Using the Path Integral to Prove Exper/Vertex

Abstract

Even though EV is predictive to the point of being interesting, my mind dwells on if it can be proven. Based on some of Einstein's earlier word (general relativity) it shows some promise for explaining the relationship between the very large and very small (quantum mechanics).

It will be seen that the integration of Dr. Feynman's observation that his Path Integral contains the same information as the Schrodinger equation, completes the proof methodology.

Introduction: What is EV?

We will just be covering the EXPER portion of EV here, but it was an ambitious project based on a fringe idea at the time. It tried to express quantum phenomenon in terms of curved space.

Using perfect functions over a version of curved space-time, it was an attempt at a more intuitive version of the standard model: a project to explain how reality really works. It seems to disagree with even deeper physics concepts of our time, but I am confident that all of these issues will be resolved leaving both intact.

Initially forming a mathematical "context" (ie. four-vector with a 5^{th} scalar amplitude), I struggled with the *perfect functions,* that would explain their interactions, for years just contemplating. My thought was that the particles were the functions themselves, if that makes sense.

The *context* is important, critically important; EV takes as an axiom, that reality is fundamentally based *on curved space-time and nothing else*. I should say a postulate at this time (an assertion that when taken as a given, can be proven or disproven).

The reason why this was taken as axiomatic is so that at the end of the project, if it was proven, that it was a way of unifying the large with the small.

The History of EV

EV is a completely alternatively derived attempt at explaining the Standard Model; as such it must be understood that it takes a very different slant than traditional QM. This paper will present argument for EV being a valid explanation of reality by hybridizing Exper algorithms with accepted QM equations.

Since both theories (QFT Feynman and EV) attempt to explain reality, then if the both of them are reconciled to reality, then they are equivalent theories (P0). QFT at this time is understood to be true and proven; not so much so with EV. Hence this proof.

EV initially used *qualitative functional analysis*, rather than the quantitative that makes up the mainstream of advanced physics. To elucidate poetically on the difference, the typical physicist is like a scientist, but EV is more artistic.

EV was also initially entirely depended on algorithms (I suppose the meanderings of a person with a lot of time on his hands). I was a frustrated physicist earlier in my life with my father explaining to me how there wasn't much money in it, so I entered electrical

engineering. I could only do physics in my spare time in my youth. However here I will hang the equations of traditional physics over its axioms and propositions.

The Working Axioms of EV

The contextual axiom is critical to the success of EV, in that at the end, explaining reality entirely in terms of curved space is technically a valid, though unorthodox, path to grand unification.

Axiom 1: The Context - That all things within EV system will be expressed in terms of curved space-time, and nothing else.

The context we will be choosing (equivalent conceptually to a metric) is 5-dimensional and identical to Einstein's concept of general relativity in that space is basically a curved sheet of rubber.

As far as implementation, it can be mathematically expressed in terms of a four-vector (x,y,z,t) with a 5th scalar component[1] added that forms a higher-order Gaussian *hypersurface, a membrane* (ie a curved surface in 4D space asymptotically extending to infinity in all directions).

It is axiomatic that nothing can be expressed in the system except that it changes the curvature of this membrane (A1).

Axiom 2: The Nature of Energy - The fundamental nature of energy in reality is to curve space. I call this form of energy, axion, the one force (though it has a positive and a negative expression).

That this one force can explain the other four fundamental forces: *Electomagetism, Strong and Weak Nuclear force, and Quantum Chromodynamic force*.

Axiom 3: The Nature of Matter - The fundamental nature of matter is that it is “the paint upon the canvas of the All”. That where space is curved by energy, that the observed pattern produced is matter.

Axiom 4: that energy's ability to curve space is based on the 2nd calculus derivative.

1 This 5th scalar vector component I call Shiva/Shakti. I see it as fundamental and dimensional.

$$E = c^8 \nabla^2 \psi_s$$ eq. 1 *(for 3d – time invariant)*

Axiom 5: that matter is that which is the calculus integration of curved space with respect to zero curvature, multiplied by a constant.

$$M = c^2 \int \psi_s \, dx$$ eq. 2 *(for 3d – time invariant)*

Postulate 1: that a simplification leading to non-nervousness in contemplation is to realize that space is so homogeneous in its nature and behavior that if you fully understand just one point, that you understand all other points.

