & Tatam, Ralph. (2009). Using integrating spheres as absorption cells: Path-length distribution and application of Beer's law. Applied optics. 48. 5748-58. 10.1364/AO.48.005748, also on website: https://www.researchgate.net/publication/38025272_Using_integrating_spheres_as_absorption_cells_Path-length_distribution_and_application_of_Beer's_law
41. Majorana, Q. (1920). XLVIII. On gravitation. Theoretical and experimental researches . The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 39(233), 488–504. https://doi.org/10.1080/14786440508636063

42. Qian-shen Wang et. al, 2024, Precise Measurement of Gravity Variations During A Total Solar Eclipse, website: https://arxiv.org/pdf/1003.4947.pdf

# Addendum

## A. Gravitational and cosmic anomalies

Recalling Eq33, the units of μ/ρ [$m^2/kg$], ρ [$kg/m^3$], X [m], all cancel out to 1, making the component $Z_x$ unitless. The values of both ρ and X are predictable for various masses, and since we are not considering subatomic particles here, we can for these analyses below set ρ*x >>0. At the moment μ/ρ, for absorption/transformation of primordial flux, is unknown. For the condition μ/ρ*ρ*x <<1 (since mass shielding and gravitational shielding is not an easily observed effect) means that μ/ρ<<1, even for masses of <1m sizes.

At an estimate we set μ/ρ as low as the graphing function allows, while still retaining some visual definition. Graphs were generated on Desmos.com.

For various examples of μ/ρ, ρ and x we attempt to explain observed cosmic anomalies. We keep it separated here to graphically show results of concept, not to attempt matching known data. The following graphs are scaled on the x-axis to show the ±radius of the object under scrutiny, and object centre at 0. Y-axis scaled from 0-1 show expected variations in G. Most of the numeric choices for μ/ρ, ρ were exaggerated to enable some definition on the graphs. Further analysis with data matching is left for future work.

For each analysis below, two charts are presented. Chart1 shows the gradient of flux absorbed/transformed from the ±R edge of the object (in x-dimension) which drops of from unity to the opposite edge. Strength of gravity at any point would be the difference between the ±curves, and is shown in Chart2. Only for galactic disks is a third chart shown from calculating orbital velocity.

**Earth-sized masses** and smaller where ρ typical ~5 kg/m$^3$ and x ~10$^6$ m

In this weak limit, for μρx << 1, Eq33 reduces to 1 and gravity appears Newtonian. If we use expected values for μ/ρ, ρ and x we get a graph with no visible definition. This is not unexpected else gravitational shielding would be easily detected on earth. In the graph we set a high μ =10$^{-9}$ which leaves some definition on the graphs. As expected it still appears very linear from -R to +R.

