

# Gravitation based on Scalar Fields and Black Holes

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**Abstract.** This paper puts forward the notion that the universe possesses a scalar field similar to that proposed by E.T. Whittaker in which waveforms travel longitudinally. It is proposed that this scalar field forms through black holes, creating both normal transverse EM radiation as well as gravity. This conception of the universe opens up new methods of analyzing the universe and black holes, allows for an increase of the speed limit of light to  $1.14c$  within a black hole, applies parsimonious explanations of dark matter and dark energy, and accounts for theories such as MOND. These conclusions are arrived at on the basis of an original cosmology as well as mathematical representations of universal rudiments and gravity. Newton's gravitational constant is given a range that may be used at long distances.

**Keywords:** Gravity, Entropy, Black Holes, Dark Matter, Dark Energy.

## Introduction

This paper will claim that the universe possesses a scalar field similar to that proposed by E.T. Whittaker in which waveforms travel longitudinally and which creates transverse EM radiation via its genesis in black holes. This allows for an increased speed limit of light and new conceptions of Newton's gravitational constant and dark matter. A method is provided to account for MOND based on a varying  $G$  value and  $G$  field, the values of which are arrived at on the basis of the limits of tetration represented geometrically. This allows for an adjusted Newton's gravitational constant which is given a range of  $0.820G - G$  and is derived from a more general and scaled formulation of Newton's universal gravitation equation. These conclusions are followed by an original cosmology centered around a full account of dark matter and dark energy.

## Usage of Scalar Relations and Tetration for Creating Distributions of Measurement Limiting Values

Without alluding to more complicated scalar fields, a maximum of four scalar quantities may be representable in nature as polar coordinates on a sphere containing a region that is both subtended and angular. Entropy, mass, energy and  $c^2$  are so-related exclusively and can derive physical meaning as a vector field by being represented on a sphere with a conic radius of  $\sqrt{2}$  and thus energy being both subtended and angular. Additionally,  $\sqrt{2}$  is the only number that allows a geometric intermediate such as that described above to create dimensions commensurate with tetration. The limit is  $(\sqrt{2})^2=2$ .

$$\begin{aligned} \lim_{n \rightarrow \infty} x_n : f(c) &= c^2 \\ x_1 &= c, c > 1 \\ x_{n+1} &= c^{x_n}, n > 1 \\ c &= c^2, c = 1 \end{aligned}$$

The universe after the big bang involves natural expansion and cannot be modeled by the above infinitely collapsible scalar sphere. Considering an arbitrary time rate and a middle value between  $\sqrt{2}$  and 2, the subtended value becomes  $\sqrt{3}$ . Any measurement limiting value such as G within a scalar sphere can be multiplied by the conic radius maximum and minimum to ascertain a range of values.

### Calculation of G at Long Distances

The values for MOND discovered by Milgrom [1] could be arrived at using this method. This assumes that the forthcoming cosmology accounts for a mass and space of finite range that has its own G value. G is adjusted over this mass and space range towards a middle value between  $\sqrt{2}$  and 2 - the range of tetration based on an infinitely reducible radius of  $\sqrt{2}$ .

$$\begin{aligned} \sqrt{3} \cdot x &= x^{-\sqrt{3}} \\ \log \sqrt{3} + \log x &= -\sqrt{3} \log x \\ x &= 0.818 \end{aligned}$$

$$p = 0.818mv$$

$$F = 0.818ma = \frac{0.818GMm}{r^2}$$

$$G_r = 5.45606 \times 10^{-11} m^3 kg^{-1} s^2$$

$$\text{Range: } G_r = 5.45606 \times 10^{-11} m^3 kg^{-1} s^2 - 6.6741 \times 10^{-11} m^3 kg^{-1} s^2$$

$$\text{Difference: } 1.214 \times 10^{-11} m^3 kg^{-1} s^2$$

Correction of  $\Delta G$  to correct for the difference. The denominator  $r^2$  reduces to  $r$  at high values in Newton's law of universal gravitation.