Axiom 6: that what is mundanely called matter is that which stands[2] on space, in that it is stable.

Axiom 7: that what is mundanely called energy is that which radiates across space (over time), in that it is unstable.

Postulate 2: that the motion of particles of matter is fundamentally caused by a geometric imbalance in its distribution of energy (curvature).

Postulate 3: that even fields are subject to Axiom 5 and by extension, to Axiom 1.

Proposition 1: If P3 is correct, then it should follow that all observable phenomena can be explained by this over-all reasoning.

Proposition 2: That if A3 is correct, more specifically if Axion 4 and 5 are related via E=MC^2, that a small set of perfect functions will emerge.

More technically, if standing waves appear on the surface of the All that they will

2 In that it is a standing wave...transverse.

constitute a solution for stability due to their (1) symmetry, and (2) their successful balancing of positive and negative curvature.

Definition 1: it is through computation that reality continues forward in time.

That cause and effect, causation, is an expression of the process of "computation" or the exhibited behavior of the canvas of space-time responding to energy and the interactions of the matter upon it.

Postulate 4: that time is that which propagates this matter and energy over space-time, animating cause-and-effect, always according to physical law.

I just needed a postulate to give me some definition of dimension, time.

Proposition 3: if P2 is correct, then to find these *perfect functions* that fully describe a literal subatomic particles that they would represent discrete solutions for standing waves of matter.

The difficult part is in finding these functions such that they implement all behaviors, natures, attributes and characteristics of real, everyday matter. They are mathematical solutions that are our way of representing what is real.

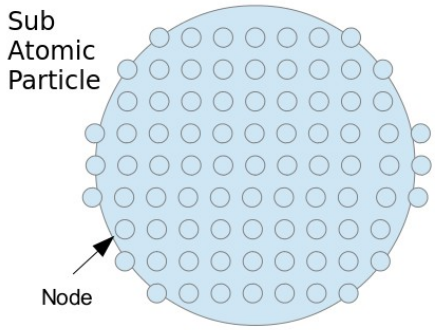
Our perfect functions are called "structural wave functions" in that their complexity and behavior is caused directly from their internal structure (and I use this term loosely).

Proof Methodology, Part I

Here is the basis for proving the concept of *structural wave functions* (ψ_s) as being compatible with current scientific thought.

Currently, if a knowledgeable physicist is asked if subatomic particles have an internal structure, if pressed, they will probably say something to the effect that "they are probably homogeneous concentrations of various forces, spherical", ergo, probably no definable internal structure.

So what we do, is we propose the existence of sub-nodes within a particle, to give it conceptually, mentally...an internal structure. Because this is a thought experiment, we do this mathematically, like so:



This can be done in a grid fashion as shown though it matters not how it is done (in that it could be done in polar sections, whatever). What would dictate this is the particular math approach used to simplify, to make workable, the calculation.

Then, in stoichiometric fashion, we run path integrals (ideally of the infinite product variety) over these nodes and see if it does, indeed, provide solutions to Quantum Field Theory.

<u>As per P0, this would prove EV, equating its validity with that of QFT.</u>

Proof Methodology, Part II

Let us introduce the perfect functions found so far. The order of presentation will be based on historicity of them (the order in which they were derived), hopefully with some commentary about them.

The first I would like to present is the SWF of the *Up quark*. It is:

$$\psi_{s-Up\,Quark}=\nabla^{12}k_1 e^{k_2 x^2} \qquad \textit{eq. 3 (formal equation)}$$

Here is the SWF for the *Down quark*; and excuse the notation (please):

$$\psi_{s-Down\,Quark}=\nabla^{12}k_1 e^{k_2 x^2},\phi=45^o\left(\frac{\pi}{4}rad\right) \quad \textit{eq. 4 (formal equation)}$$

Where phi is expressed as a nodal 45 degree phase shift in the matter wave. I thought the

most concise way of expressing it.

For the *electron*:

$$\psi_{s-Electron} = k_1 e^{k_2 x^2} \quad \textit{eq. 5 (formal equation)}$$

For the purposes of computation though, I prefer to use approximations as the formal equations are difficult on computers (requiring *long double* variables or better). I present a trigonometric approximation of these higher derivatives, using the Up quark function as an example.

