An attempt to a binomial reformulation of relativistic kinetic energy, relativistic gravity including an approach to the expansion of the universe using no other constants than c an G and a binomial formulation of the double-slit experiment, Bell's inequality and Heisenberg's uncertainty.

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Abstract

Knowledge comes to us through observations. This is in its basic form a binary process. The neurophysiological equivalent is the action potential, which can be facilitated or inhibited, recursive and summated but still a binary process.
This article tries to reformulate relativistic gravity and kinetic energy to fit the binomial model. With the function *f(x)=(1/x)* and the inverse of the derivative of the Lorentz transformation, both Einsteinian kinetic energy and relativistic gravity can be computed with correct values. With the constants *c* and *G*, it is possible to construct a version of postnewtonian relativistic gravity, consistent with basic parts of Einstein's theory, but also suggesting a calculation of the expanding universe, deduction of a correct value of the Hubble constant, with no other constants involved than *c* and *G*. The binomial model with covariance/correlation is discussed and then tried in a formulation of the double-slit experiment, Bell's inequality and Heisenberg's uncertainty. In this variance is what describes potential of observation, which is often the case for the action potential in neurophysiology.
Finally an attempt is made to fit the reformulation of kinetic energy and gravity in the binomial model.

Introduction

This paper works with the idea that the formulations of physics are a just systematization of observations and the likeliness of them, and is not primarily focused on building a model of reality. Observation is a binary process, we observe or we do not. The binomial model is a description of this, allowing a quantized distribution, a poisson distribution and normal distribution depending on the size of population and covarians/correlation. An attempt is made to reformulate Einstein's equation for kinetic energy E_k to a function for “potential for observation” which is the inversion of f(x)=1/x, minus a function for “basal potential for observation”, derived from the inversion of the derivative of the Lorentz transformation.
This function of potential observation can then be used in a 1/x formulation of postnewtonian gravity that can accurately predict the increased gravity for objects in orbit around the sun, including doubled gravity of photons passing the sun. This formulation can also be used to compute the expansion of the universe including correct values of zero-gravity corresponding to a stationary state R_{stat} (2.992278*10^{18}

,when acceleration from gravity-acceleration of expansion = 0) and a value of a Hubble constant (2.22575*10^{-18}/s).
Since “potential of observation” is dimensionless, some adjustments of this are made.

In the following we use the binomial model with correlation to formulate variants of the double-slit experiment, Bell's inequality and Heisenberg's uncertainty. In this variance is equal to the “potential of observation”, which bears similarities to the neurophysiological situation where large variances in cooperating neurons is a main factor in eliciting action potentials.

Finally a synthesis is tried with reformulation of kinetic energy and gravity in a binomial model.

Kinetic energy

Newtonian kinetic energy can be defined from a 1/v function of "potential for observation”, for lack of better vocabulary. The longer between observations the more energy is required to compensate for falling potential. This compensation is v and the kinetic energy is the integral of the compensation: $v^2/2$.
The same maneuver for Einsteinian E_k means taking the Lorentz transformation, differentiate it in respect to v, taking the inverse and factorizing out 1/v. Below is the factorized inverse of the derivative of the Lorentz transformation, where also the factor c^2 has been excluded and treated as implicit in mass(temporally put back later in equation E_3).

Inverse of derivative:

$$\frac{c^2\left(1-\frac{v^2}{c^2}\right)^{1.5}}{v}$$

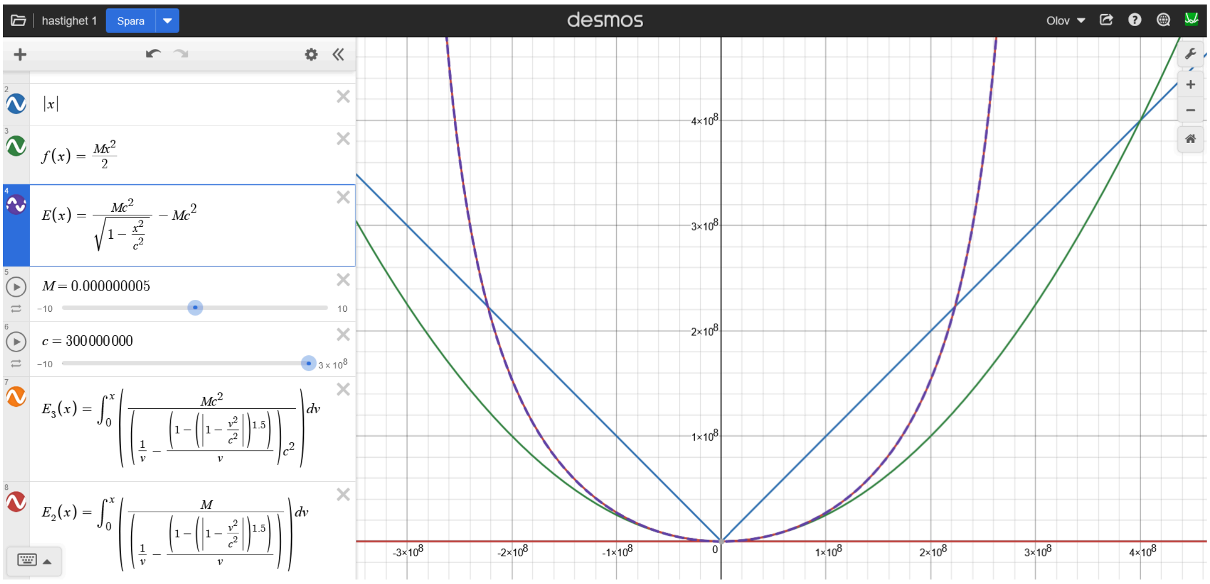
Inverse derivative with 1/v factorized out, factor c^2excluded:

$$\frac{\left(1-\left|1-\frac{(v)^2}{c^2}\right|^{1.5}\right)}{v}$$

The complete expression:

$$\left(\frac{1}{v} - \frac{\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)}{v}\right)$$

The integrals are below: (Desmos)



$|x|$

$f(x)=\frac{Mx^2}{2}$

$E(x)=\frac{Mc^2}{\sqrt{1-\frac{x^2}{c^2}}}-Mc^2$

$M=0.000000005$

$c=300000000$

$E_3(x)=\int_0^x\left(\frac{Mc^2}{\left(\frac{1}{v}-\frac{\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)}{v}\right)c^2}\right)dv$

$E_2(x)=\int_0^x\left(\frac{M}{\left(\frac{1}{v}-\frac{\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)}{v}\right)}\right)dv$

So $E_2(x)$ and $E_3(x)$ integrals over x are equal to E(x).

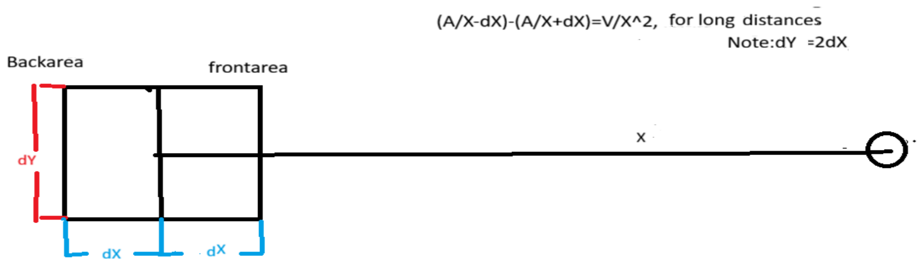
The reason for this “shuffling” of figures is to obtain a “base potential for observation” relating to speed=

$$\frac{\left(1-\left|1-\frac{(v)^2}{c^2}\right|^{1.5}\right)}{v}$$

Thus in the case of velocity, “base potential” is treated like “noise” for observation, to be subtracted from “signal”.
Further on we will use this base potential for gravitation.

Gravity

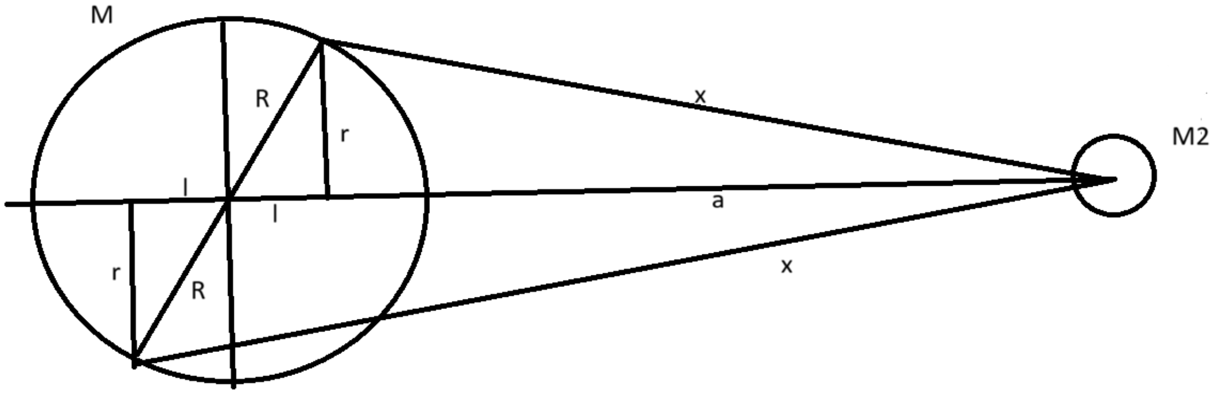
To continue we need an 1/x based gravity function. To accomplish this we look to surfaces instead of centers of mass. A simplified view of this that will suffice approximately on large distances is for example a cube or cylinder, with the same volume as a sphere.