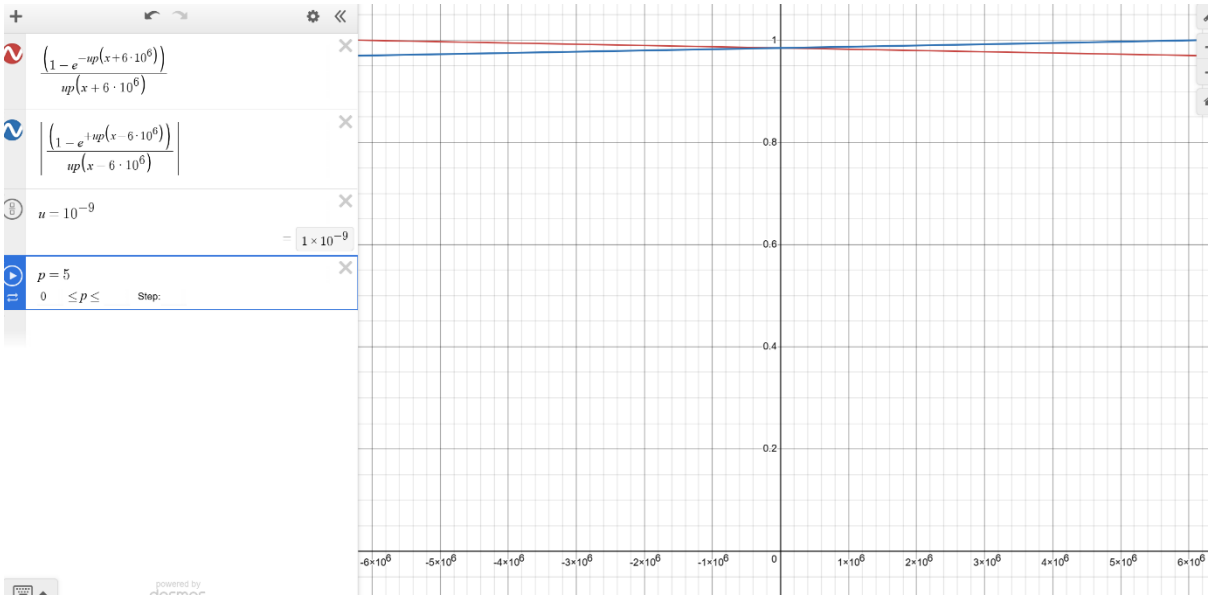



*Figure 8: Earth absorption curves.*

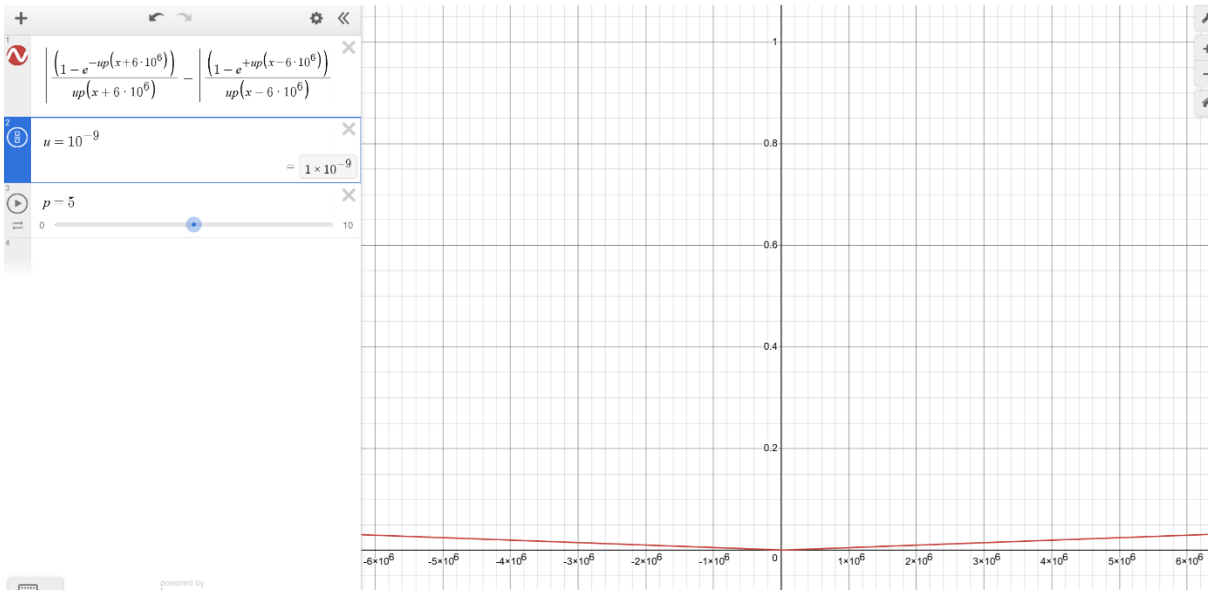



*Figure 9: Earth strength of gravity curve*

**Sun sized masses** where ρ typical ~2 kg/m$^3$ and x in the order of 10$^9$ m

Exponential decay is slightly noticeable. While we used a μ =10$^{-9}$ for earth and a μ =10$^{-11}$ for the sun, these were chosen for visual effect. We do not expect these μ values to be final, and certainly not to differ by that much, but to differ enough to show a gravity anomaly between e.g. Sol vs Mercury. Same size large masses interacting will not immediately appear anomalous though, because even if G varied, the error becomes hidden within G*M by an incorrect mass assumption – for both.

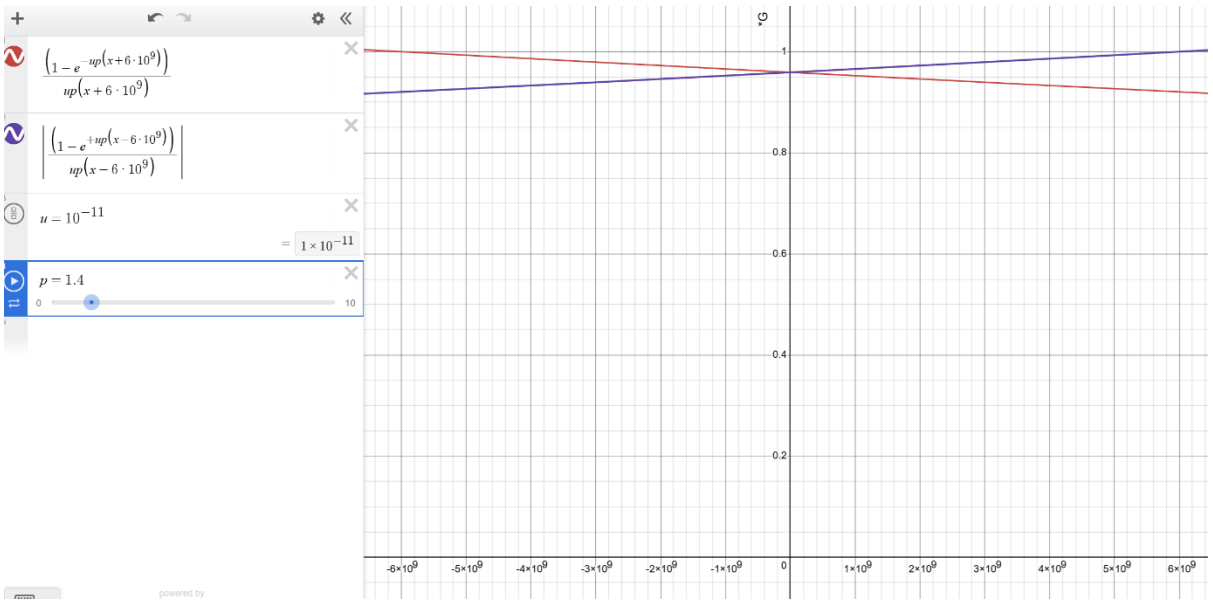



*Figure 10: Sun absorption curves*

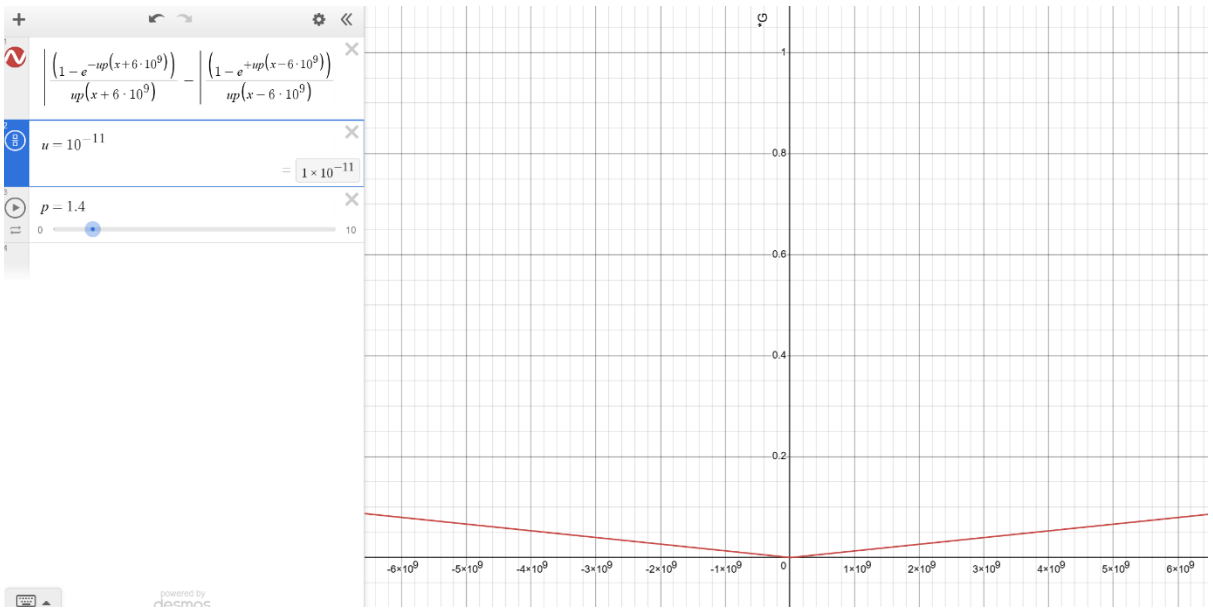



*Figure 11: Sun strength of gravity curve*

**Neutron star**: For very large ρ~ $10^{17}$ kg/$m^3$ such as electron-degenerate matter with smaller than sol diameter x~ $10^4$ m the exponential becomes markedly noticeable (but not reaching zero within this limit of x). We used μ = $10^{-21}$ for effect.