EV Approximations

You will notice that the multiple nodes of the Up quark, rather the 12th derivative of *e*, look somewhat sinusoidal. Via the multiplication of an *Amplitude Limiting Function* (ALF), a Cosinusoidal *Particle Function* (CPF) can be shaped to the approximate character of the formalized function.

Remember P3, in that even a particle's field needs to be expressed in terms of spacial curvature. To do this in the approximation, we add the *Asymptotic Field Function* (AFF) such:

$$\psi_{s-Up\,Quark} \approx ALF \times CPF : {}^{r_p}_{0} \qquad AFF : {}^{\infty}_{r_p} \qquad \textit{eq. 6}$$

$$ALF = \frac{1}{x-1}, CPF = k_1 \cos(k_2 x), AFF = \frac{1}{x-1} \qquad \textit{eq. 7,8,9}$$

Proving EV (Exper/Vertex)

Implementing the First Test

We take the generalized approach in Part I, and as a first step let us check Axioms 2 and 3 by relating it via $e=mc^2$.

$$E=\nabla^2,\ m=\int \psi_s\ d(x,y,z) \qquad \textit{Axioms 2,3}$$

Relating it, we need for this formula to evaluate as true:

$$\nabla^2 \psi_s = k \int \psi_s dx \quad \text{eq. 10}$$

...where $k=c^{2}$.

To evaluate this, we've chosen to do it algorithmically, to just crunch it via numeric analysis. To do this we need to have an explicit version of the ALF and CPF to place in the computer program.

$$ALF=\frac{1}{127\,x\,1.58\text{E}16}\left(x+\frac{1}{1.58\text{E}16}\right), CPF=\frac{1}{1.58\text{E}17}\ \cos\ \frac{1.58\text{E}17}{2\pi}x \quad \text{eq. 11,12}$$

Note: the constants used are empirically worked out in previous EV experiments.

In our simulation, we found that we had to tweak it quite a bit but found that by looping from 0 to 0.80 fm (with about 2000 steps), and numerically integrating and summing the 2nd derivative over our Up quark *perfect function*, that with a bit of hand-working, we obtained a positive result.

The relation came out with the correct value of c (the speed of light).

Implementing the Second Test

The second test is somewhat more sophisticated where we develop a Schrodinger/Exper hybrid equation and algorithm (numeric integration).

Schrodinger's equation is such:

$$\frac{-\overline{h^2}}{2m}\frac{d^2\psi}{dx^2}+V\psi=E\psi \qquad \textit{Schrodinger's Equation}$$

By slipping in the *structural wave function* such, you will see that not much changes:

$$\frac{-\overline{h^2}}{2m}\frac{d^2\psi_s}{dx^2}+V\,\psi_s=E\,\psi_s \qquad \textit{eq. 13}$$

We perform a substitution based on the $e=mc^2$ relationship to insert into the E variable:

$$\psi_s c^2 \int \psi_s dx \qquad \textit{substitution for right side of eq. 13}$$

This simplifies somewhat the necessary conditions we have to satisfy for numeric analysis to prove that this relation is trustworthy(eq. 13). Here is the equation we go to the computer with:

$$\frac{-\overline{h^2}}{2\int \psi_s dx}\frac{d^2\psi_s}{dx^2}=\psi_s c^2 \int \psi_s dx \qquad \textit{eq. 14}$$

The algorithm is quite short but it iterates a numeric analysis over 0<=x<=0.80 fm of about 2000 steps. M (mass) is computed, and y (aka ψ_s) and d2y (second derivative of ψ_s with respect to x) and E (energy).

Internally, this pseudocode implements an internal variable assignment:

```
-(h_bar ^ 2)/(2*M) * d2y = y * c^2 * M
```

Massaging it a little, we get:

```
-(h_bar ^ 2)/(3*M) * d2y = c^2 * y
```

and this (that the computer can understand):

```
C = sqrt((h_bar ^ 2)/(3*M) * d2y * (1.0/y))
```

...which leads to an iterative calculation of C (the test variable for the computed speed of light) which should be equal to c, 2.99E8 m/s in order to prove the relation true, and prove the underlying hypothesis.