## Modelling Space Expansion and Size via Scalar Distributions

It is notable that  $0.819G$ , when made into a ratio with  $1G$  as  $1/0.819$ , provides a value of  $\Delta x = 1.221001$ . As a number in a new mathematical language this would indicate the potential for maximum spread of variability with limited spatial translation. This can be understood as an object not experiencing gravitational force. It is also notable how  $1/0.891$  provides a numerical value of  $\Delta x = 1.122334455667789001$  for the minimum spread of variability. This can be taken as the path of an object in a black hole.  $0.891$  adds with  $0.819$  to equal  $1.71$  and forms the ideal curvature  $\sqrt{3}$  using the curvature equation below that provides maxima. This implies that black holes maintain efficient entropy.

$$a + \sum_{n=1}^{\infty} \frac{f^n a}{n!} (x-a)^n$$

$$a + \sum_{n=1}^{\infty} \frac{f^n a}{n!} (1.13a-a)^n$$

Where  $a$  is the value in question and  $1.13x = x + 0.1x + (\sqrt{3} - \sqrt{2})(0.1)x$

$$1.71 + \sum_{n=1}^{\infty} \frac{f^n 1.71}{n!} ((1.013)(1.71) - 1.71)^n = \sqrt{3}$$

$1.13$  is scalable according to resolution ( $1.013$ ,  $1.0013$ , etc..). The resolutions are each represented by  $0.1$  and in ascending order are the scalar sphere, the choice of  $\sqrt{3}$  for scalar distributions, the addition of a spatial variation range of  $0.819-0.891$  for gravity, the ‘map’ wherein a scaled Newtonian equation is employed and gravitational phenomena occur, the observed universe of classical measurements, and the universe as observed from the speed and wave nature of light.

## Scaled Equation for Newton’s Universal Gravitation

The ideal observed curvature near and within a black hole of  $1/0.891$  approaches the value for  $\sqrt[3]{1-e+\pi}$  which may represent a gravitational bit of information inserted into the universe by a black hole. The cube root refers to the fact that bits of information are cubic for representational purposes as well as for existence in a spatially 3d world. The  $-e$  is the net slowing of time in the universe due to black holes. The  $+\pi$  is the negative volume inserted into the universe (see mechanism).  $1/0.891$  relates to  $\sqrt[3]{1-e+\pi}$  via the curvature equation.

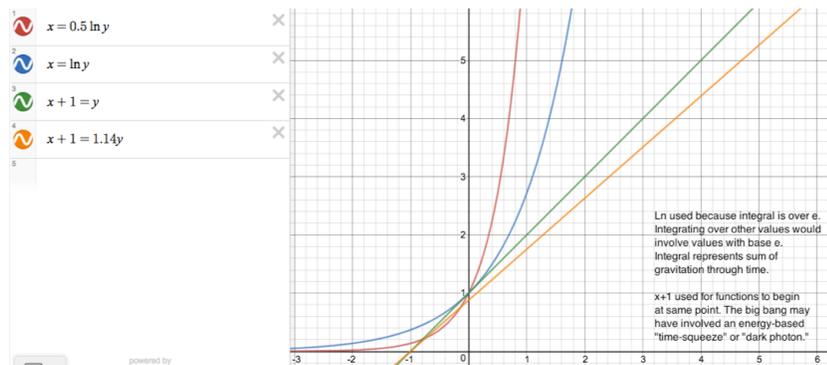
$$(1/0.891) + \sum_{n=1}^{\infty} \frac{f^n (1/0.891)}{n!} ((1.13)(1/0.891) - (1/0.891))^n = (\sqrt[3]{1-e+\pi})^2$$

$\sqrt[3]{1-e+\pi}$  is the maximum range of the curved path at a given point along  $1/0.891$ . It is apparent that in the Newtonian context  $\Delta G$  can be replaced with  $1-e^{1-e}$  and  $e^{1-e}$ , the former being precisely between the logarithmic distribution of  $\sqrt{2}$  and  $2$  and the latter juxtaposing resolution with physical meaning.

$$F_g = \frac{e^{1-e} G^2 m_1 m_2}{r} \int \frac{1}{Gr^2} dr$$

The integral which represents observed gravitation can be integrated from  $\ln e$  to  $e$  to provide the transfer through time from dark energy to gravitation as the present universe was created. This value is presented in units of  $1/m^5 \text{kg} \text{s}^2$  and is definite at  $9.47 \times 10^9$ , representing units of universal expansion coinciding with the age of the creation of earth in years. This indicates the nature of Newtonian gravity as entirely dependent on distance-limited and time-limited observations. It is also commensurate with the idea of momentum transferring to dark energy within a black hole (see cosmology).

