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Title: A Top-down Approach to Fundamental Interactions

Abstract

Accurate estimates regarding the number of neutrons in the universe are now available due to the WMAP [8] project. The author noted that there are approximately the natural number e (2.71828) to the power 180 (exp(N)) protons in the universe (Technical endnote 1) and explored the possibility that the number is fundamental to physics. Probabilities similar to the field of information theory developed by Claude Shannon [16] and others were used as tools to develop an information based approach to energy components in nature. Considering the probability of one neutron as 1/exp(180) a "top-down" model lead to a uniform method of matching fundamental energy values. Once basic particle energies were identified a model of the neutron and proton was developed that lead to information that underlie fundamental interactions (forces). A cosmology model the author describes as "cellular cosmology" defines cells associated with protons that geometrically combine into what has been described in literature as "the universe". The relationship between large scale space and cells indicates that a small factor equal to 1/exp(90) is actually the gravitational coupling constant. A key field energy (2.732 MeV) extracted from the proton model is associated with the radius 7.22e-14 meters. The source of gravity is thought to be the inertial force mv^2/r*(1/exp(90)) on a proton of mass 1.67e-27 kg where r is the above radius and v is associated with a kinetic energy of 10.11 MeV (v/C=0.145). If this is the source of gravity, its energy scale is much lower than the Planck scale energy 1.2e22 MeV and could reconcile general relativity with the Standard Model. It could also shed new light on space and time and the author considers it the discovery of quantum gravity. A "Force Table" is presented for the hierarchy of interactions sourced from the proton model and comparisons to published data are carried out.

Methodology

Information theory and thermodynamics define probability P and uncertainty S as shown in the following table. The terminology and methodology involves the use of the natural log (ln). This proposal will seek meaningful quantities associated with N, where N will be derived from the value 180. Subsequently the relationship E=e0 exp N will be used to give energy after the pre-exponential can be clearly defined. The current Standard Model is based on symmetries [5][12]. The author explores symmetries that are information theory operations on the logarithms N=180, N=90, etc. and related to probabilities by the equation P=1/exp(N). Information theory probability and energy are defined together [13] as follows: As an energy ratio E/e0 increases, probability decreases to retain E/e0*P=1.

Comparison		
Information Theory	S= -ln P	S is called information
		P is a probability
Thermodynamics	S=- ln P	S is called entropy
		P is a probability
Language of Nature	N= -ln P	N is called information
		P is a probability
		P=1/exp(N)
		P=e0/E=v0/v
	E=e0 exp N or N=ln E/e0	

Information operations are associated with energy with unity separated into an energy ratio and a corresponding probability.

	1=exp(N)/exp(N)	
Energy ratio		**Probability**
E/e0=exp(N)	**E/e0*P=1**	**P=1/exp(N)**

Operations 1, 2, 3, 4, 5 and the Higgs

Modern physics accurately describes many aspects of nature but also requires the insertion of many constants. The Standard Model [4][5] makes the Higgs energy the source of particle mass but its energy has only recently been identified experimentally. A proposed value for the Higgs energy is derived from the number 90 and its energy is calculated from measurable quantities.

Eight information operations will be described below, the first of which is simply, divide the number 90 by 4 to give four values of 22.5 each. The author associates these values with what will be called the Higgs N value (see Technical endnote 1 under the column entitled N). The author also associates these values with four equal dimensions.

							Fundamental		
							N values		Probability
		Operatio	Operati	Operation 4		Operation 5			P=1/exp(N)
Higgs X dimension		22.5	10.167	5.167	15.333	0.0986	15.432		1.99E-07
			12.333		12.333	0.0986	12.432		3.99E-06
Higgs Y dimension		22.5	10.167	3.167	13.333	0.0986	13.432		1.47E-06
			12.333		12.333	0.0986	12.432		3.99E-06
Higgs Z dimension		22.5	10.167	3.167	13.333	0.0986	13.432		1.47E-06
			12.333		12.333	0.0986	12.432		3.99E-06
			0.667		0.667	0.0750	0.075		9.28E-01
Time		22.5	11.500						
			10.333		10.333		10.333		3.25E-05
Total		90	90		90		90		8.19E-40

The third, fourth and fifth operations are arithmetic operations on the number 90 as shown in the table above. The number 0.666 in the second column above is related to charge as indicated in operation 6 below. The author will show how the numbers in the table specify parts of the neutron. After each operation, the number 90 is maintained as the sum. Each part has a probability 1/exp(N) associated with it and the total probability 1/exp(90)=8.194e-40 is the multiple of these probabilities.