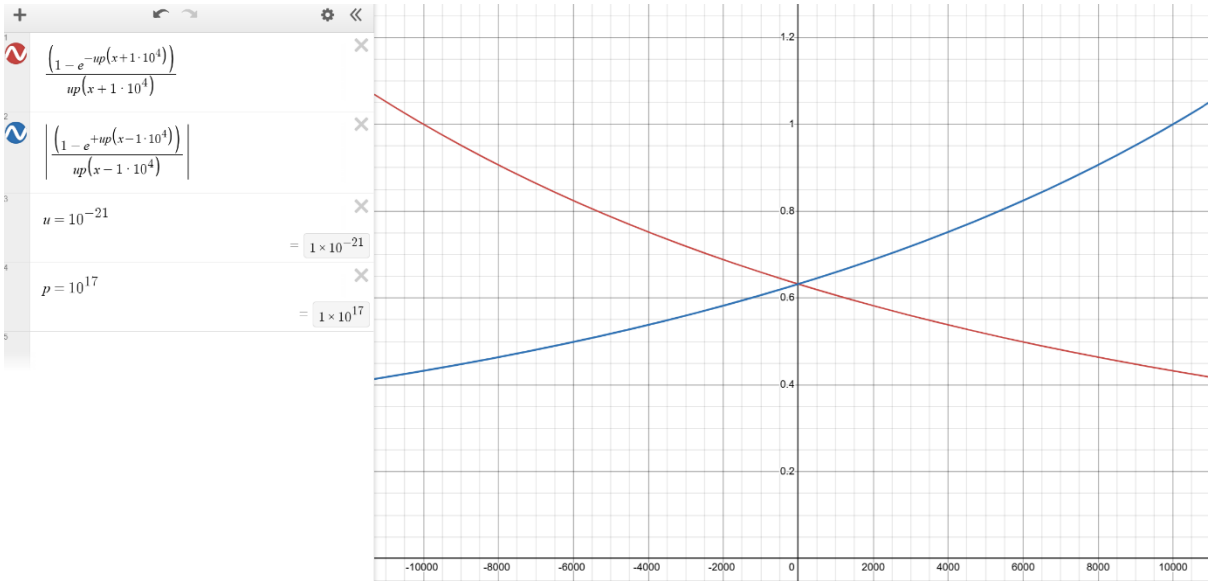



*Figure 12: Neutron star absorption curves*

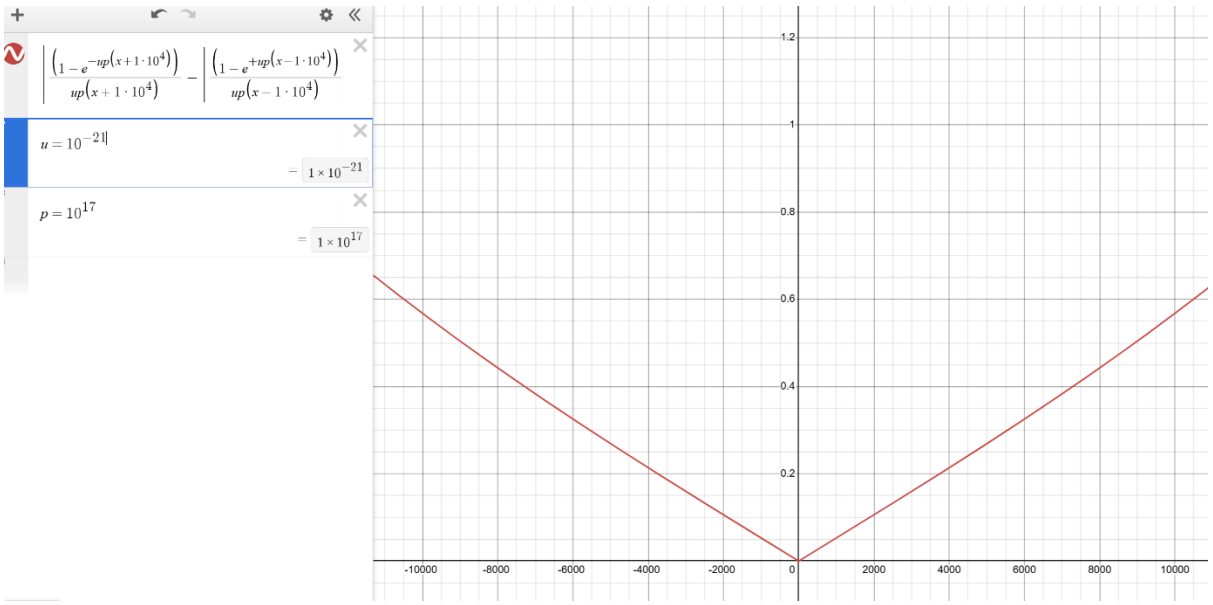



*Figure 13: Neutron star gravity curve*

**Black hole**: An extension of the neutron star example, ρ~ $10^{17}$ kg/$m^3$ for a small x~ $3*10^4$ m dark star but where opacity has reached maximum. Aether transparency is severely reduced since most or all of the inflowing primordial aether is absorbed/transformed in the mass. We chose u=$10^{-20}$ to show definition and concept. At u=$10^{-19}$ definition is lost which shows transparency as severely depleted. Note that for the combined graph the line crosses unity at the radius, where-as for other objects it extended to left and right. Crossing at R for the net effect seems to indicate maximum opacity.