This program performed as expected, generating an acceptable value of C.

Proof Methodology, Part III

Providing excerpts from QFT F. it is shown that the path integral contains all of the information of the Schrodinger equation.

Formal Path Integral (Feynman), the beautiful part of this equation is that it uses an esoteric principle contained in an infinite product that allows integration over all paths. I just wanted to include it to show that path integration is possible. In his works, he points out that certain paths are more sure than others (leading to a “fuzziness”) but that if one wanted to, the mathematics is there to do it.

$$\langle x_f, t_f | x_i, t_i \rangle = \int \prod_{i=1}^{N-1} dx_i \, e^{i \sum_{i=0}^{N-1} L(t_i) \Delta t / \hbar} \quad \text{eq. 15 F.}$$

The more common form is this equation:

$$\langle x_f, t_f | x(t2), x(t1) | x_i, t_i \rangle = \int_{t_f < t < t_i} Dx(t) e^{iS[x(t)]/\hbar} x(t_2) x(t_1) \quad \text{eq. 16 F.}$$

To explain, between the bra-kets are time-variant terms that relate a particle's position x at time t such that the path integral can be linearly computed, I suppose allowing matrix manipulation to arrive at an expectation value.

This case of the equation allows for the working of a particle's path over time in as much as its “action” is known (and expressed as a continuous function over the time of the integral).

This is not the case for our use, as it has to do more with momentum and movement, however the derivation that follows this is sure. Rather than re-derive I will visit the

highlights for shifting the above equation to a measure of momentum that allows the Schrodinger equation to emerge (its derivation being known).

$$\partial S = \frac{\partial L}{\partial \dot{x}} \delta x(t_f) = p(t_f) \delta x(t_f) \quad \textit{Substitution for d-Action}$$

Substituting in, we can modify the time-dependence to a form more suitable to our needs.

$$\frac{\partial}{\partial t_f} \langle x_f, t_f | x_i, t_i \rangle = \int Dx(t) e^{iS[x(t)]/\bar{h}} \frac{-i}{\bar{h}} H(t_f) \qquad \text{eq. 17 F.}$$

Further substituting, a modification to the Hamiltonian term (based on system energy).

$$H = \frac{p^2}{2m} + V(x) \quad \textit{Substitution for H term}$$

….gives us, the Schrodinger equation.

$$i\bar{h} \frac{\partial}{\partial t} \langle x_f, t_f | x_i, t_i \rangle = \left(\frac{1}{2m} \left(\frac{\bar{h}}{i} \frac{\partial}{\partial x_f} \right)^2 + V(x_f) \right) \langle x_f, t_f | x_i, t_i \rangle \quad \textit{Schrodinger's equation}$$

While this is academic, it does give a path to proof for the axioms of Exper/Vertex.

Conclusion

Touching on my FUN theorem, we have a representation of the Context (A1), when combined with EV, leads to the following set of equations, that describe all observable phenomena:

$$\vec{A}=\frac{1}{27}\sum_{i=1}^{27}\vec{n}_i \qquad \textit{spacial context}$$

$$F_A=k_n\vec{A}\times\vec{n_{14}} \qquad \textit{introduction of time-variance}$$

$$\psi_{Up\,Quark}=\nabla^{12}k_1e^{k_2x^2} \qquad \textit{function of Up quark}$$

$$\psi_{Down\,Quark}=\nabla^{12}k_1e^{k_2x^2},\phi=45^o\left(\frac{\pi}{4}rad\right) \qquad \textit{function of Down quark}$$

$$\psi_{Electron}=k_1e^{k_2x^2} \qquad \textit{function of electron (leptons)}$$

These five equations are sufficient to construct model that reproduces all observable phenomena in reality.

I would point out that the first equation is reminiscent of a metric, however it represents a context that its simplicity is deceptive and working with it dependent on large amounts of computer power.

Energy (the abstract form, A2) and all forms of time-based things are introduced though the concept F_a here, that the behavior of a point in space, in relation to the immediate points around it, is described by this One Force equation and the context equation.