In the case of cylinder $\Pi R^2/(x - \Delta x)$-$\Pi R^2/(x + \Delta x)$ will be very close if Δx is defined as :

Δx=$- 3x + \sqrt{9x^4 + 16x^2r^2}$ derived from $\Pi R^2/(x - \Delta x)$-$\Pi R^2/(x + \Delta x)$=$4\Pi R^3/3x^2$.

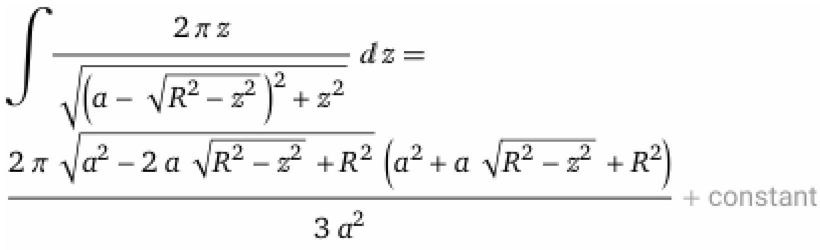
In the case of a sphere:



$Sum\ of\ \Delta area(ie\ circumference)/distance(x)\ -\ sum\ of\ \Delta backarea(ie\ circumference/distance(x$

$= \int_0^R 2\Pi r/\sqrt{(a-\sqrt{R^2-r^2}\ )^2+r^2}$ - $\int_0^R 2\Pi r/\sqrt{(a+\sqrt{R^2-r^2})^2+r^2}$,

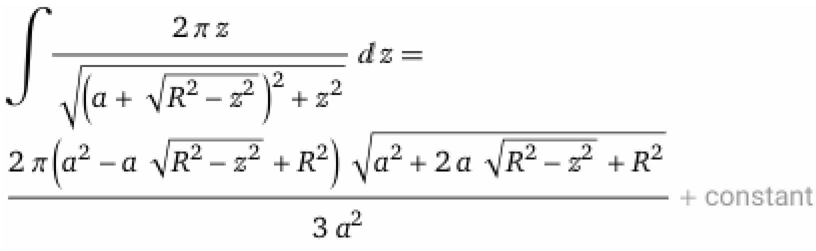
This is equal with $4\Pi R^3/3a^2$=V/a^2.
If multiplying with another mass, you have to multiply the product with a^2(M/a^2* m/a^2) to achieve Mm/a^2.
This can also be shown by finding the primitive functions with the same interval R to 0 and subtracting front from back:



$$\int \frac{2\pi z}{\sqrt{\left(a-\sqrt{R^2-z^2}\right)^2+z^2}}\,dz = \frac{2\pi\sqrt{a^2-2a\sqrt{R^2-z^2}+R^2}\left(a^2+a\sqrt{R^2-z^2}+R^2\right)}{3a^2} + \text{constant}$$

front R→ 0 (Wolfram)

minus



$$\int \frac{2\pi z}{\sqrt{\left(a+\sqrt{R^2-z^2}\right)^2+z^2}}\,dz = \frac{2\pi\left(a^2-a\sqrt{R^2-z^2}+R^2\right)\sqrt{a^2+2a\sqrt{R^2-z^2}+R^2}}{3a^2} + \text{constant}$$

back R→ 0 (Wolfram)

Simplification of this will give

$4\Pi R^3/3a^2.\ r = z = integration\ variable,\ see\ picture\ above.$

Now the complete equation will be (“a” has been substituted for x in the following):

$$g_9(x) = Gx^2\left\|\left(\left(\left(\int_0^{r}\frac{p2\pi z}{\sqrt{\left(x-\sqrt{r^2-z^2}\right)^2+z^2}}\,dz\right)-\left(\int_0^{r}\frac{p2\pi z}{\sqrt{\left(x+\sqrt{r^2-z^2}\right)^2+z^2}}\,dz\right)\right)\right)\left(\left(\left(\int_0^{r_7}\frac{p_7 2\pi z}{\sqrt{\left(x-\sqrt{r_7^2-z^2}\right)^2+z^2}}\,dz\right)-\left(\int_0^{r_7}\frac{p_7 2\pi z}{\sqrt{\left(x+\sqrt{r_7^2-z^2}\right)^2+z^2}}\,dz\right)\right)\right)\right|$$

Which is equal to:

$$g(x) = \frac{G\left(\frac{4\pi r^3 p}{3}\right)\left(\frac{4\pi r_7^3 p_7}{3}\right)}{x^2}$$

after simplification.

p = density, not pressure.

Next we proceed with the gravitation formula, using our earlier function for speed:

$$\left(\frac{1}{v} - \frac{\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)}{v}\right)$$

Multiply with 1/t for v→ $s(distance)$ but instead of subtracting “base potential” we make, in the case of gravity, an addition, thus treated like an “enhancement of signal”:

$$\frac{1}{x} + \frac{\left(1 - \left(\left|1 - \frac{v^2}{c^2}\right|\right)^{1.5}\right)}{x}$$

Again substitute x according to figures above x⇒ $\sqrt{(x - \sqrt{R^2 - r^2}\,)^2 + r^2}$

So we now add the results from the two functions of gravity: the function 1/x and the “base potential of gravity”.

Result:

$$o_9 = Gx^2\left(\left(\left(\int_0^r \frac{p2\pi z}{\sqrt{(x-\sqrt{r^2-z^2}\,)^2+z^2}}\,dz\right) - \left(\int_0^r \frac{p2\pi z}{\sqrt{(x+\sqrt{r^2-z^2}\,)^2+z^2}}\,dz\right)\right)\right)\left(\left(\left(\int_0^{r_7} \frac{p_7 2\pi z}{\sqrt{(x-\sqrt{r_7^2-z^2}\,)^2+z^2}}\,dz\right) - \left(\int_0^{r_7} \frac{p_7 2\pi z}{\sqrt{(x+\sqrt{r_7^2-z^2}\,)^2+z^2}}\,dz\right)\right) + \left(\left(\int_0^{r_7} \frac{p_7 2\pi z\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)}{\sqrt{(x-\sqrt{r_7^2-z^2}\,)^2+z^2}}\,dz\right) - \left(\int_0^{r_7} \frac{p_7 2\pi z\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)}{\sqrt{(x+\sqrt{r_7^2-z^2}\,)^2+z^2}}\,dz\right)\right)\right)$$

or:

$$g_9(x) = \frac{G\left(\left(\frac{4\pi r^3 p}{3}\right)\left(\frac{4\pi r_7^3 p_7}{3} + \frac{4\pi r_7^3 p_7}{3} \cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}$$

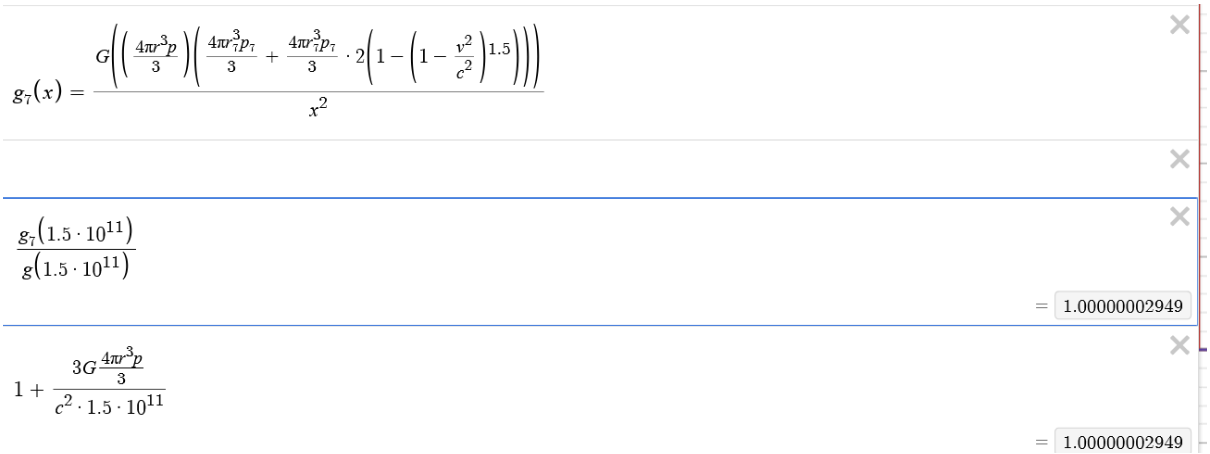
after simplifying and factorization. I am uncertain about the factor 2, but believe it is because $\Delta dY = 2\Delta x$, look at the figure cube/cylinder above. To divide the extra factor on the sun and planet as a reciprocal phenomenon, gives almost identical results.

$$g_7(x) = \frac{G\left(\left(\frac{4\pi r^3 p}{3} + \frac{4\pi r^3 p}{3}\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\left(\frac{4\pi r_7^3 p_7}{3} + \frac{4\pi r_7^3 p_7}{3} \cdot \left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}$$

What we lose with going from integral to primitive function is that O_9 is identical to Newton's formula until x=radius of sphere but goes to 0 when x=0. With g_9 and g_7 the problem with infinite gravity when x=0 occurs.

g_9 gives the same enhancement of “gravity” we see in Einstein's formula with respect to velocity in circular orbit. Comparison to $3GM/c^2x$ as accepted postnewton addition (NSA reference among others)

Earth:
(Desmos)