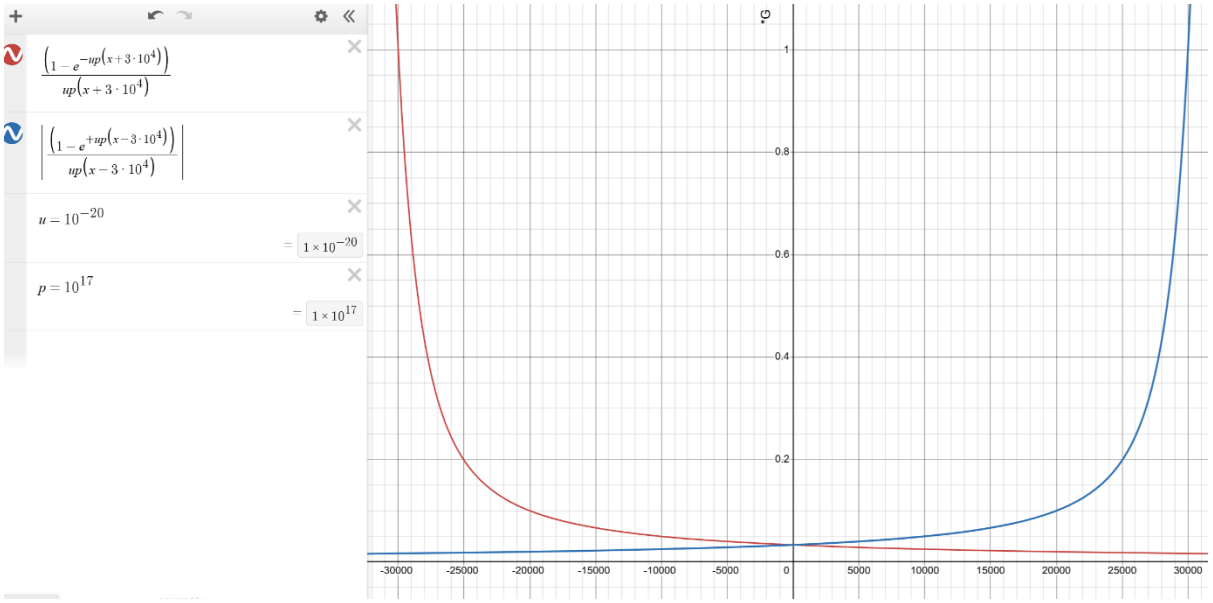



*Figure 14: Black Hole absorption curves*

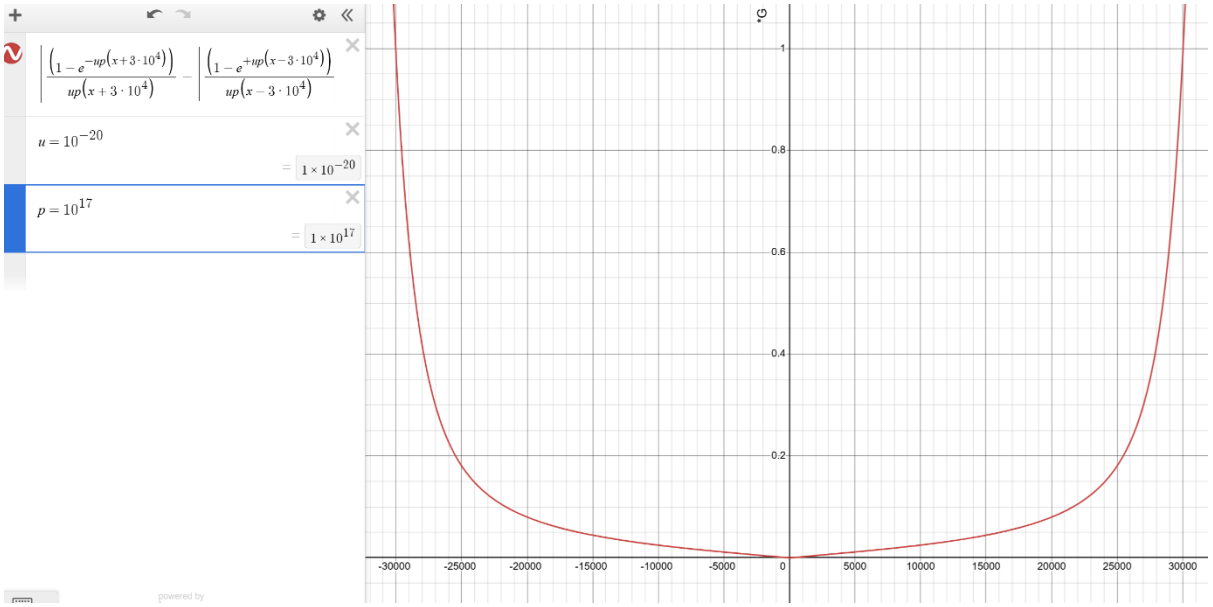



*Figure 15: Black Hole net gravity curve*

**Galactic Disk**: For a small ρ<<1 e.g. galactic disk, and ρ itself decreasing exponentially with respect to r from the centre, and a large x~$10^{17}$ m for the disk.

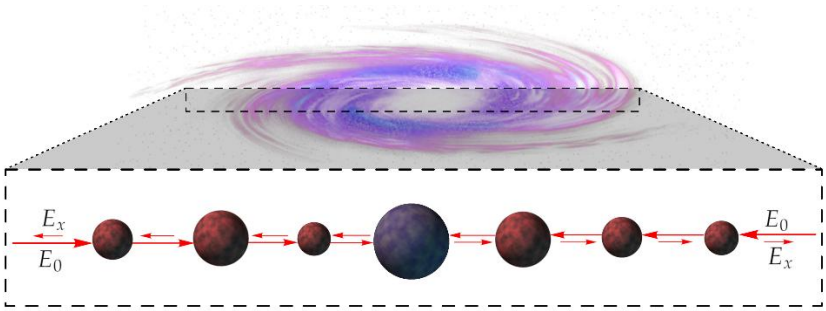



*Figure 16: Representation of flux dilution in a spiral galaxy disk, viewed side-on into the plane of the disk, shows diminishing flux from each side until out the other side.*

Since the disk is diffused but concentrated in a narrow 'disk', we acknowledge additional ±x.(cosθ) aether components must contribute from above and below the disk, and the disk flux cannot be diluted to 'zero' as with a black hole. If there were no ±x components induced, no outward push would exist, and the disk would summarily collapse into the central mass, since the central mass has absorbed 'all' flux in the plane from the centre.