All other fundamental particles can be formed by extrapolation upon two principles:

(1) that there are particles that are larger solutions (larger in diameter and amplitude, but discrete, quantized) of lesser ones, following the 1:100:1000 or 1:1000:10000 mass pattern, and (2) that through construction dictated by the appropriate Feynman diagram, that they can be built up from other particles (similar to gauge's pseudo-scalar quark approach) .

The quarks and leptons follow pattern 1, and that the W, Higgs and neutrinos follow the other pattern.

Code for Simulation (in ANSI Posix-compliant C, used GCC on Ubuntu to compile and run):

```
#include <stdio.h>
#include <math.h>
#include <string.h>

#define PI 3.14159
#define speed_of_light 299792458 //in meters per second

#define Mev_to_Kg 1.79E-30 //conversion constant
#define Mev_to_Joules 1.609E-13 //conversion constant

#define hbar 1.054571800E34 //h bar

//early EXPER approximation functions (alf*cpf); actual is d14swf/dx^14;


long double alf(long double x)
{
      //amplitude limiting function
      return (long double)((long double)1.0/(127.0*1.58E17 * x +
(1.0/1.58E17))*100000000);
}

long double cpf(long double x)
{
      //cosinusoidal particle function
      return (long double)(((long double)1.0/1.58E17)*cosl(1.58E17/(2.0*PI) *
x ));
}

long double aff(long double x)
{
      //asymptotic field function
      //CODE LATER!!!
      return alf(x)*cpf(x);
}

//*** Beginning of Pool Ball ***
long double alf2(long double x)
{
      //amplitude limiting function
      return (long double)((long double)1.0/((1.0/1.58E17))*500000000);
}

long double cpf2(long double x)
{
      //cosinusoidal particle function
      return (long double)1.0;
}

long double aff2(long double x)
{
      //asymptotic field function
```

```
	//CODE LATER!!!
	return (long double)0.0;
}

// *** End of Pool Ball ***

main()
{

	//three-dimensional time-invariant EXPER relation

	long double x; //one-dimensional x value (position)
	long double y; //swf
	long double slice; //x slice on numeric analysis
	long double vslice; //volumetric slice on numeric analysis (to make 3D)

	long double c = speed_of_light; //speed of light
	long double k; //if the relation holds then k should equal c^2
	long double C; //temp variable to hold computed C value for comparison to c

	long double E=0.0; //sum of d2(swf)/dx - the ENERGY
	long double M=0.0; //integration of swf - the MASS

	long double dy,d2y; //differentiation variables
	long double ppy=0.0,py=0.0,pdy=0.0; //intermediate variables for
differentiation

	long double d2y2,y2; //adjustment variables for derivatives

	slice=1.0E-19;

	for (x=0;x<8.0E-16;x+=slice)
	{

		vslice=4.0/3.0*PI*(powl(x+slice,3.0)-powl(x,3.0));

		//structural wave function
		if (x>8.0E-16)
			y=alf(x)*cpf(x); //particle
//			y=alf2(x)*cpf2(x); //pool ball
		else
			y=aff(x); //field
//			y=aff2(x); //pool ball field

		M+=y*vslice*1000000*powl(c,2.0); //integrate to get mass
//		M+=fabsl(y*vslice*100000000)*powl(c,2.0); //absolute integrate to get
complex mass

		dy=(y-py)*slice; //2nd derivative
		d2y=(dy-pdy)*slice;

		E+=fabsl(d2y*vslice)*1000000*powl(c,8.0); //sumation of 2nd derivative

		ppy=py;
		py=y;
		pdy=dy;
```

```
      }

//    M=M/100000000; //approximate to real mass

      //debug: output mass and energy values
      printf("Debug: Computed M value (in kg): %Le, M value (in Mev): %Le,
Computed E value (in Joules): %Le, E value (in Mev):
%Le\n\n",M,M/Mev_to_Kg,E,E/Mev_to_Joules);

      k=E/M; //related by e=m*c^2

      //solve for K
      C=powl(k,0.5);

      printf("Computed C value: %Le, Speed of Light: %Le, Fraction of Expected to
Computed: %Le\n\n",C,c,C/c);

//    return; //exit to operating system

      //one dimentional time-invariant EXPER/Schrodinger HYBRID relation

      //reset values for numeric analysis (keep total mass from last calculation)
      //E=0.0;
      y=0.0; py=0.0; ppy=0.0; pdy=0.00;

      M=3.0*Mev_to_Kg; //gives us the actual mass of an up quark in Kg

      for (x=0;x<8.0E-16;x+=slice)
      {

            vslice=4.0/3.0*PI*(powl(x+slice,3.0)-powl(x,3.0));

            //structural wave function
            if (x>8.0E-16)
                  y=alf(x)*cpf(x); //particle
//                y=alf(x)*cpf(x); //pool ball
            else
                  y=aff(x); //field
//                y=aff2(x); //pool ball field

//          M+=y*vslice*1000000*powl(c,2.0); //integrate to get mass
//          M+=fabsl(y*vslice*100000000)*powl(c,2.0); //absolute integrate to get
complex mass

            dy=(y-py)*slice; //2nd derivative
            d2y=(dy-pdy)*slice;

            E+=fabsl(d2y*vslice)*1000000*powl(c,8.0); //sumation of 2nd derivative

            ppy=py;
            py=y;
            pdy=dy;

            //tweak here
            y2=y*100000000*powl(c,8.0); //*100000000*powl(c,2.0);
```

```
            d2y2=d2y*100000000; //*powl(c,2.0); //*powl(c,8.0)

            //output calculations so far
            k=(-powl(hbar,2.0)/(3.0*M))*d2y2*(1.0/y2); //EXPER/Schrodinger relation
under test
            C=powl(k,0.5);

            printf("Computed C value (in m/s): %Le\n",C);
//          printf("Dump: M=%Le, Y2=%Le ,DY2=%Le, D2Y2=%Le, k=
%Le\n",M,y2,d2y,d2y2,k); //debug

      }

}
```