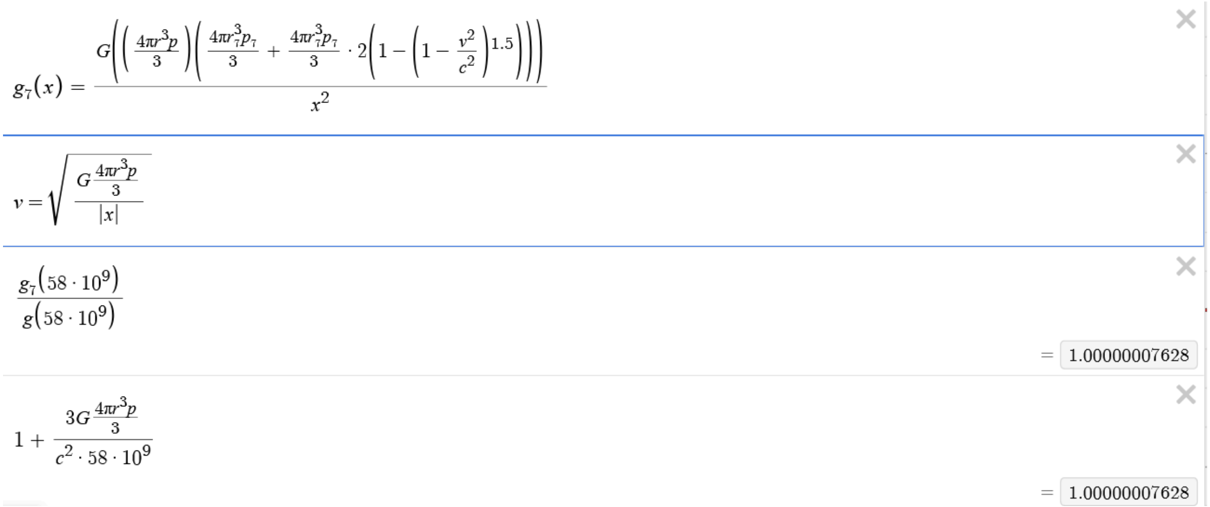


$$g_7(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}\cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}$$

$$\frac{g_7\left(1.5\cdot 10^{11}\right)}{g\left(1.5\cdot 10^{11}\right)}=1.00000002949$$

$$1+\frac{3G\frac{4\pi r^3p}{3}}{c^2\cdot 1.5\cdot 10^{11}}=1.00000002949$$

Mercury.



$$g_7(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}\cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}$$

$$v=\sqrt{\frac{G\frac{4\pi r^3p}{3}}{|x|}}$$

$$\frac{g_7\left(58\cdot 10^{9}\right)}{g\left(58\cdot 10^{9}\right)}=1.00000007628$$

$$1+\frac{3G\frac{4\pi r^3p}{3}}{c^2\cdot 58\cdot 10^{9}}=1.00000007628$$

v= orbit velocity.

For v=c, photons (with no resting mass) we get double gravity, corresponding to double sun lensing compared to Newton. For matter(resting mass)near the speed of light, it seems like it would triple? A higher velocity gives a larger gravitation giving the impression of a larger mass. How would that affect dark matter calculations in particular if other velocities than in orbits are included. Objects far away, moving faster away would have higher gravitation, affecting Hubble values(Hubble tension)? Very speculative though. I do not have the needed calculating skills.

(For an elliptic orbit of Mercury, substitute distance in the equation? (Have not tried) → $a(1 - e^{2})/(1 + ecos(\theta)),\ where\ e = (r\alpha - r\rho)/(r\alpha + r\rho),$
$r\alpha = apoapsis\ and\ r\rho = periapsis.$)

Far from the sun, velocity of orbit goes toward 0.

$$v = \sqrt{\frac{G\frac{4\pi r^{3}p}{3}}{|x|}}$$

From:

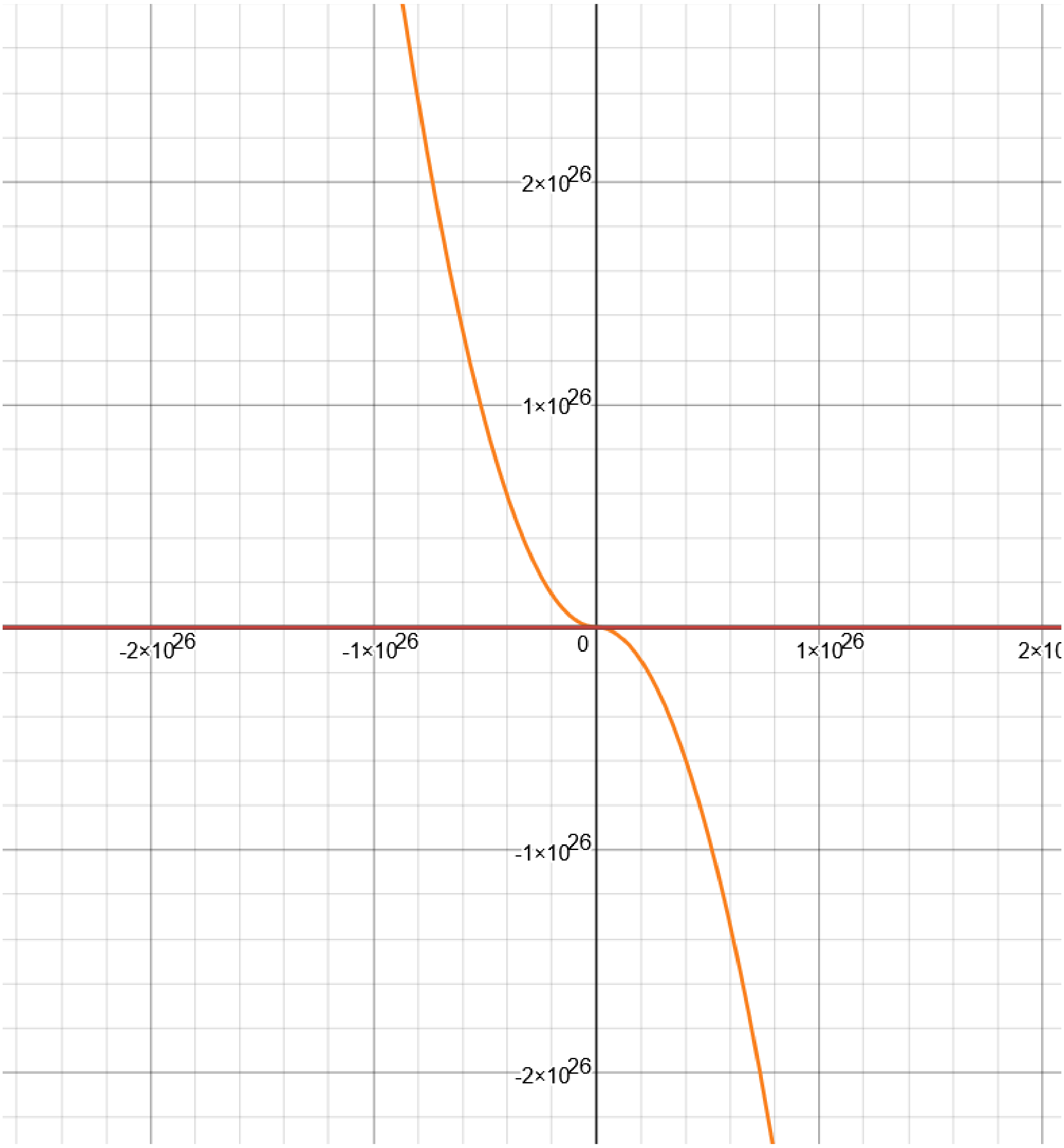
$$\frac{GMm}{x^{2}} = \frac{mv^{2}}{x}$$

To look at far distances we again use the same shape of “base potential of observation” and multiply the remaining v and c again with1/t, for:

$$\frac{\left(1 - \left(\left|1 - \frac{x^{2}}{c_{1}^{2}}\right|\right)^{1.5}\right)}{x}$$

c_1 will in this be $3 * 10^{8}$m, not velocity, constituting a third perspective of “base potential of observation”.

This gives a third part of the function for gravity, or with properties of expansion if you choose that semantic, that grows more negative with distance(below). Note that this part of the function is not multiplied with the mass of the sun, but merely added to follow what happens with the “base potential of observation” in the far distance, not related to speed and when the influence of the sun is negligible (or multiplied with M_{test}, see later): (Desmos):



This function accelerates fast negatively towards $1 * 10^{26}$. However, it does not reach a finite limit.

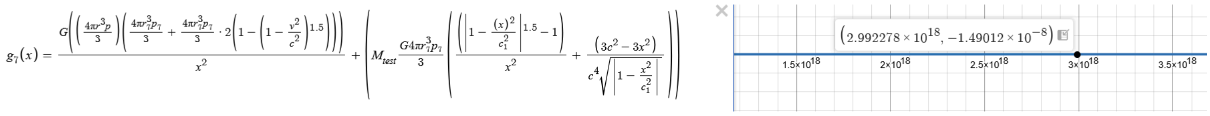
If we add this third function to the equations above:

$$g_9(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)+\left(\frac{G4\pi r_7^3p_7}{3}2\left(1-\left(\left|1-\frac{x^2}{c_1^2}\right|\right)^{1.5}\right)\right)}{x^2}$$

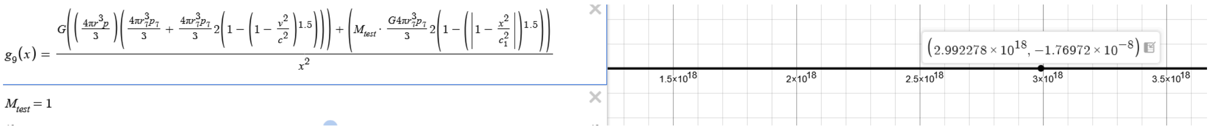
or:

$$g_7(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}\cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}+\left(\frac{G4\pi r_7^3p_7}{3}\left(\frac{\left(\left|1-\frac{(x)^2}{c_1^2}\right|^{1.5}-1\right)}{x^2}+\frac{\left(3c^2-3x^2\right)}{c^4\sqrt{\left|1-\frac{x^2}{c_1^2}\right|}}\right)\right)$$