Operation 6 Energy

The numbers 15.43, 13.43 and 13.43 will be associated with sub-particles in the neutron/proton and the author found meaningful energies associated these numbers. That association is found with the number 10.333 - 3*0.0986=10.136. The number 10.136 represents the electron. Data label PDG in this document is from the Particle Data Group [4].

e0=E/exp(N)					**1.335E-06**	
	Find the value e0 by solving the above equation with E=.511					
	Electron mass (mev)		**mass of electron (MeV**		**0.51100024**	**MeV**
			(best value from PDG)		**0.510999**	**MeV**
	Note that 3*.0986=.296		**0.296**		**E=eo*exp(.2958)=2.72e-6 r**	
	The electric field energy of the electron is known to be: (M					**2.72E-05**

All subsequent energies are evaluated with the constant e0: i.e. E=eo*exp(N), where e0=2.025e-5 MeV. The Higgs energy can be determined with the equation E=2.025e-5*exp(22.5)=119671 MeV. This value for the Higgs published on July 4 2012 is 125300 and was within the range identified [5].

Operation 7 Energy interaction

The author calls operation 7 an "energy interaction". Operations 2, 3 and 4 created four sets of numbers and the set identified as N=13.431 and N=12.431 will be used below for demonstration. The energy interaction adds the number 2 to 13.431 to give 15.431 while at the same time, the number 2 is subtracted from 12.431 to give 10.431. Each number in the interaction has a specific place and a specific meaning described below. We will call this set of 4 numbers a quad.

E1 will be identified as a mass (a quark for the strong interaction)
E2 is identified as a kinetic energy (ke) addition to energy E1.
E3 is identified as field energy (strong potential energy for this N).
E4 is identified as a gravitational energy component.

The total energy across the interaction is conserved at zero with mass (E1) + ke (E2) +ke difference (E4+E3-E2-E1) balancing field energies (E3+E4 shown as negative). Values are placed in a table to the right of the basic interaction.

						ke (difference ke)					
N1	**E1 mass**	**N3**	**E3 field1**			**E3+E4-E1-E2**			**E3 field1**		
N2	**E2 ke**	**N4**	**E4 field2**		**E1 mass**		**E2 ke**			**E4 field2**	
	mev		**mev**		**mev**	**mev**	**mev**		**mev**	**mev**	
13.432	**13.797**	**15.432**	**101.947**		**13.797**	**83.761**	**5.076**		**-101.9**		
12.432	**5.076**	**10.432**	**0.687**							**-0.687**	
				E1+difference ke+E2			**102.634**		**E3+E4**	**-102.6**	
					Energy is conserved since 102.634=102.634						

This energy interaction has powerful implications resulting from the addition and subtraction of the number 2. The interaction creates orbits based on E=ke and are special case Lagrangians (technical endnote 2). The interaction involving E1 can be read E1 is given exp(2) of energy to become E3 . Since the numbers (N) are exponents (recall that E=e0*exp(N)), the number 2 can be associated with a fractional divisor for the original energy. The number 2 is evaluated as 1/exp(2)=0.135. After the interaction, energy 13.78 MeV becomes 101.947 MeV since 13.79/0.135=101.947 MeV. This is identical to the concept of gamma in relativity. Gamma is the fractional divisor that increases the kinetic energy of a fast moving mass involved in the Lorentz transformation. The definition required is: ke=m/gamma-m.
Operation 2 proposed that the Higgs N value is associated with each of four dimensions. Three of the dimensions are distance (think x,y,z) while the other dimension is time (t). Gamma is a measure of how far mass moves into the time dimension while distance changes by an incremental amount due to kinetic energy. Since the dimensions are equal, x/t is a constant (C, the speed of light). Furthermore, the dimensions are orthogonal, meaning that they cross each other at right angles (90 degrees). The above information leads to the famous Einstein energy momentum relationship [13].
(Etotal^2=Emass^2+(pC)^2, where p is momentum).