For this type of structure the entire galaxy will appear to have more mass if it is measured in in the plane of the disk, than measured in another orientation. Due to this asymmetry, orbital velocities will be enhanced since inward gravity is the highest at the edges of the disk.

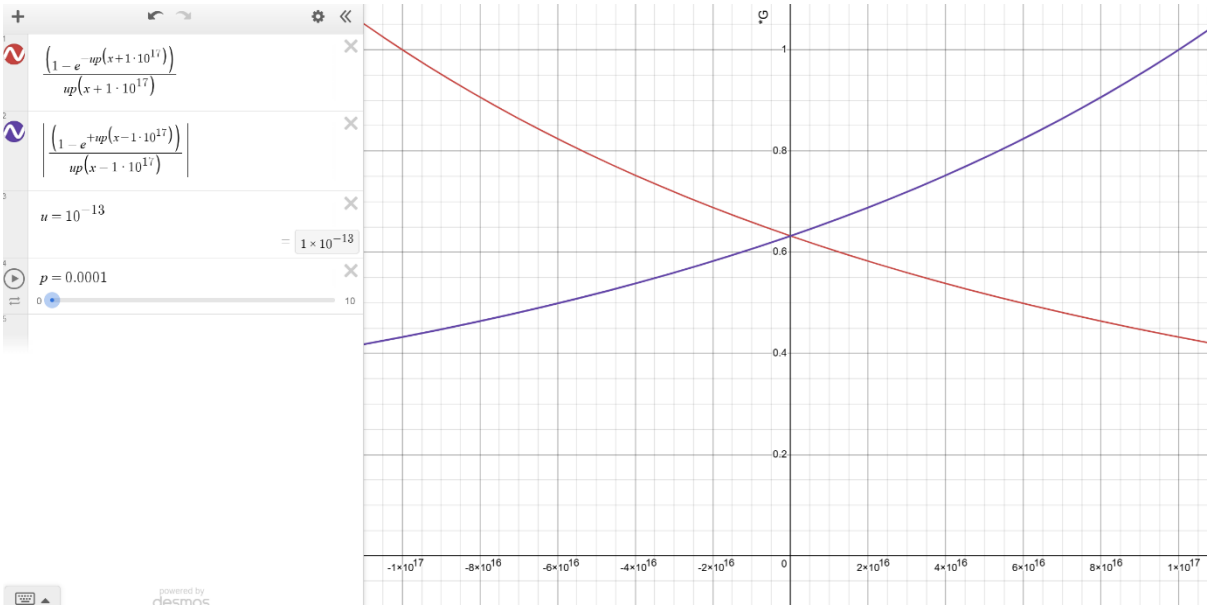



*Figure 17: Galactic disk absorption curves*

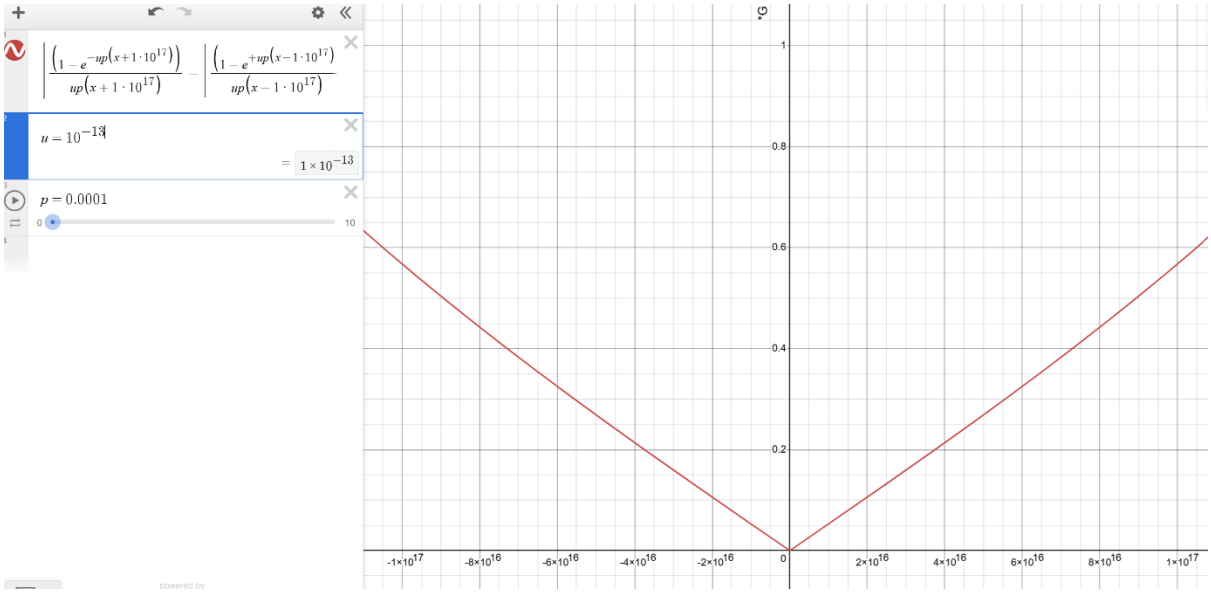


*Figure 18: Galactic disk net gravity curve*

Note how linear the combined effect appears up to R. Divide by ‘r’ up to R but exclude 0, will make the result G/r appear as a constant. From a naive $v^2 = GM/r$ equation we get the curve shown below, which flattens out and appears like observed galactic rotation curves. Influence of the central bulge has not been included, and this solution was applied with $DM_{HALO}=0$ and excluding central mass object. Then from $v^2 = GM/r$ the rotation curve remains as a f(Mass) which is crudely taken as $\sqrt{(1-e^{-px})}$ and orbital velocity looks like the following scaled graph.