We will follow the “base potential" for long distances .
g_9 is in analogy of earlier equations, g_7 is the same thought but computed with the derivative of the “base potential” as the constant of the curve at x multiplied with mass.
The complete formula now grows increasingly negative towards distant x.
From this final formula you find 0-gravity at x=
(Wolfram,Desmos)



$$g_7(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}\cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2}+\left(M_{test}\frac{G4\pi r_7^3p_7}{3}\left(\frac{\left(\left|1-\frac{(x)^2}{c_1^2}\right|^{1.5}-1\right)}{x^2}+\frac{\left(3c^2-3x^2\right)}{c^4\sqrt{\left|1-\frac{x^2}{c_1^2}\right|}}\right)\right)$$



$$g_9(x)=\frac{G\left(\left(\frac{4\pi r^3p}{3}\right)\left(\frac{4\pi r_7^3p_7}{3}+\frac{4\pi r_7^3p_7}{3}2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)+\left(M_{test}\cdot\frac{G4\pi r_7^3p_7}{3}2\left(1-\left(\left|1-\frac{x^2}{c_1^2}\right|\right)^{1.5}\right)\right)}{x^2}$$

$M_{test}=1$

R_{stat}=a_e(acceleration of expansion)-a_g(acceleration of gravity)=0

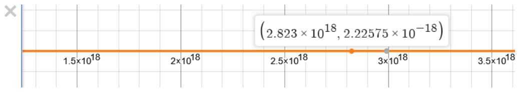
$Rstat: GM/x^2 - H^2x. \Rightarrow x = \sqrt[3]{GM/H^2} = 2.83 * 10^{18} - 3.08 * 10^{18}m$, depending on measurement of H, well in alignment of equations above, and notably without other constants than c and G. This assumes that H is constant or near-constant in time.

Further we can compute a value for the Hubble constant:

$$H=\sqrt{\frac{\left(\frac{-g_7(x)}{\frac{4\pi r_7^3p_7}{3}}+\frac{G4\pi r^3p}{3x^2}\right)}{|x|}}$$

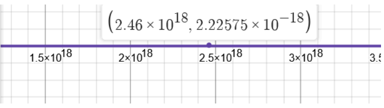
Calculated from $Ftot(g7)/m =- H^2x + GM/x^2$.

$$H=\sqrt{\frac{\left(\frac{-g_{217}(x)}{\frac{4\pi r_7^3 p_7}{3}}+\frac{G4\pi r^3 p}{3x^2}\right)}{|x|}}$$



This is almost the same as:

$$H_1=\sqrt{\frac{-2\left(\left(1-\left(\left|1-\frac{x^2}{c^2}\right|\right)^{1.5}\right)\right)G}{x^3}}$$



if we ignore the second part of function concerning velocity, also well consistent with measurements($2.17 * 10^{-18} - 2.4 * 10^{-18}$).

H_1 has the same value regardless of the value of x from about $1 * 10^{11}$m and distant. . H is constant from $5 * 10^{15}$and distant, decreases to 0 at $5.87 * 10^{14}$ and has no real values closer to zero, if we do not use absolute values. If we keep the velocity-depending second part in H_1 the functions seem identical.

$$H_2=\sqrt{\frac{-2\left(\left(1-\left(\left|1-\frac{x^2}{c^2}\right|\right)^{1.5}\right)\right)G}{x^3}-\frac{G\left(\frac{4\pi r^3 p}{3}\cdot 2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)}{x^3}}$$

The Hubble sphere radius c/H will be 1.34926* 10^{26}m with this Hubble value(c= $3 * 10^8$m). Note that with this computation, if no further factors are included, the Hubble tension can only be explained with a variation of constants c or G between the near and the far universe, or possible effect of triple gravity for objects moving fast away(very speculative).

(For adjusting units in g_9 and g_7 multiplication with a reference mass of 1 kg, mostly to mark the distance, is a variation):

$$g_9(x)=\frac{G\Bigg(\Bigg(\frac{4\pi r^3 p}{3}\Bigg)\Bigg(\frac{4\pi r_7^3 p_7}{3}+\frac{4\pi r_7^3 p_7}{3}2\Bigg(1-\Bigg(1-\frac{v^2}{c^2}\Bigg)^{1.5}\Bigg)\Bigg)\Bigg)\Bigg)+\Bigg(M_{test}\frac{G4\pi r_7^3 p_7}{3}2\Bigg(1-\Bigg(\Bigg|1-\frac{x^2}{c_1^2}\Bigg|\Bigg)^{1.5}\Bigg)\Bigg)}{x^2}$$

$$M_{test}=1$$

Thoughts about Schwarzschild radius etc.

I have some uncertain thoughts about how this relates to Schwarzschild's radius, the photon sphere etc.
I do not know if this is significant or only numerology and coincidental: If $g_7(x)$ describes a summation of relativistic gravity and centrifugal acceleration we can make the equation below

$$g_{7mod}(x): \frac{G\left(\frac{4\pi r^3 p}{3}\cdot\frac{4\pi r_7^3 p_7}{3}\left(1+2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2\frac{4\pi r_7^3 p_7}{3}} = \frac{v^2}{x}$$

Further simplification and solving for x when v=c, will give x=$3GM/c^2$, i.e. photon sphere radius.
Furthermore the same for flight radius:

$$g_{7mod}(x): \frac{G\left(\frac{4\pi r^3 p}{3}\cdot\frac{4\pi r_7^3 p_7}{3}\left(1+2\left(1-\left(1-\frac{v^2}{c^2}\right)^{1.5}\right)\right)\right)}{x^2\frac{4\pi r_7^3 p_7}{3}}x = \frac{1}{2}\,\frac{4\pi r_7^3 p_7}{3}v^2$$

Solving for x when v=c, will give $6GM/c^2$ i.e. smallest stable orbit radius for matter
Finally $GMmx/x^2 = mv^2/2$ (the resting mass part of g7), give in the classical way when v=c, x=$2GM/c^2$= Schwarzschild radius.

Interesting numerology:

Note also that the third addition for gravitation if x=c, gives the expression for Schwarzschild radius, c in this case $3 * 10^8 m$:

$$G\frac{4\pi r_7^3 p_7}{3}\cdot\frac{2\left(1-\left(1-\frac{c^2}{c^2}\right)^{1.5}\right)}{x^2}=\frac{2Gm}{c^2}$$

If we convert by dividing mass, and invert $c^2/2G = 6.7425831585 * 10^{26}$,(mass to radius ratio for a black hole)

which evens out if we add the baseline function

$$b(x)=\frac{\left(1-\left|1-\frac{(x)^2}{c^2}\right|^{1.5}\right)}{x}$$

for b(Hubble sphere radius) we get

$b(1.3492606052 \cdot 10^{26})$

$= -6.7426080768 \times 10^{26}$

Correction for c=2.99792458* $10^8 m$ and G=6.6743015* 10^{-11} and Hubble sphere radius= $1.346895 * 10^{26}$ will give:

$b(1.346895 \cdot 10^{26})$

$= -6.7329497412 \times 10^{26}$

and

$\frac{c^2}{2G}$

$= 6.7329530943 \times 10^{26}$

So the **mass to radius ratio** for a black hole gives the same but negative value as our “base line potential” equation gives for x= Hubble sphere radius.

Binomial model

The binomial model is used to describe the synaptic response from vesicle release, amplitude and probability for action potential.

Definitions:
n=number of release sites
p=probability of release of vesicle
q=quantal amplitude (size of postsynaptic potential/vesicle)
k=number of vesicles

Total synaptic response: **μ**=npq.

P(k)=probability of number of vesicles with impulse:(Desmos)

$$ncr(n,k) = p^{k}(1-p)^{(n-k)}$$

variance=$Ơ^2$=np(1-p), Sd=√(np(1-p))
Variance can also involve q, variance of size of vesicle, np(1-p)q^2+npq^2

Probability of action potential:(desmos)

$$P(actionpotential) = \sum_{k_{treshold}}^{n} ncr(n,k) = p^{k}(1-p)^{(n-k)}$$

The binomial model will go from discrete steps, poisson distribution to normal distribution when np(1-p)>10, or both np and n(1-p)>5.

Excitatory and inhibitory neurons can change thresholds. Recursive feedback can also be inhibitory or excitatory to the same or other neurons.

Covariance and correlation is common between neurons.

Covariance= $\sum(x - \ddot{X})(y - \bar{Y})$/N or /N-1 if Bessel's correction.

Correlation=cov(x,y)/$Ơ_xƠ_y$

Summation of variances Var(x+y)= Var(x)+var(y)+2 cov(x,y).

or: Var(x)+Var(y)+2ρSd(x)*Sd(y)

There are some circumstances when ρ is higher than 1, for example supralinear summation when amplitude from 2 vesicles is more than 2, multivesicular release(clustering) and positive feedback among others. It can be expressed like $(q_{eff}/q_{base})^2$giving seemingly exponential ρ.

If $\sigma^2_x=\sigma^2_y$, $\sigma^2_{tot}=\sigma^2_x+\sigma^2_y+2\rho\sigma_x\sigma_y=2\sigma^2+2\rho\sigma^2=2\sigma^2(1+\rho)$.

Variance of the mean is calculated by dividing the variance with the number of observations. These observations can be of spatial or temporal character or a mixture of both. If these are interchangeable, the system is ergodic, for example, 1000 observations * 1 millisecond equals 1 observation * 1000 ms.

Variance of the mean:
$\sigma^2_{mean}=\sigma^2/N\ +(\sigma^2(N-1)/N)\rho$.

With large N, σ^2/N will go towards =0, and $(\sigma^2(N-1)/N)\rho$ will go towards $=\rho\sigma^2$, which is the "variance floor", i.e. the variance will not go under this value regardless of increasing N.
When variance goes toward 0, for example σ^2/N, if N is very large or if ρ is -1, $\sigma^2_{tot}=\sigma^2_x+\sigma^2_y+2\rho\sigma_x\sigma_y$ will be =0. Normalizing constant will then be infinite $1/\sqrt{(2\pi\sigma^2)}$, i.e towards deltaDirac. In the binomial model Dirac spike for mean value will cause action potential every time if threshold is less than mean and never if threshold is more than mean, so called "binary switch", always on or always off. An observation will also of course cause a collapse of variance and a deltaDirac.