To compile on Linux, enter:

```
gcc proof.c -o proof -lm
```

To run, enter:

```
./proof
```

An important part of it is something called the “poolball” which is a SWF that produces a homogeneously distributed mass/energy over a volume of space the size of the particle in question. You will notice it “blows up,” so conventional wisdom was right that it was a non-productive path.

However, contrarywise, the exciting part is how substituting in Nabla 12 k1 e sup k2 x sup 2, all of a sudden everything lights up and correlates. Surprise, surprise. :)

To see both results (and compare and contrast them) just activate the one or the other by commenting the appropriate code in or out.

Appendix I

An explanation of the algorithmic approach used

We were hoping that Schrodinger's relation would hold true empirically, that we could quickly arrive at an answer through a *1-dimensional time-invariant* approach, however when we tried using empirically measured values, we found very large and very small numbers.

Intuition and discussion lead to a guess that improving our algorithm so all of the physical constants were in harmony with each other might lead to fast success, so we were faced with the daunting challenge of how to upgrade from 1-dimension to 3-dimensions.

We had to crunch a 3-dimensional vector field, so we were intimidated with thoughts of an Exper-like FEM/FEA approach (very memory intensive), however we came up with an elegant mathematical strategy that used the spherical symmetry of the particle being examined.

With its one-dimensional cross-section being known, we figured that if we looked at the problem as a series of nested shells that, knowing the 1D versions (2nd derivative and areas) that we could sum it over shell volumes:

$$V_{shell}(r1, r2) = \frac{4}{3}\pi(r_2^3 - r_1^3) \qquad \textit{eq. 18 – spherical shells}$$

Multiplying this by the first, and second derivative, and its area, in 1D we found that we could quickly modify the code such that it properly implemented the 1-to-3D conversion necessary to use physical constants directly.

$$curvature = \sum \frac{d^2\varphi_s(r)}{dr^2} V(r, r+\Delta r)$$
$$mass = \int \varphi_s(r) V(r, r+\Delta r)\, dr \qquad \textit{eq. 19, 20 – 1 to 3D conversion}$$

When we did this, we arrived at the appropriate approximate values of C (the speed of light test variable) required for proof of methodology. But it required a FULL elaboration of all the requisite principles, constants and computation involved, to use the physical constants.