Operation 8 Waves

Wave/particle duality is fundamental in physics and operation 8 describes everything as waves by multiplying the probabilities and associated energies defined in operation 6 by the quantities exp(iv dt) and exp(-iv dt). The symbol i designates an imaginary number, v is frequency and dt is differential time. However, it is possible to maintain a simple approach by limiting our evaluation to times when exp(iv dt)*exp(-iv dt)=1.

After operation 8, we can use the concept of frequency (v=1/time) and use the well known relationship E=Hv, where H is Planck's constant. Planck's constant lets us relate conventional time (sec) and energy (MeV).

The equation for R

Technical endnote 2 shows development of the equation R= (HC/(2pi)/(E*m/g)^0.5. This known equation for orbital radius [14] tells us that the energy interaction establishes an orbit. Mass (m) with velocity (gamma) orbits field energy (E) at radius R. The author calls this the R equation. R for the electron quantum circle is shown below:

t=H/E and t=2*pi*R/V are equal for a little quantum circle.

2*pi*R/C=1/frequency

2*pi*R/C=H/E

where H=Heisenberg's Constant 4.136e-21 mev-sec.

Electromagnetic field		**2.72E-05**	**MeV**
t=H/E	**t=4.14e-21/27.2e-6**	**1.52E-16**	**seconds**
2*pi*R/V	**equal but V?**	**1.52E-16**	**seconds**

If we know V above, we can calculate R

Known	**1.36E-05**	**MeV**	**kinetic energy**
Known	**0.511**	**Mev**	**electron mass**
g	**0.999973386**	**g=0.511/(0.511+13.6e-6)**	
V/C	**0.007295673**	**V/C=(1-g^2)^0.5**	

R calculated from H/E=2piR/V

R=H/E*V/(2pi)

R=4.136E-21/27.2e-6*0.00729*3e8/(2*PI())=5.29e-11 meters

Operation 9 The neutron

The concepts are now in place to understand the value 90 in a different way. Recall that the probability of one neutron is P=1/exp(90)*1/exp(90). There were 8 operations on the logarithm N= 90 that set up at least three orbits. The table below is an overall energy balance comprised of the various components of the value 90. The mass and kinetic energy value 939.56 MeV is the mass of a neutron and compared to the measurement error for a neutron in the section below entitled “Data Comparisons”. We can name the energy components of the neutron using Technical endnote 1. It contains one quark of mass 101.97 MeV that is called the strange quark and two quarks of mass 13.8 MeV called down quarks. The quarks are in orbits around strong fields shown in the column labeled Strong Field. They have kinetic energy shown in the column labeled Difference Ke. Note that a third interaction is shown below the quarks. It adds 0.622 MeV to the neutron mass, is later involved in the decay of a neutron to a proton and contributes energy to the right hand side of the balance. The author identifies the total energy 2.732 MeV as the gravitation field energy. The energy 20.3 MeV (4*5.08) is set aside for expansion [22]. As explained below, this value can be a potential energy or field energy. A diagram of the neutron is shown. The three quarks are confined within a range less

than 2.01e-15 meters and contain 798.6 MeV of kinetic energy. The "bundle of quarks" is held in a larger orbit with kinetic energy 10.15 MeV by the field energy 20.3 MeV. This field energy is a result of the overall energy balance and the force is called the strong residual force. The value of this energy is the difference between the neutron mass 939.56 MeV and the (negative by convention) sum of the strong field energy 957.18 MeV.
The overall spin of the neutron is known to be 0.5 (spin is a measure of angular momentum) and the spin components are shown in the spin column which obeys the exclusion principal disallowing two down quarks to be one orbit unless they have opposite spin). The overall charge of the neutron is zero and the column labeled Charge shows the components. The neutron table is broken into two inserts below. The first insert shows the information quads for the quarks and the two quads for what will become the neutrinos and electron (quads are sets if four numbers that engage in an energy interaction and are separated by lines below). The energy is derived from E=e0*exp(N).