This is the significance of variance. It allows different observations and cooperation between neurons to get a signal through.

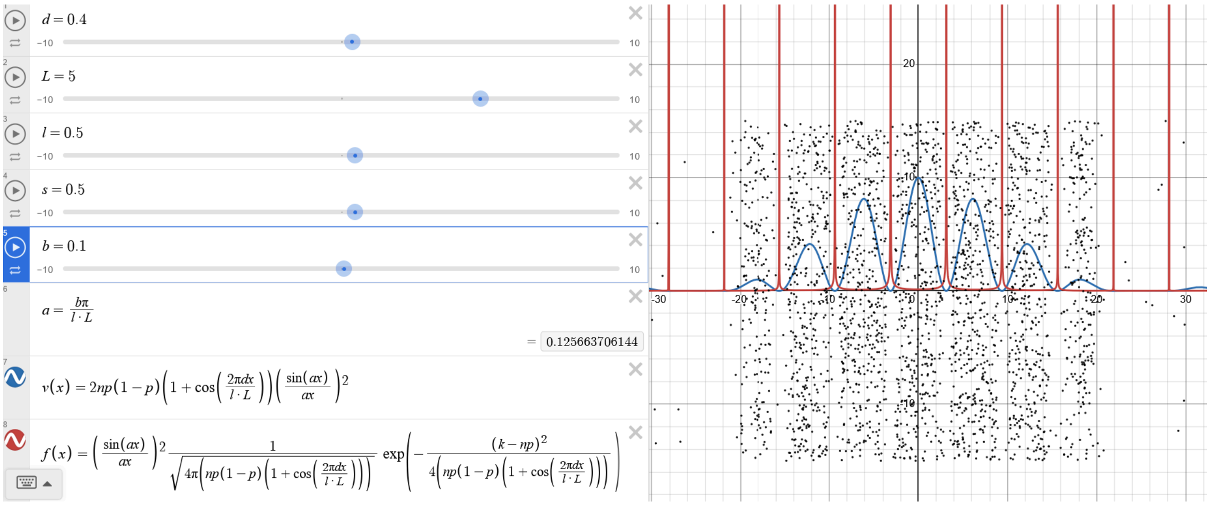
In the following variance will be what constitutes the probability/potential of observation("energy in the system"). Delta dirac will be silence or something given, like constants, or something observed.

Binomial interference(double slit)

From above we get $\sigma^2_x=\sigma^2_y$, $\sigma^2_{tot}=\sigma^2_x+\sigma^2_y+2\rho\sigma_x\sigma_y=2\sigma^2+2\rho\sigma^2=2\sigma^2(1+\rho)$.

If $\sigma^2_x=\sigma^2_y$ are two identical sources and we chose a phase-dependent ρ. We can simulate the experiment of wave-particle-duality and interference. We define variance as “potential for observation”

d=distance between slits.
L=distance to screen.
x=position on screen.
l=wave-length.
b=width of slit.
(Note that these are not the original settings, just an example.Desmos.)



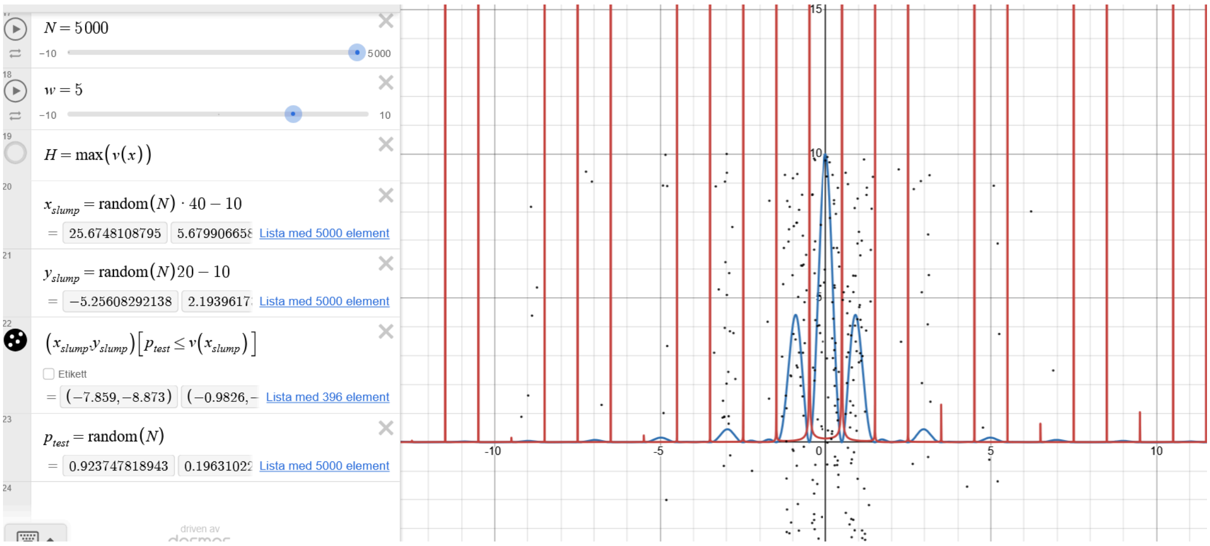
1 $d=0.4$
2 $L=5$
3 $l=0.5$
4 $s=0.5$
5 $b=0.1$
6 $a=\frac{b\pi}{l\cdot L}$ $=0.125663706144$
7 $v(x)=2np(1-p)\left(1+\cos\left(\frac{2\pi dx}{l\cdot L}\right)\right)\left(\frac{\sin(ax)}{ax}\right)^2$
8 $f(x)=\left(\frac{\sin(ax)}{ax}\right)^2\frac{1}{\sqrt{4\pi\left(np(1-p)\left(1+\cos\left(\frac{2\pi dx}{l\cdot L}\right)\right)\right)}}\exp\left(-\frac{(k-np)^2}{4\left(np(1-p)\left(1+\cos\left(\frac{2\pi dx}{l\cdot L}\right)\right)\right)}\right)$

Diffraction Shield

$$=\left(\frac{\sin(ax)}{ax}\right)^2.$$

p=0.5. If p=1, observation, the interference disappears.

A different view next page(Desmos):



$N = 5000$

−10 5000

$w = 5$

−10 10

$H = \max(v(x))$

$x_{slump} = \text{random}(N) \cdot 40 - 10$

$= 25.6748108795 \quad 5.67990665$ Lista med 5000 element

$y_{slump} = \text{random}(N)20 - 10$

$= -5.25608292138 \quad 2.1939617$ Lista med 5000 element

$(x_{slump}, y_{slump})[p_{test} \le v(x_{slump})]$

☐ Etikett

$= (-7.859, -8.873) \quad (-0.9826, -$ Lista med 396 element

$p_{test} = \text{random}(N)$

$= 0.923747818943 \quad 0.1963102$ Lista med 5000 element

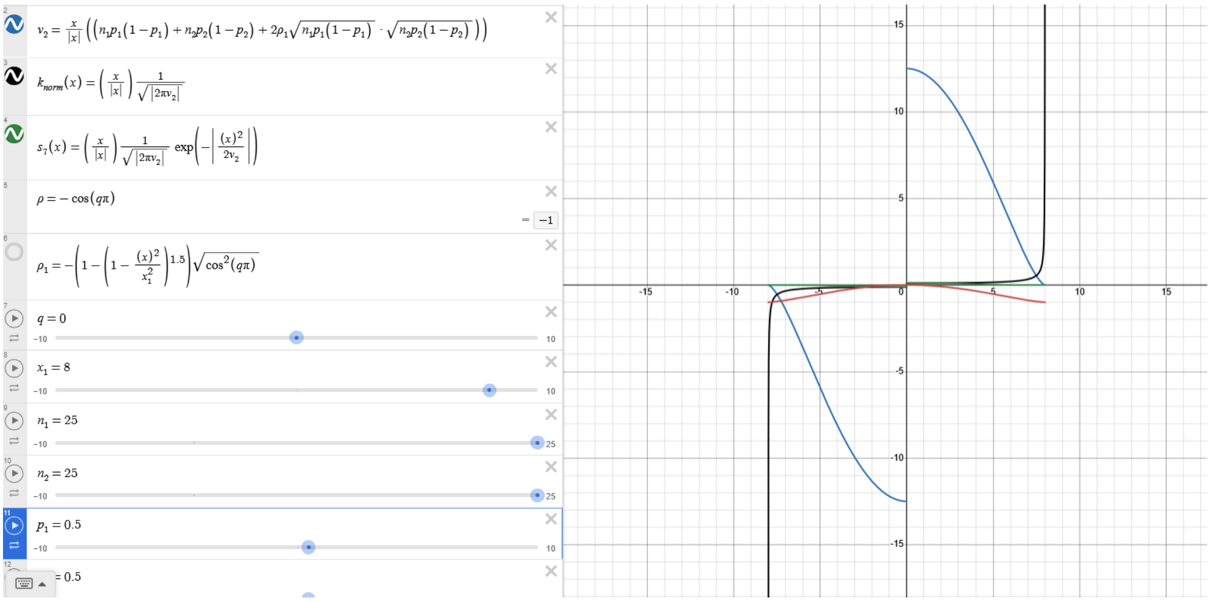
Bells inequality, spin up/down

From above we get $\sigma^2_x=\sigma^2_y$, $\sigma^2_{tot}=\sigma^2_x+\sigma^2_y+2\rho\sigma_x\sigma_y=2\sigma^2+2\rho\sigma^2$.