Appendix II

A Priori Derivation of Planck's Constant using Only EV

Up Quark

Simulated (Exper6.c) mass = 104 mu (mass units)

Accepted mass: 3.0 Mev = 1.608 x 10^{-21} Kg

Postulate: 104 mu = 3.0 Mev *(A5)*

The relationship between kg (mass) and meters^4 (distance hypercubed)

$$104 \text{ mu} = 1.546 \times 10^{-21} \text{ kg}$$

...therefore, 1 mu = 1.546 x 10^{-23} kg

1 du (distance unit) = 0.0057 fm = 5.643 X 10^{-18} m

$$\mathbf{(5.643 \times 10^{-18} \text{ meters})^4 = 1.546 \times 10^{-23} \text{ kg}}$$

Hypervolume (x,y,z,s) in meters^4 — Mass in Kg

$$1.014 \times 10^{-69} \text{ m}^4 = 1.546 \times 10^{-23} \text{ Kg}$$

$$1 \text{ Kg} = 6.559 \times 10^{-47} \text{ m}^4$$

Tweaks – required some massaging of the code with which to get it to operate correctly.[3]

x 10^8 on ψ_s amplitude (in the ALF function)
x 10^6 on mass integration

Total empirical corrections accounted for: $10^8 \times 10^6 = 10^{14} \approx 10^{13}$

Calculated (Simulated): **1 Kg** = 6.559 x $10^{(-47+13)}$ m^4 = ***6.559 x 10^{-34} m^4***

Accepted Value of Planck's Constant: ***6.626 x 10^{-34}***
(Units: m^2*kg/s)

3 Notes: 3.4 x 10^8 hypervolume per particle, possibly use entire mass value (instead of mu)

Appendix III

Proof Methodology using String Theory Approach

Using 11-dimensional string theory (gauge bosons to be precise), a case can also be made for EV. One of M-Theory's focus on mass predictivity makes it a natural candidate for linking to Exper-Vertex.

The list of gauge bosons: *photon (γ), pseudoscalar quark (pi ½), Z0 Left, X Right (symmetry braking), X Left (symmetry braking), Z0 Right, g (11th dimension boson).*

These with the (in)appropriate selection of gauge give agreeing answers to EV; also satisfying P0 that if the three agree then they are all correct descriptions of reality.

Like Gauge, there is an attempt at providing building blocks which which to fully describe reality. EV also provides building blocks but they are assembled usually using algorithms rather than advanced mathematics (and Feynman diagrams...joking).

Perhaps EV's and Gauge's main difference though is Occam's Razor, that EV explains in 5 dimensions while Gauge takes 11 to explain. It is fearful to imagine that QFT is the conservative middle-ground yet it appears. EV exchanges geometric/topological complexity for dimensional complexity. When understood, it is hard to fight the temptation that EV is by far the most believable of all available theories to actually explain nature around us. And inherently relativistic to boot...a claim.

Through the engagement of the pseudoscalar quark (as perhaps the fulcrum) mixing the particles of gauge gives the mundane particles that are described by EV using a more direct approach. With a minimum of anomalies, our theory seems to be the most plausible explainable as to what reality really is.

Quantum Gravity

With the successful keeping of Axiom 1, we can flip the entire theory giving us...quantum gravity, in a way similar (or identical) to a functional. Deep contemplation has lead to a hypothesis that gravity is by extension a mathematical certainty of small quantum phenomenon.

While we could just leave it in Einstein's dimensional parlance, I am predicting (perhaps the beginnings of another proof methodology) that when taken statistically, the geometric arrangement (and I mean this in the basic Cartesian sense) of the particles involved inevitably lead to the **inverse R squared** gravity law that we are used to.

It is not linear however this hypothesis! It, like the Standard Model version, will be difficult to solve, but am confident in my system that the depressions and foothills that comprise the landscape of space will be found to collectively contribute (subtract?) to the macroscopic occurrence of gravity. Emergent...

Using the subatomic stoichiometric method, I am confident it will support gravity as a direct, unavoidable effect of fields at distance of real objects. It will be interesting to see the mathematics involved when it is proven *in detail* (maybe derivatives a touch higher than usual to QM).

Until then, a dimensional description of gravity is given using the standard four-vector approach/metric.

(Also, I can't wait to see that the Lorentz transformation is inherent, that is to say included and native, to the EV system. You will find this not an obvious of the “context” [A1] than let's say a developed, described metric like Minkowski).