The time rate of observable momentum actualized from universal expansion is represented by the indefinite integral rate constant at  $1.498 \times 10^{10}$ . This coincides with half the speed of light when scaled by 0.01. The time rate is important considering that while observations are limited to  $c$  as the speed limit with a constant speed, the absolute speed limit of the universe before the big bang according to a non-arbitrary time frame would be  $\sqrt{2}c$  or  $(e/2)c$ . As will be described in the cosmology section, the bending of light within a black hole described by the curvature equation bends  $c$  towards  $\sqrt{2}c$  via the curvature equation that equates to  $1.14c$ . The difference between  $c-1.14c$  and  $c-\sqrt{2}c$  is commensurate with doubling the limit of  $0.5 \ln y$  towards that of  $\ln y$  as shown in Figure 1.



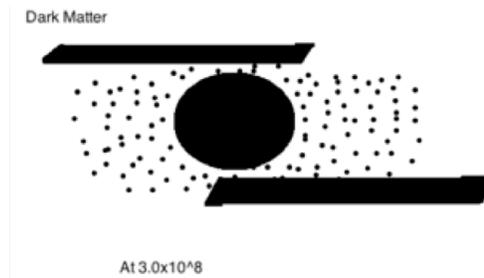
Red: Slope at a point is theoretical maximum speed limit of universe.  
 Blue: Slope at a point is timeframe of maximum gravitational transfer from dark energy.  
 Green: Speed of light. Shifts to orange via curvature equation.  
 Orange: Actual maximum speed limit of universe.

**Figure 1:** Distance vs. Time Graph

## ”Dark Matter” as the Result of A Black Hole-Generated Scalar Field Amidst Large Galactic Masses

This theory has hereunto now appeared as a very basic Brans-Dicke theory. The forthcoming gravitational mechanism in nature would be akin to a Weyl fermion with accompanying fermi arcs, whose temperature is already known to behave like spacetime gravity. It would also be similar to the idea of a scalar field proposed by E.T. Whittaker in 1904. Whittaker claimed waveform perturbations travelling through scalar standing waves longitudinally do so proportionally to local mass-density; there is a local electrostatic scalar potential. Longitudinal propagation allows linear wavefronts to superpose. Two scalar potential functions intersecting at long distances allow for ordinary transverse EM fields to appear.

Following from this, from the point of view of an observer with the energy and speed of a radio wave, a galaxy would appear as three horizontal sheets. The top and bottom of these sheets would represent dark matter while the middle sheet would contain stars and an extremely prominent black hole.



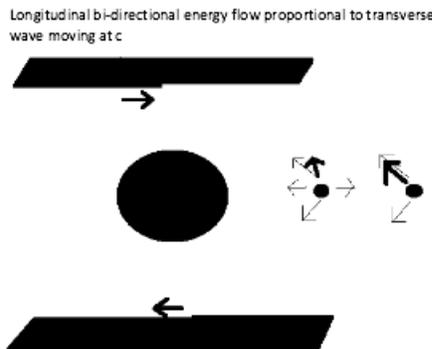
**Figure 2:** ”Dark Matter” at the Speed of Light

Dark matter, seen in Figure 5 as two of three sheets at the speed of light and energy of a radio wave, accrues around galactic masses to prevent spinoff as specified by Richmond [2]. Yet this occurs according to a different set of physical laws. It forms these two sheets when observed at a speed approaching that of light and becomes slower and more diffuse as the observer decelerates. This indicates that dark matter abides by principles within a different dimension: a mass-energy dimension through time, with its own G value, where dark matter is measured in terms proportionally related to the speed of the observer. As will be explained this is ultimately the efficient result of equilibrating the net flow of entropy in response to light and black hole gravitation in the universe.

Matter within a black hole would be composed of many 2\*3 grids of quarks alternating through time between their quark, antiquark and annihilation. Dark matter would involve only one quark alternating randomly and increasingly slowly between its quark and antiquark. Due to the infinitesimally small and

fluid nature of dark matter, the two viewed sheets of dark matter represent all the dark matter in the universe acting together on the individual galaxy. The top layer contains all deleted universal entropy before that moment and the bottom layer contains all potential universal entropy, with a varying time vector incorporated within entropy itself.