N for Neutron Energy Interactions			
mass	Energy-mev	S field	Energy
ke		G field	mev
15.43	101.95	17.43	753.29
12.43	5.08	10.43	0.69
13.43	13.80	15.43	101.95
12.43	5.08	10.43	0.69
13.43	13.80	15.43	101.95
12.43	5.08	10.43	0.69
-10.33	-0.62	-10.33	-0.62
10.41	0.67	10.41	0.67
10.33	0.62	10.33	0.62
0.00	0.00	0.00	0.00
90.00	sum	90.00	

The insert below shows the associated mass and kinetic energy for the quads above:

	Mass, Kinetic Energy and Fields for Neutron					
						Gravitational
			Residual ke	Expansion		Field
Mass	Difference KE			KE	Strong field	
mev	mev		mev	mev	MeV	MeV
101.95	641.88				-753.29	
						-0.69
13.80	78.69				-101.95	
						-0.69
13.80	78.69				-101.95	
						-0.69
			10.15	10.15		
0.00	0.00			10.15		-0.67
			0.048			
0.62	0.00					
130.16	799.25	939.57	**0.048**	20.30	-957.18	-2.73
		NEUTRON MASS		Total m+k	Total fields	
				Total posi	Total negative	
				959.916	-959.92	
				MeV	MeV	

A simplified model is presented below based on adding the quark values together. The value 130.16 includes the neutrino quad value 0.62 but the quark masses total 129.51 MeV below.

	Mass and Kinetic Energy			**Field energy**		
	Mass	**ke**		**Strong**	**Gravitational**	
				field ener	**Energy**	
	MeV	**MeV**		**MeV**	**MeV**	
Quark S	**101.947**	**641.880**		**-753.291**	**-0.687**	
Quark U	**13.797**	**78.685**		**-101.947**	**-0.687**	
Quark D	**13.797**	**78.685**		**-101.947**	**-0.687**	
	129.541	**799.251**		**-957.185**	**-2.061**	

Simple neutron model					
r20 uc2					
	Mass and Kinetic Energy			**Field energy**	
	Mass	**KE**	**Strong**	**Strong**	**Gravitational**
	Quarks		**Residual**	**field ener**	**Energy**
	MeV	**MeV**	**Field**	**MeV**	**MeV**
Strong	**130.16**	**799.25**		**-957.18**	-2.73
Strong Residual KE		**10.15**			
Neutron		**939.57**	**-20.35**		-959.92
neutrinos		0.05			
Gravitational ke		**10.15**			
Gravitational pe		**10.15**			
Total		959.92			

Note that the energy 0.05 MeV=0.671-0.622 is a neutrino.

Operation 10 The proton

The neutron decays to a proton and electron with a half-life of 881 seconds (PDG). The decay process starts with a separation in the interaction mentioned above containing the value E=e0*exp(10.33)=0.622 MeV. Zero separates into minus 10.33 and plus 10.33 and the 10.33 moves outside the proton to form the base for the electron. Charge components involve another separation, zero= 3*0.0986-3*0.0986. Recall that the electric field energy 27.2 electron volts=e0*exp(0.296). This gives the electron and the proton their opposite but equal electrical field energies as shown in the column labeled Charge. The electron is formed by the energy interaction near the bottom of the diagram below. Nature maintains another zero. It allows an electron to be created if and only if an anti-particle in the lepton family is created. That particle is the energy 2.47e-5 MeV named the anti-electron neutrino. Physics knows of these particles because there is missing energy in known interactions. It leaves the proton along with the 0.622 MeV. Another neutrino (the mu neutrino) results from the leftovers (10.33+.075-10.33) in the proton. As it leaves it takes energy E=e0*exp(10.408)= 0.671 MeV with it. (Together 0.671 and 0.622 MeV make up the energy difference between the neutron and proton (1.293 MeV). Again refer to measured data and compare it to the authors "model" of the proton and electron. The spin for the proton, electron and neutrinos are all 0.5.