If spin up+spin down=0, $\sigma^2_x\to0$, will give $\sigma^2_y\to0$, forcing deltaDirac-spike.
If $\rho=-1$, variance vill be=0.

$$\rho_1 = -\left(1-\left(1-\frac{(x)^2}{x_1^2}\right)^{1.5}\right)\sqrt{\cos^2(q\pi)}$$

Which is the same form as earlier(kinetic, gravity), but x_1=measuring site and cos(q) is angle of detector, deltaDirac at measurement: q=0, coupled.



$v_2 = \frac{x}{|x|}\left(\left(n_1p_1(1-p_1)+n_2p_2(1-p_2)+2\rho_1\sqrt{n_1p_1(1-p_1)}\cdot\sqrt{n_2p_2(1-p_2)}\right)\right)$

$k_{norm}(x) = \left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}$

$s_7(x) = \left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}\exp\left(-\left|\frac{(x)^2}{2v_2}\right|\right)$

$\rho = -\cos(q\pi)$

$= -1$

$\rho_1 = -\left(1-\left(1-\frac{(x)^2}{x_1^2}\right)^{1.5}\right)\sqrt{\cos^2(q\pi)}$

$q = 0$

−10 10

$x_1 = 8$

−10 10

$n_1 = 25$

−10 25

$n_2 = 25$

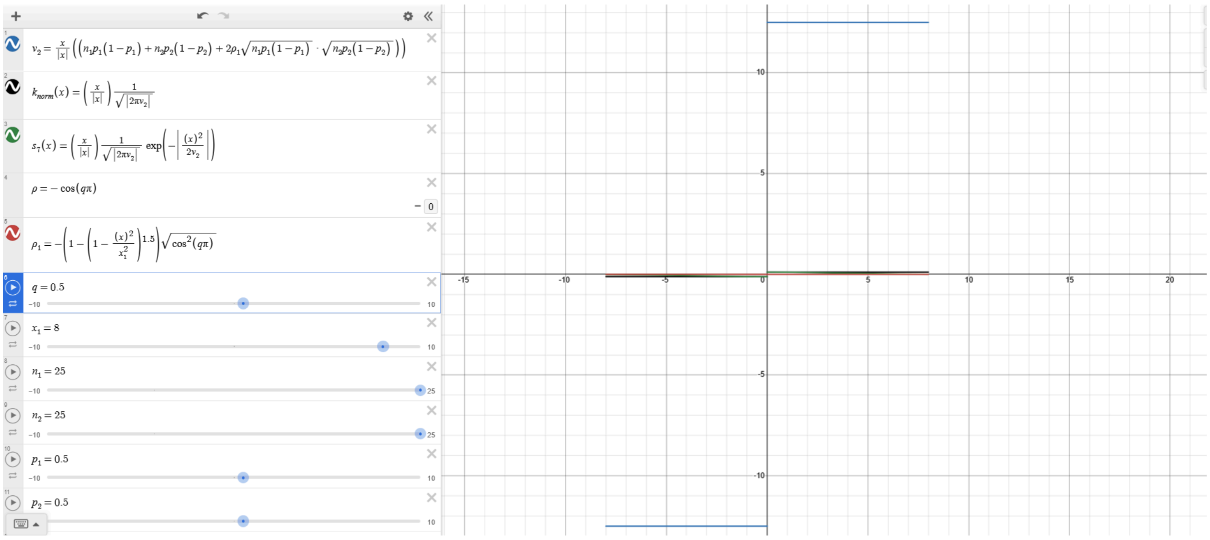
−10 25

$p_1 = 0.5$

−10 10

$= 0.5$

q=0.5, uncoupled.:



1 $v_2=\frac{x}{|x|}\left(\left(n_1p_1(1-p_1)+n_2p_2(1-p_2)+2\rho_1\sqrt{n_1p_1(1-p_1)}\cdot\sqrt{n_2p_2(1-p_2)}\right)\right)$

2 $k_{norm}(x)=\left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}$

3 $s_7(x)=\left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}\exp\left(-\left|\frac{(x)^2}{2v_2}\right|\right)$

4 $\rho=-\cos(q\pi)$ $=0$

5 $\rho_1=-\left(1-\left(1-\frac{(x)^2}{x_1^2}\right)^{1.5}\right)\sqrt{\cos^2(q\pi)}$

6 $q=0.5$

7 $x_1=8$

8 $n_1=25$

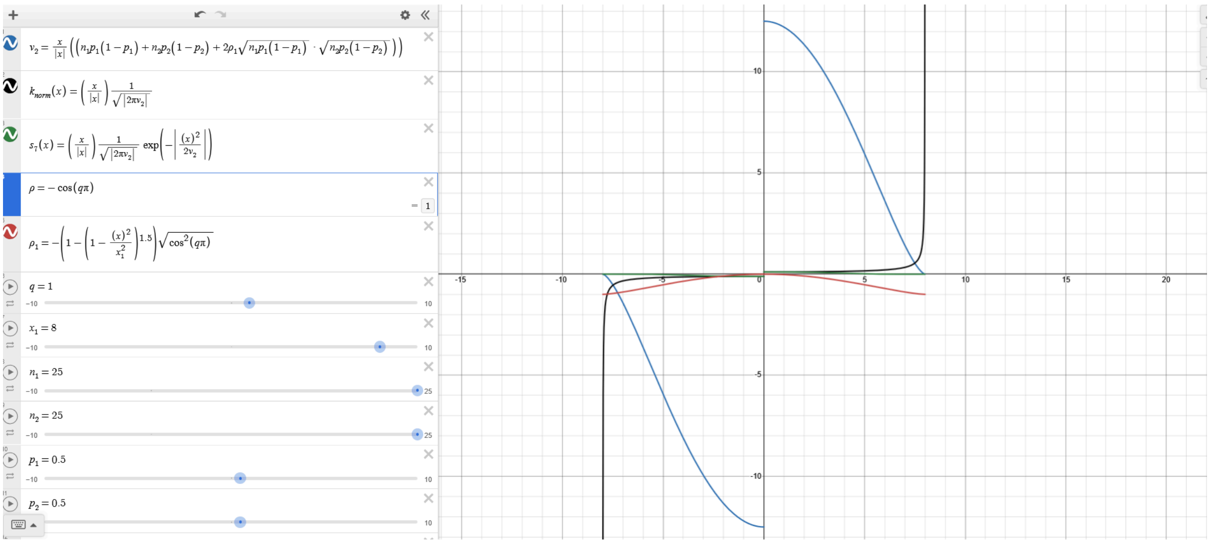
9 $n_2=25$

10 $p_1=0.5$

11 $p_2=0.5$

The correlation will of course follow the same pattern as Bell`s inequality. c is not a part of this equation but will later occur in the case of spatial or temporal summation.

q=1, coupled:



$v_2=\frac{x}{|x|}\left(\left(n_1p_1(1-p_1)+n_2p_2(1-p_2)+2\rho_1\sqrt{n_1p_1(1-p_1)}\cdot\sqrt{n_2p_2(1-p_2)}\right)\right)$

$k_{norm}(x)=\left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}$

$s_7(x)=\left(\frac{x}{|x|}\right)\frac{1}{\sqrt{|2\pi v_2|}}\exp\left(-\left|\frac{(x)^2}{2v_2}\right|\right)$

$\rho=-\cos(q\pi)$ $=1$

$\rho_1=-\left(1-\left(1-\frac{(x)^2}{x_1^2}\right)^{1.5}\right)\sqrt{\cos^2(q\pi)}$

$q=1$

$x_1=8$

$n_1=25$

$n_2=25$

10 $p_1=0.5$

11 $p_2=0.5$

Heisenberg´s uncertainty

The variance of mean will decrease with larger N:

$\sigma^2_{mean} = \sigma^2/N + (\sigma^2(N-1)/N)\rho$.

In the variance of speed (v) and position/distance (x) we use the same approach as for kinetic energy and gravity above. We let variance of speed be the spatial summation per observation i.e 1/v=1/N. In the same manner variance of distance will be a temporal summation of observations of distance, 1/x=1/N.

(Desmos:)

$$v_v(v) = K\left(\frac{p(1-p)}{v} + \frac{p(1-p)(v-1)\rho_v(v)}{v}\right)$$

$$\rho_v(v) = -\frac{\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)}{v-1}$$

and

$$v_s(x) = K\left(\frac{p_b(1-p_b)}{x} + \frac{p_b(1-p_b)(x-1)\rho_s(x)}{x}\right)$$

$$\rho_s(x) = \frac{\left(1-\left(\left|1-\frac{x^2}{c_1^2}\right|\right)^{1.5}\right)}{x-1}$$

$\sigma^2 = p(1-p)$ as above, $p=0.5$, $p_b=0.5$. $K=4$, normalizing to 1 (0.5*0.5*4). $c_1 = 3 * 10^8 m$. (x-1) and (v-1) in the denominator is because we will use discrete steps where 1 is the lowest.

For Heisenberg´s we go from summation to N=1.

For the second equation for speed v-1 in numerator and in denominator in Rho will even out.

The value of remaining :

$$-\left(1-\left(\left|1-\frac{v^2}{c^2}\right|\right)^{1.5}\right)$$

is close to zero($-1.5/c^2$)

The same for:

$$\left(1-\left(\left|1-\frac{x^2}{c^2}\right|\right)^{1.5}\right)$$ about=$(1.5/c^2)$

The second part of the equations are therefore ignored.