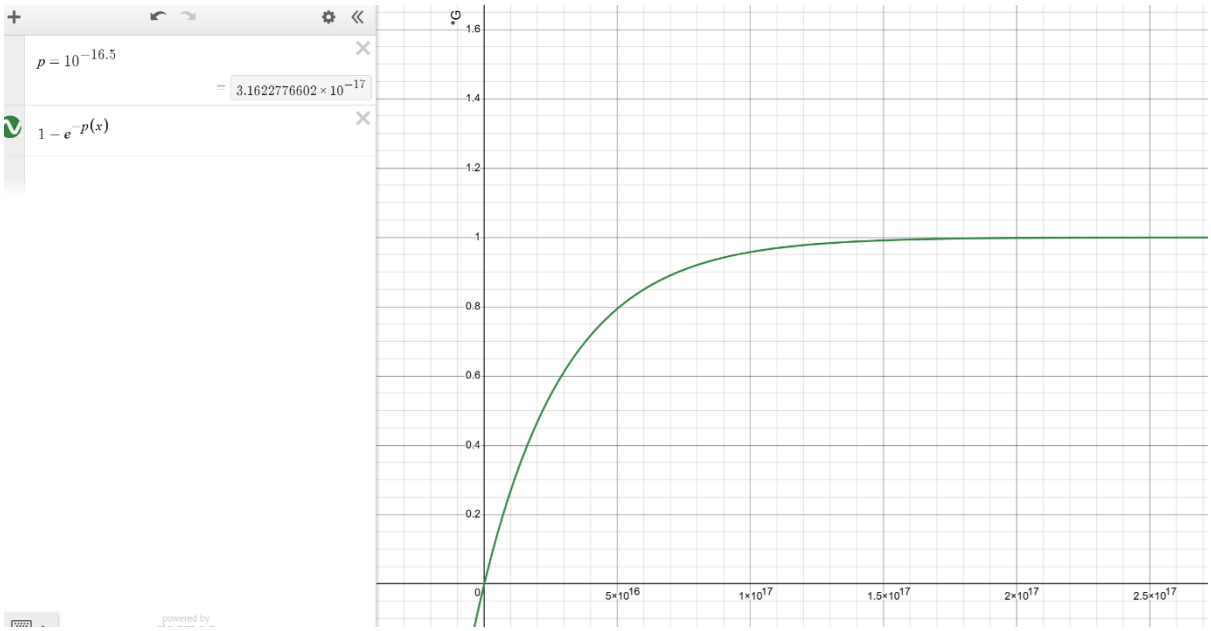
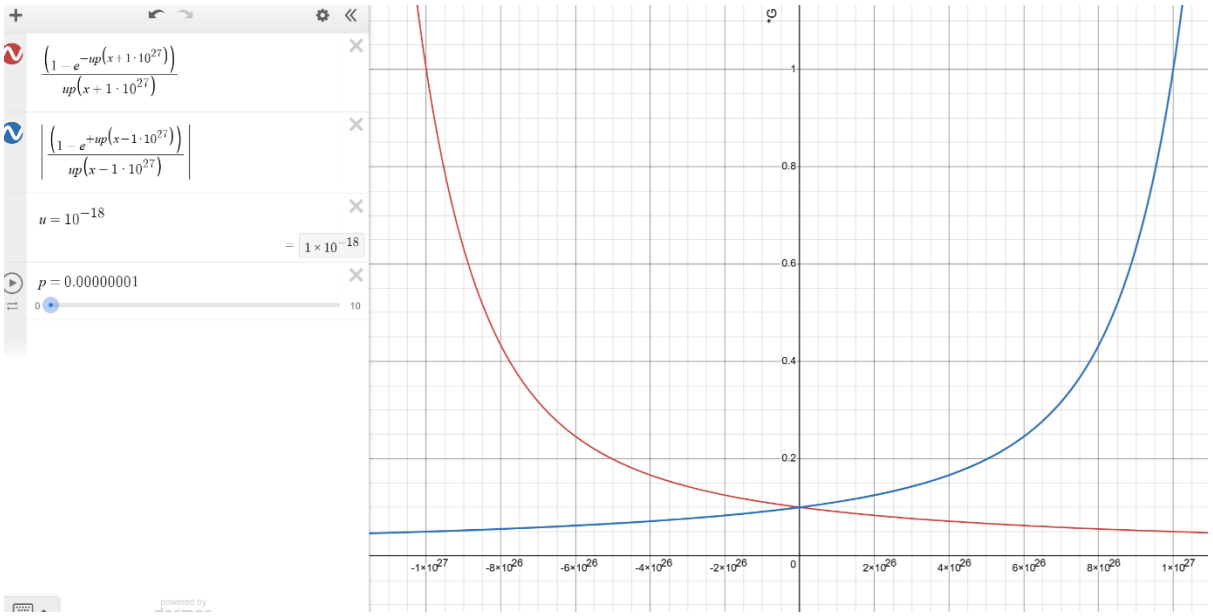
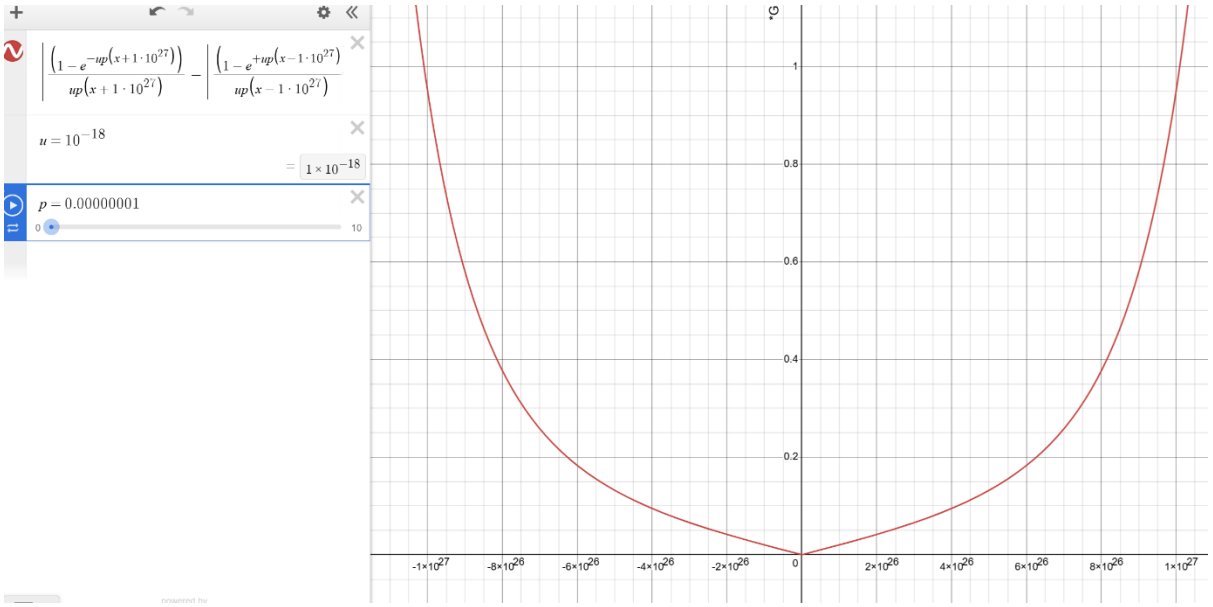