Proton mass model

N for Proton Energy Interactions			
mass	Energy-mev	S field	Energy
ke		G field	mev
15.43	101.95	17.43	753.29
12.43	5.08	10.43	0.69
13.43	13.80	15.43	101.95
12.43	5.08	10.43	0.69
13.43	13.80	15.43	101.95
12.43	5.08	10.43	0.69
		-0.30	-2.72E-05
		equal and opposite charge	
-10.33	-0.62	-10.33	-0.62
10.41	0.67	10.41	0.67
10.14	0.51	10.33	0.62
0.20	0.00	0.30	2.72E-05
90.00		90.00	

					Gravitational	
		Residual ke				Field
Mass	Difference KE		Expansion		Strong field	
mev	mev	mev	mev	KE	MeV	MeV
101.95	641.88				-753.29	
						-0.69
13.80	78.69				-101.95	
						-0.69
13.80	78.69				-101.95	
						-0.69
		10.15		20.30	expansion pe	
				0.00	expansion ke	
	-0.67		0.67	v neutrino		
			0.05	neutrinos		-0.67
129.54	798.58	**938.27**	**PROTON MASS**		2.72E-05	
0.51	0.11	e ke			-2.72E-05	
ELECTRON						
			Total m+ke		Total Negative	
	0.62	938.27	0.72	**959.92**	**-959.92**	-2.73
				MeV	MeV	

Adding the quarks together, separating the 0.622 MeV for the electron quad and ejecting a neutrino 0.671 MeV gives the proton.

	129.541	**799.251**	**-0.671**
		10.151	
Proton		**938.272**	**Mev**

And the simplified model follows:

	Mass and Kinetic Energy			Field energy	
	Mass	**KE**	**Strong Residua**	**Strong field energy**	**Gravitational Energy**
	MeV	**MeV**		**MeV**	**MeV**
Strong	**130.16**	**799.25**		**-957.18**	-2.73
Strong Residua		**10.15**			
Neutron		**939.57**	**-20.30**		-959.92
below, the Neutron decays to a proton, electron and neutrino					
neutrinos		0.05			
Proton		**938.27**		**2.72E-05**	
ejected neutrino		**0.67**		**E/M charge splits**	
Electron	**0.51**	**0.11**		**-2.72E-05**	
Gravitational k		**10.15**	**10.11**		
Gravitational p		**10.15**	**10.19**		
Total		959.92			

Data comparisons

Note the excellent agreement with (National Institute of Standards and Technology [15] and Particle Data Group[4].

931.4940281	nist		0.51099891		0.5110002	548.581341	-1.33472E-06		1.30E-07
931.4940282	pdg	548.5799095	0.51099891		0.5110002	548.581343		-0.00143339	2.40E-07
simple cell g67	Data		Data (mev)		Calculation (mev)	calculation	Difference	Difference	measurem
	Ratio		Particle Data Group		Present model	(amu)	(mev)	(amu)	error
		(amu)			(mev)				
Neutron		1.008664916	939.5653600		939.565353	1.00866492		-8.3214E-09	
Proton		1.007276467	938.2720132	pdg	938.272013	1.00727647	-1.42109E-10	4.77933E-10	6E-10
Neutron/electron	1838.683661		939.5653460	nist	939.565353		-7.11786E-06		2.30E-05
Proton/electron	1836.152672		938.2720130	nist	938.272013		-2.30142E-07		2.30E-05