What remains is:

$$K\frac{p_b(1-p_b)}{x} + K\frac{p(1-p)}{v}$$

$\sigma^2_{tot}=\sigma^2_x+\sigma^2_y+2\rho\sigma_x\sigma_y$

In the simplest case of no correlation, $\rho=0$,

$\sigma^2_{tot}=\sigma^2_x+\sigma^2_y$

If x=v=N=1, K=4 and the smallest possible denominator is put to $1*h/4\pi$

$Knp_b(1-p_b)/(1*h/4\pi) +Knp(1-p)/(1*h/4\pi)=1/(1*h/4\pi)+1/(1*h/4\pi)=2/h/4\pi$.

so: $\sigma^2_x+\sigma^2_y=2/h/4\pi$.

$(\sigma^2_x+\sigma^2_y)/2 =1/h/4\pi =4\pi/h$= arithmetic mean value.

$\sqrt{}(\sigma^2_x+\sigma^2_y)$= geometric mean value≤arithmetic mean value

$(\sigma^2_x+\sigma^2_y)/2 =1/h/4\pi =4\pi/h\geq\sqrt{}(\sigma^2_x*\sigma^2_y)$.

$4\pi/h$ is the highest possible variance if n=1, maximum “noise”, maximum potential of observation($h/4\pi$ would work as a regulator to avoid infinity).

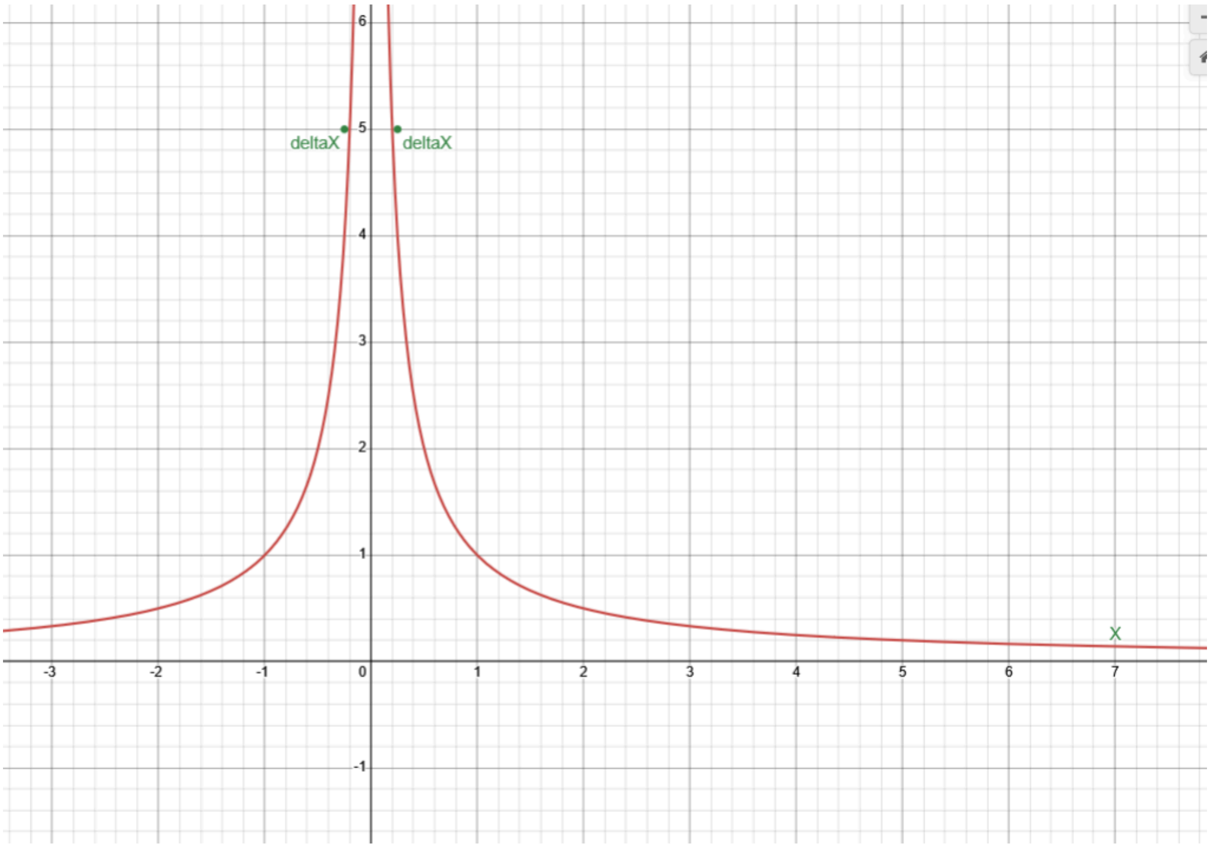
$\sqrt{}(Knp_b(1-p_b))\sqrt{}(Knp(1-p))\leq 4\pi/h$

$n\sqrt{K}(p_b(1-p_b))\sqrt{}K(p(1-p))\leq 4\pi/h$, n=mass.

Remember that this expression is the inverse of Heisenberg´s uncertainty, describing maximum variance proportional to 1/x and 1/v.
Heisenberg´s deltaX is the width of the curve, the bigger the x, the higher the variance or standard deviation. In the equation above it's the opposite, the higher the x, the lower the variance.

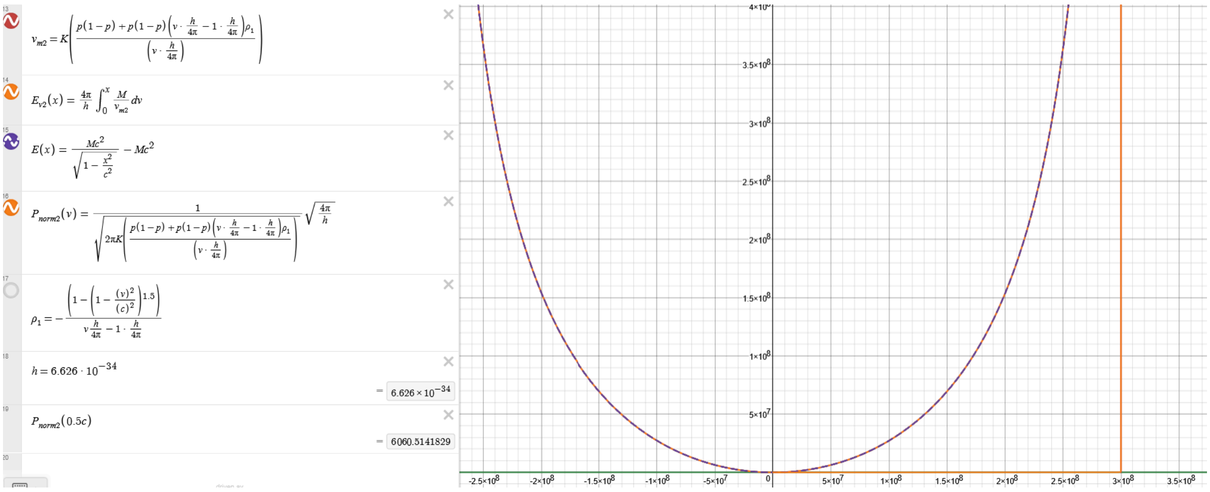
If we go from $n\sqrt{K}(p_b(1-p_b))\sqrt{K}(p(1-p))\leq 4\pi/h$ i.e $\sigma_{1/x}*\sigma_{1/v}$ to the inverse $\sigma_x*\sigma_{y,}$ we go from maximum variance to maximum precision, which gives us Heisenberg´s $h/4\pi\leq n*Sd_x*Sd_v$ or if n=m, $h/4\pi\leq m*Sd_x*Sd_v$.

This calculation is with $\rho=0$, if correlation we get a different result.



Binomial kinetic energy

This calculation is in principle the same as before. We use variance of mean and let variance of speed be the spatial summation per observation i.e 1/v=1/N. **ρ**=**ρ**$_1$.



$$v_{m2}=K\left(\frac{p(1-p)+p(1-p)\left(v\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}\right)\rho_1}{\left(v\cdot\frac{h}{4\pi}\right)}\right)$$

$$E_{v2}(x)=\frac{4\pi}{h}\int_0^x\frac{M}{v_{m2}}dv$$

$$E(x)=\frac{Mc^2}{\sqrt{1-\frac{x^2}{c^2}}}-Mc^2$$

$$P_{norm2}(v)=\frac{1}{\sqrt{2\pi K\left(\frac{p(1-p)+p(1-p)\left(v\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}\right)\rho_1}{\left(v\cdot\frac{h}{4\pi}\right)}\right)}}\sqrt{\frac{4\pi}{h}}$$