*Figure 19: Calculted orbital velocity curve*

**Cosmologic scale**: Here ρ<<<1 even much smaller than (5) but for a distance x~ $10^{27}$ m gives a noticeable reduction of the flux, making the extreme distance opaque, similar to a black hole viewed from outside. If you look in any direction, you will see the aether locally as weakened from a far-off distance. In the extreme limit you see 'nothing' while locally all appears in order. We conclude what is observed as a weakening of the origin flux is mistaken as velocity component of the observed distant object. Far-away observations are pronounced, compared to (relatively) nearby. 'Very' nearby attenuation effects seem negligible due to ρ<<1, but not, as in (2), (3) and (4) where there is more mass present. This solution puts a constraint on the expansion of the universe and is thus in conflict with standard cosmological models.



## B. The Fatio/Le Sage shadow gravity theory

### Summarising developments from the original Fatio / Le Sage hypothesis

Valid problems have been identified in Fatio/Le Sage type push-gravity theories, and attempts have been made in resolving them. (Also known as Le Sage's Shadow Theory)[1-17].

Authors have attempted revisions of Le Sage, with many successful corrections thereof, and much progress, however not all holistic, and to date these theories have still not been widely accepted. Rosamond Woody and Jana McKenney summarises[11]:

> *Although it is not regarded as a viable theory within the mainstream scientific community, there are occasional attempts to re-habilitate the theory outside the mainstream, including those of Radzievskii and Kagalnikova (1960), Shneiderov (1961), Buonomano and Engels (1976), Adamut (1982), Jaakkola (1996), Tom Van Flandern (1999), and Edwards (2007)*

A great number of these 'problems' stem from at least some misunderstanding of the original push-gravity theories. As 'shadow-gravity', it is sometimes incorrectly understood that gravity must have a 'light-speed or higher' connection between objects of mass and that attraction only ensues when a mutual 'shadow' connection has been established between masses. Conventional definitions of gravity conjure images of 'ropes' or 'strings', or 'loops' or 'gravitons' stretching from one mass to the other. Defining these connections have been troublesome and even more so as is evident from the many failed attempts at explaining push-gravity. This document has shown that such a light-shadow-connection is unnecessary.

Almost every gravitational theory currently suffers from the 'speed of gravity' problem (GR excluded). As an example of this, if an exchange-particle, a 'graviton', left the sun toward earth for purposes of acting as force-carrier, and attracting the earth when it arrives, the orbital speed of the earth would have moved it out of the particle's path in the ~8 minutes it takes the particle to get there, and the particle will find nothing there to attract. Add to that it must not only be intuitive and set a course to interact at the correct future location, but also then return to the sun to effect upon it a full 'graviton exchange'. To correct this idea, to thus 'connect' sun and earth, a successful graviton leaving from the sun would need to already know the velocity vector of the earth, which seems unphysical. It was erroneously thought by many that the only way to overcome this problem, was to assign speeds to gravity much greater than the speed of light.

This document no longer suffers from Le Sage's problems, as are briefly discussed below. The problem statements will not be extensively elaborated in this section; please refer to the

references[1-17] for exceptional reviews of Le Sage, attempts at resolution, and the many problems associated therewith.

Some of the problems encountered by Fatio and Le Sage have by now been overcome by advances in science, but many have remained unsolved. The issues listed below are now believed solved and clarified, either in currently established science, or in this document.

### Porosity of matter

Problem: Leibniz criticized Fatio's theory for demanding empty space between the particles:

Solution: At the time of the writings of Fatio and Le Sage, little was known about the atom; nucleus and electron, as is known today. This problem can be discounted since atoms are now known to be largely ‘empty space’. Furthermore, the premise of this document is that matter is transparent to the flux, like glass is to visible light. The defined primordial photon pairs have great penetration depth, and the absorption/transformation of flux scales with density. Empty space, although present in ‘atoms’, is no longer an essential requirement for this hypothesis. Where ‘empty space’ does become significant, the solution is simply offered with a relation to the density of a volume.

### Superluminal speeds of particles

Problem: Corpuscles had to be sufficiently small as to not have a large cross-section with matter. To compensate, and still transfer sufficient momentum upon interaction, particle velocities had to be raised to speeds greater than the speed of light, aka superluminal speeds.

Solution: In this document the speed of light is the speed of the flux. The flux interacts with mass through coupling and a fraction of flux is absorbed/transformed in mass. The ‘sizes’ of the flux particles are found to be of a Planck length scale.

### Surface area, or volume, not mass

Problem: Flux interaction will interact on a volume, and it is known that gravity is mass dependent, not volume or surface dependent.

Solution: An easy solution for this problem already exists, which knows mass as volume times density, and that the solution must account for both. This document shows that flux travel through a surface area, also needs to account for travel at a normal to the area, through the entire mass, which ends in a measure of volume. By accounting for density ρ into equations, volume is converted to mass. It is intuitive that a higher density will receive more interaction with a permeating flux.

### Gravitational shielding

Problem: If a mass absorbs or transforms flux, it will shield the next mass of some flux, and gravity will be lower on the next mass, and the next mass, and so on.

Solution: Gravitational shielding was perceived to be a big problem for the Fatio/Le Sage theory, and it would have been, given the physical nature of the corpuscles. However, an understanding of the mechanism of gravity now brings evidence that shielding is real, as flux will be absorbed/tranformed and reduced through multiple masses, or through very large masses. It can be observed in e.g. non-uniform gravity in spiral galaxy disks, and the behaviour of ocean tides on earth. Shielding is not a problem, but indeed a foundation and support of this hypothesis. There appears to be supportive evidence that gravitational shielding exists[41,42].

### Speed and Range of gravity, Instant action at a distance,

Problem: Due to the finite speed of gravity, an object should be attracted to its historic 'visible' location, at a distance d=ct. LaPlace calculated that the speed of gravity must be 'at least a hundred million times greater than that of light'. It was not understood how Newton's equations could know 'where the mass is', and how a mass could instantly be attracted over a great distance. It defied the rules of causality and could only be explained by letting the interaction far exceed the speed of light.