Fundamental forces

The following table follows directly from the proton mass model above. The proton is a manifestation of information symmetries and contains orbits that underlie some of the fundamental forces. Gravitational mass is 129.541. Refer to the proton model above to see the source its Ke (10.151 MeV) and Field Energy (-2.732 MeV). The strong field energies of the three quarks are added together and orbit the true mass of the three quarks (129.541 MeV). The Standard Model identifies the weak interaction as the fourth fundamental force but information from the proton model involves what is called the strong residual force. The strong residual field energy (-20.3 MeV) is the missing energy required to balance the total to zero (negative 959.92 and positive 959.92 MeV). The strong residual mass is the 129.5 true mass of the quarks plus the quark kinetic energy (799.251 MeV) because of the orbits identified in the following section. From these values, gamma and a radius (R) are derived. Gamma is ke/(m+ke) and R =(HC/(2pi)/(E*m/g)^.5.

	Mass (m) (mev)	**Ke (mev)**	**gamma (g**	**R meters**	**Field (E (mev)**
Gravity	**938.272**	**10.110**	**0.9893**	**7.2238E-14**	**-2.732**
Electromagn	**0.511**	**1.36E-05**	**0.99997**	**5.2911E-11**	**-2.72E-05**
Strong	**129.541**	**798.580**	**0.1396**	**2.0936E-16**	**-957.18**
Strong residu	**928.121**	**10.151**	**0.9892**	**1.4297E-15**	**-20.303**

The cellular cosmology model

A cosmology model is proposed [17][18][19] that is based on exp(180) cells, each associated with a proton. Let small r represent the radius of a many small spheres and large R represent the same surface area of one large sphere containing exp(180) spheres. There is one proton on the surface of each cell. Large M equals small m*exp(180). A cosmology model based on a large surface offers the feature that no particle occupies a preferred position. This feature is required so that the laws describing the particle and its position are no different than any other particle. Geometrically, many small cells with the same combined surface area offer the same feature. General relativity uses the metric tensor (ds^2=three dimensions dr^2+ Cdt^2). The surface area of a 2-sphere is broken into many small spheres with an equal surface area i.e., Area=4*pi*r^2*exp(180) and this leads to R=r*exp(90). The total energy will be that of a protons/cell plus a small amount of kinetic energy. Based on geometry, two substitutions are placed in G below, i.e. M=m*exp(180) and R=r*exp(90).

Area=4*pi*R^2
Area=4*pi*r^2*exp(180)
A/A=1=R^2/(r^2*exp(180)
R^2=r^2*exp(180)
r=R/exp(90)   surface area substitution

M=m*exp(180) mass substitution

For gravitation and large space, we consider velocity V, radius R and mass M as the variables (capital letters for large space) that determine the geodesic. With G constant, M=m*exp(180) and the surface area substitution R=r*exp(90), the gravitational constant would be calculated for large space and cellular space as follows (lower case r,v and m below are for cellular space):

At any time during expansion		
Large space		**Cellular Space**
		With substitutions:
		R=r*exp(90) and M=m*exp(180)
R*V^2/M=	**G=G**	**r*exp(90)*V^2/(m*exp(180))**
R*V^2/M=	**G=G**	**(r*v^2/m)/exp(90)**

It is known that gravity is inertial as stated by the general theory of relativity. The source of information about gravity is a fundamental radius that partially defines the geometry of space time. The radius (by the equation R=(HC/(2pi)/(2.732) is 7.22e-14 meters. The orbital velocity is given below:

Identify the radius and time for the gravitational orbit described above				
Fundamental radius=1.93e-13/(2.732*2.732)^.5=7.224e-14 meters				
Fundamental time=7.224e-14*2*PI()/(3e8)=h/E=4.13e-21/2.732				
Fundamental time	1.514E-21	seconds		

Gravitational Constant

The above information leads directly to a calculation for the gravitational constant. Physics has struggled with the reconciliation of general relativity and quantum field theory. The main reason for the difficulty is gravity's very low force and very long range effect. The above radius partially defines the geodesic for gravity. The proton is on this radius and its mass and velocity complete the geodesic (a geodesic is the combination of r,v and m that give the gravitational constant G, i.e. G=r*v^2/m. The author also believes that the value 1.51e-21 sec defines fundamental time. As this value repeats, time increases. The author used these concepts to study cosmology [24][18][20].