An entropic deletion process occurs and is the result of black hole gravitation stripping all rest energy from mass itself. This manifests physically as the fact that universal mass remains constant while approximately 2/3 of universal energy is dark energy as claimed by Ade [3], the result of slowing momentum within a black hole. The gravitational mechanism is displayed in Figure 3 as a bi-directional longitudinally-propagating energy flow with potential superluminal propagation, as proposed by E.T. Whittaker [4].



**Figure 3:** Gravitational Mechanism

## Mechanism: Gravity as Negative Volume

Gravity is a consequence of the existence of light and black holes in a universe that maximizes the rate of entropy as physical processes are undertaken. As primordial stars emitted much high-energy electromagnetic radiation, thus vastly increasing the scope of time and limit of space in the universe, huge entropic dead-ends formed as the stars naturally died out. Black holes counteracted entropic dead-ends by offering a time gateway where mass-energy is stripped of all energy, thus eliminating entropy and reducing the rate of time to zero.

This can be understood from the rudiments of the universe and their relations. Assume that there is, initially, an abstract constant time adjustable only according to the speed and energy of the observer. Assume that the universe contains space, mass and entropy. Assume that a maximized rate of entropy is ideal. Entropy clearly depends on the speed and energy of the observer as well as universal mass/space. As such one can deduce that maximum entropy

is some ratio of mass/space/time rate. The existence of much high-energy electromagnetic energy within a hugely enlarged universe would drastically lower this ratio as space increases without a commensurate mass increase.

Entropy is thus eliminated without disobeying conservation of mass via the black hole's uniform  $dt/dr$  gradient operating irrespective of motion and energy of the object. Consider a vector through space and time as velocity and a vector through mass and energy as entropy. Time varies inversely with velocity and proportionally to energy. In a black hole, however, time (vector) depends solely on space; mass, entropy, and time (scalar) are irrelevant. As an object enters the event horizon, time uniformly and continuously slows with position as mass transfers energy ( $-mass/entropy$ ). A third property – density of the object – is also translated as a uniform  $dt/dr$  gradient forms. In this model a gravitational wave would occur as a disturbance in the collective mass and volume of dark matter (the scalar field) due to the increase (merging black holes) or appearance (merging binary system) of the entropic deletion process.

Gravity in the universe is then the result of the existence of light initially, black holes providing direction, dark energy providing magnitude and dark matter providing pressure. Spacetime might be a heterogeneous and changing temperature gradient. In a black hole time would slow down with position as motion increases and energy decreases until some efficient volume is reached, after which motion would begin to decrease as energy decreases. Electromagnetic radiation would stretch and form a helix, reaching speeds of  $1.14c$ , and begin to acquire a rod-like volume at a position in the black hole dependent on the energy of the radiation. The higher the energy, the later the volume would be acquired. All electromagnetic radiation would acquire a value of  $0.87c$  at the singularity and then stop. One can arrive at these speeds by removing the spacetime metric tensor within black holes past the Cauchy horizon or using the curvature equation.

## Conclusion

From these ideas combined, one can formulate the following theory:

I. There are four dimensions within a thermodynamically-processed quantum universe

1 – A point in space infinitesimally small. It is found in nature as dark matter in all resolutions.

2 – The inertial frame, which moves alongside the point according to a time scale that becomes relative to both energy and motion.

3 – The three spatial dimensions that affect the inertial frame.

4 – Entropy – both scalar (through time) and vector (through space).

II. Within this framework, curvature in observable space via a  $dt/dr$  gradi-

ent can be mediated via a scalar true value. This provides a mathematical solution to MOND and a broad mathematical overview for universal expansion. A scalar bit with a range of spatial variation between 0.819–0.891 can be envisioned while information is transferred at 3600/50 arcseconds (50c being the information transfer limit).

III. Utilizing  $e$  as a factor of universal expansion, one can formulate a more general Newtonian Equation of Universal Gravitation for the most basic spatial variation.

IV. This is made possible via a black hole-generated scalar field that propagates longitudinally and bidirectionally, as proposed by Whittaker in 1904.

## References

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