Solution: With this flux theory, mass absorbs/transforms flux and creates an asymmetry in flux-in vs flux-out, around every mass. Such imbalance is continuously updated outward at the speed of light and, once in motion, is no longer dependent on its originating mass' position. When another mass encounters the asymmetry, it is *already there*. An action ensues between the mass and the asymmetry, creating an impression of an instant interaction between distant masses.

### Aberration

Problem: Even if gravity is found to propagate at the speed of light (which it has), there is still a finite time for gravitational interactions to occur. The gravitational attraction must point in the direction of a mass' 'visible' (historic) location, which is not its current position, and this offset will create an unstable angular momentum in the system. Since this is not observed, it is argued that classic gravity must propagate at infinite speed.

Solution: In a static solution no aberration is expected. However, to account for velocity components, a relativistic solution is required. This has been done with both a classic Newton[24] and General Relativity[25] solution, with gravitational effects changing at the speed of light, and it has been found that a velocity component of gravity cancels out the expected

aberration. The gravitation vector of a mass in motion points directly at each mass at its current position, and hence no aberration is observed.

### Drag

Problem: Gravity through absorption seems to work fine until bodies start moving, then flux particles will ‘pile up’ on the leading face of a mass and cause noticeable drag, which would decelerate any moving object of mass. Since a drag is not observed in orbiting bodies, this was considered one of the ‘death-blows’ to the corpuscle theories.

Solution: In this theory of particle flux, momentum is transferred from particle to mass, but retrieved after transit through the transparent mass, like photons through glass. In a symmetric flux, even if the mass has ‘velocity’, there is no net transfer of momentum to or from the flux, and thus there is no net drag effect. In an asymmetric flux, as would be in a gravitational field, a constant momentum is transferred, which does not lead to drag effects.

### Energy: Absorption; Thermodynamic problem;

Problem: Given the superluminal speeds of particles mentioned above, most Fatio/Le Sage variations would result in ‘blowing up the earth’ due to scales of absorbed energy. This has been calculated by Maxwell, La Place, Poincare, Feynman and others. It is considered as another ‘deathblow’ problem.

Solution: It is unclear how much of this problem relates to the superluminal speeds, which would clearly have carried huge kinetic energies. However, particles now proposed are not superluminal and this problem is moot. There is however a further argument that gravity would require so much energy that a mass must explode (if energy is coming in) or burn quickly to nothing (if energy is going out of mass). Of course, this is not observed but it must be a problem for every gravitational theory to explain this, including GR’s ‘mass bends space’. This hypothesis agrees that some energies of absorbed particles must ultimately be observed as heat, as is known for Jovian planets to have excess heat. However, with the photon-pair transformation as proposed, the photon-pair changes mode during the interaction, and very little heat is produced.

### Massive bodies absorb flux, Growing earth

Problem: Flux of corpuscles gets absorbed to create the shadow effect. Where do the corpuscles go? No matter how small, Fatio and Le Sages corpuscles needed to be absorbed, or somehow discreetly discarded. Some theories suggested a ‘growing earth’ from these accumulated particles, for which no evidence exists at the scale of expected growth.

Solution: A small fraction of flux is absorbed/transformed, and even from this fraction only a small fraction remains absorbed. All other flux particles that interact would change modes and exit the mass with their original energy intact. Absorbed flux would exit as e.g., heat, decoupled from gravitation effects. No growing earth is predicted.

### Coupling to energy

Problem: The question is, ‘how does push-gravity attract a particle toward a mass?’

This would be the same problem conventional gravitation theories suffer from.

Solution: The ‘how’ question has now been answered. This problem arises from labelling gravity as an ‘attractive’ force when it is shown here-in to be because of a ‘push’ force. The flux interacts with the mass on a local level, and mass disturbs the flux which disturbance spreads out at the speed of light, where it may interact with another mass. This offers an understanding for Einstein’s “mass bends space, and space tells mass how to move”. The flux asymmetry around a mass is the ‘curved space’.

### Particles exit with reduced velocity

Problems: Corpuscles that are not absorbed may have some scattering or refracting interaction with the mass and will eventually lose velocity, thereby no longer contributing to ‘the flux’. Corpuscles with little or no velocity will clog up regions of space.

Solution: The photon pairs proposed here-in arrives at ‘c’ and leaves at ‘c’. Just like visible light through glass. Inside the glass mass traverses at ‘v=c/n’, but exits again at ‘c’. A flux-particle, in a balanced flux, that has not been transformed, does not lose any of its energy. A flux-particle that is transformed changes to a different mode. There is however a ‘loss of primordial aether’ except not lost but modes transformed. This loss can be observed as Hubble effect on the scale of the universe.

### Particles would collide with, and attract each other,

Problem: No matter how small, corpuscles must attract and bounce against each other. A flux of particles that does not annihilate itself is hard to fathom.

Solution: Flux particles as photon pairs are bosons and immune to the effects mentioned.

### Special relativity (SR)

Problem: To maintain a shadow, corpuscles must travel at greater than the speed of light. This is considered a major causality problem.

Solution: The speed of light is a universal limit. This document has shown the local flux to abide by the limit, and any relative movement of a mass in a symmetric flux immediately

creates a relativistic relationship. This model is SR compliant, although general solutions here-in have only been offered for static or low-velocity scenarios. Expanding this model to relativistic cases is a task to be taken and not seen as an insurmountable problem.

### Ultramundane particles, Cosmic radiation, Omnidirectional flux

Problem: Fatio/Le Sage proposed a new ‘ultramundane corpuscle’ as an omnidirectional flux, with origin outside of the universe. Even though Newton was exploring the particle behaviour of light, little was known of photon- or boson-like particles. Fatio and Le Sage required particles with mass (corpuscles) to transfer momentum unto mass.

Solution: A photon-pair aether overcomes this problem since the particle will only transfer momentum while in transit through a transparent medium, then reclaim its momentum at exit, unless it is absorbed/transformed during transit.

The problem of the flux origin has not been overcome but there is a conclusion that some of it must originate from within the visible universe, thereby creating a horizon limit over cosmic distances. The (apparently infinite) source of the flux has not been established but has been ruled out as being of origin from celestial bodies such as stars. It could still be in a Machian sort of way, except not from ‘all stars’. Proposing a source of the flux is one of many tasks at hand. ‘Not knowing’ the origin of the flux does not detract from this hypothesis.