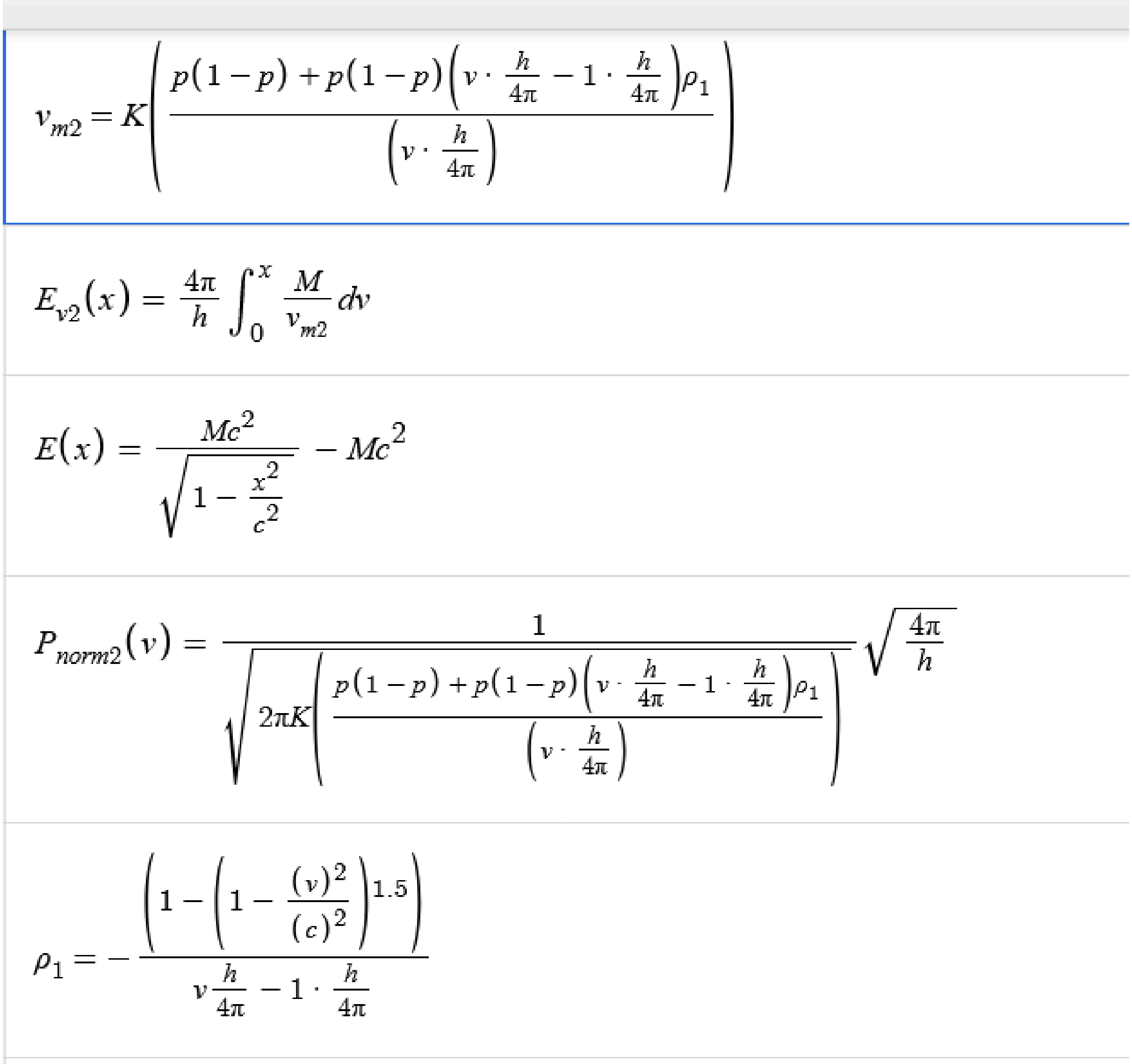
$$\rho_1=-\frac{\left(1-\left(1-\frac{(v)^2}{(c)^2}\right)^{1.5}\right)}{v\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}}$$

$$h=6.626\cdot10^{-34}$$

$= 6.626\times10^{-34}$

$$P_{norm2}(0.5c)$$

$= 6060.5141829$



$$v_{m2} = K\left(\frac{p(1-p) + p(1-p)\left(v \cdot \frac{h}{4\pi} - 1 \cdot \frac{h}{4\pi}\right)\rho_1}{\left(v \cdot \frac{h}{4\pi}\right)}\right)$$

$$E_{v2}(x) = \frac{4\pi}{h} \int_0^x \frac{M}{v_{m2}} dv$$

$$E(x) = \frac{Mc^2}{\sqrt{1 - \frac{x^2}{c^2}}} - Mc^2$$

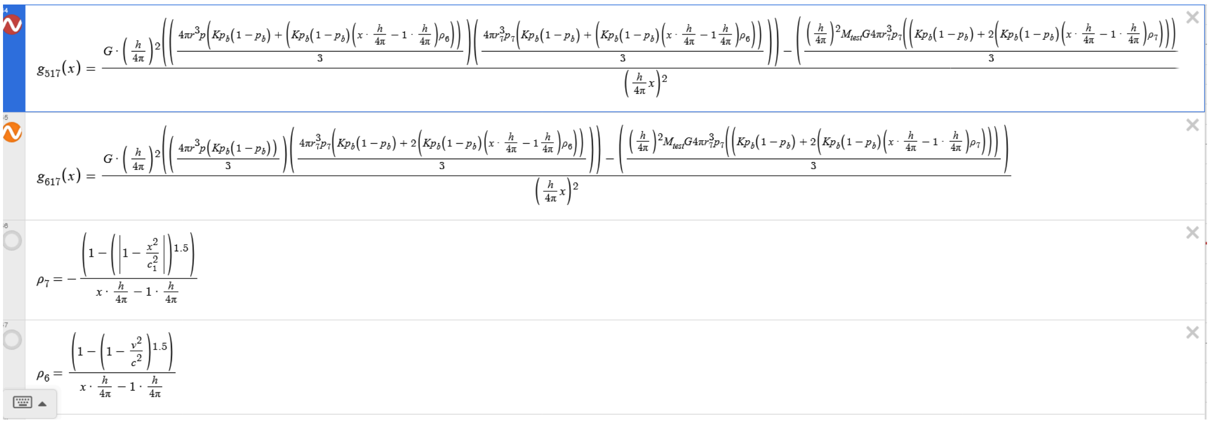
$$P_{norm2}(v) = \frac{1}{\sqrt{2\pi K\left(\frac{p(1-p) + p(1-p)\left(v \cdot \frac{h}{4\pi} - 1 \cdot \frac{h}{4\pi}\right)\rho_1}{\left(v \cdot \frac{h}{4\pi}\right)}\right)}} \sqrt{\frac{4\pi}{h}}$$

$$\rho_1 = -\frac{\left(1 - \left(1 - \frac{(v)^2}{(c)^2}\right)^{1.5}\right)}{v\frac{h}{4\pi} - 1 \cdot \frac{h}{4\pi}}$$

As shown, Ev2(x) and E(x) are identical. In Ev2(x) scaling with $4\boldsymbol{\pi}/h$.
Delta Dirac for v=c.

Binomial gravitation

In the same manner as before variance of distance will be a temporal summation of observations of distance, 1/x=1/N. **ρ**=**ρ**$_6$ and **ρ**$_7$.



$$g_{517}(x)=\frac{G\cdot\left(\frac{h}{4\pi}\right)^{2}\left(\left(\frac{4\pi r^{3}p\left(Kp_{b}\left(1-p_{b}\right)+\left(Kp_{b}\left(1-p_{b}\right)\left(x\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}\right)\rho_{6}\right)\right)}{3}\right)\left(\frac{4\pi r_{7}^{3}p_{7}\left(Kp_{b}\left(1-p_{b}\right)+\left(Kp_{b}\left(1-p_{b}\right)\left(x\cdot\frac{h}{4\pi}-1\frac{h}{4\pi}\right)\rho_{6}\right)\right)}{3}\right)\right)-\left(\frac{\left(\frac{h}{4\pi}\right)^{2}M_{test}G4\pi r_{7}^{3}p_{7}\left(\left(Kp_{b}\left(1-p_{b}\right)+2\left(Kp_{b}\left(1-p_{b}\right)\left(x\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}\right)\rho_{7}\right)\right)\right)}{3}\right)}{\left(\frac{h}{4\pi}x\right)^{2}}$$

$$g_{617}(x)=\frac{G\cdot\left(\frac{h}{4\pi}\right)^{2}\left(\left(\frac{4\pi r^{3}p\left(Kp_{b}\left(1-p_{b}\right)\right)}{3}\right)\left(\frac{4\pi r_{7}^{3}p_{7}\left(Kp_{b}\left(1-p_{b}\right)+2\left(Kp_{b}\left(1-p_{b}\right)\left(x\cdot\frac{h}{4\pi}-1\frac{h}{4\pi}\right)\rho_{6}\right)\right)}{3}\right)\right)-\left(\frac{\left(\frac{h}{4\pi}\right)^{2}M_{test}G4\pi r_{7}^{3}p_{7}\left(\left(Kp_{b}\left(1-p_{b}\right)+2\left(Kp_{b}\left(1-p_{b}\right)\left(x\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}\right)\rho_{7}\right)\right)\right)}{3}\right)}{\left(\frac{h}{4\pi}x\right)^{2}}$$

$$\rho_{7}=-\frac{\left(1-\left(\left|1-\frac{x^{2}}{c_{1}^{2}}\right|\right)^{1.5}\right)}{x\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}}$$

$$\rho_{6}=\frac{\left(1-\left(1-\frac{v^{2}}{c^{2}}\right)^{1.5}\right)}{x\cdot\frac{h}{4\pi}-1\cdot\frac{h}{4\pi}}$$

The result is exactly as above(gravity chapter), however not so easy to survey. Scaling as before.

I have chosen to have the last part of g$_{517}$ and g$_{617}$ negative (negative vector), to avoid negative variance. That's why **ρ**$_7$ instead has a minus sign.

ρ$_7$ is growing far beyond 1, $(q_{eff}/q_{base})^2$? This is a mathematical inconsistency, but probably not impossible neurophysiologically.

Discussion

This has been an attempt to make somewhat of a synthesis between the observed and the observer, because it's my belief that more effort has to be put into understanding the interface between the observed and the observer rather than separating the two.

However I have taken liberties with the mathematics to make them fit and have very lacking knowledge of quantum physics and general relativity.

Variance has been described as what gives potential for observation. Low variance will “lock the system” and force an observation (delta Dirac) or force no observation. An observation will do the same thing i.e collapse the variance, and nullify any other possibility for the moment(p=1). I have used p=0.5 for the same reason, maximum variance. Variance of the mean will diminish variance at a distance and make observation at a distance more unlikely with a larger N=v=x, i.e temporal and/or spatial summation. In the same manner the variance floor is a consequence of summation, and c is in the same reasoning a part of and consequence of this i.e. a result of summation and variance floor.

Therefore c is, in this context, not relevant if N is very close to 1,and not part of the equation, e.g. Bell´s inequality.

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General practitioner of medicine

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