Source of Gravitational Constant G:

GRAVITY			
		proton	neutron
Neutron Mass (mev)		**938.2720**	**939.565**
Neutron Mass M (kg)		**1.673E-27**	**1.675E-27**
Field Energy E (mev)		**2.732**	**2.732**
Kinetic Energy ke (mev)		**10.111**	**10.140**
Gamma (g)=M/(M+ke)		**0.9893**	**0.9893**
Velocity Ratio v/C=(1-g^2)^0.5		**0.1456**	**0.1457**
R (meters) =(HC/(2pi)/(E*E)^0.5		**7.224E-14**	**7.224E-14**
Inertial Force (F)=(M/g*V^2/R)*1/EXP(90) N		**3.656E-38**	**3.666E-38**
HC/(2pi)=1.97e-13 mev-m			
Calculation of gravitational constant G			
G=F*R^2/(M/g^2)=NT m^2/kg^2		**6.6739E-11**	**6.6743E-11**
Published by Partical Data Group (PDG)		**6.67E-11**	**6.6743E-11**

The inertial force m/g*v^2/R*1/exp(90) equals 3.66e-38 Nt. This orbit is caused by firstly, a field of 2.732 MeV establishing the radius and secondly a neutron falling from a potential energy of 20.3 MeV to the radius and developing kinetic energy 10.14 MeV. Gravitation is known to be inertial and in general relativity the central mass shapes space-time and a body follows the curvature. When a body of mass M finds the combination of radius R and velocity V where it experiences no force, it is called the geodesic. This is known as the equivalence principle in general relativity. In cellular cosmology, general relativity continues down to the quantum level. The field energy 2.732 MeV shapes space-time and a neutron falls to that radius. The proton model gives the neutron 20.3 MeV at the beginning. When a geodesic is established it has 10.14 MeV of potential energy and 10.16 MeV of kinetic energy. For the cell with the aid of 1/exp(90), the geodesic is:

V	m/sec	0.145*3e8=4.37e7
M	kg	1.67E-27
R=GM/V^2*exp(90)		7.22e-14 meters

The author believes that the radius 7.22e-14 meters is the fundamental radius of exp(180) cells that define the beginning radius of a large volume associated with the universe. As these cells expand to about 0.54 meters each they define a large radius of about 6.2e25 meters.

Calculation of gravitational force with accepted the accepted coupling constant

In physics, the gravitational coupling constant, αG, is the coupling constant characterizing the gravitational attraction between two elementary particles having nonzero mass. αG is a fundamental physical constant and a dimensionless quantity, so that its numerical value does not vary with the choice of units of measurement (Wiki).

AlphaG=Gme^2/(hC)=(me^2/mP^2)=1.752e-45

http://en.wikipedia.org/wiki/Gravitational_coupling_constant		
	alphaG=(me/mP)^2=1.752e-45	
	m/me=1836.15	
	alphaG=(m*1836.15/mP)^2=1.752e-45	
	alphaG=(m*1836.15/mP)^2=1.752e-45	
	alphaG=(m/mP)^2=1836.15^2*1.752e-45=5.907e-39	
	alphaG=5.9068e-39	5.90677E-39
	G/hC=1/Mp^2	
	alphaG=(m^2*G/hc)=5.907e-39	
	F=alphaG/R^2	
	F=(G m^2/hc)/R^2	
	compares to F=Gm^2/R^2 if multiplied by hC	
	F=(5.907e-39)*hC/R^2	

This coupling constant can be understood as follows:

http://en.wikipedia.org/wiki	
alphaG=(mp/me)^2=1.752e-45	
mp/me=1836.	where mp/me=proton/electron
alphaG=1836.15^2*1.752e-45=5.907e-39	
F=(5.9068e-39)*hC/R^2	

If R for the force calculation is 7.22e-14 meters, as proposed above, the force is:

F=(5.9068e-39)*hC/R^2			
	hbar	6.5821E-22	mev-sec
	hbar in NT-m-sec	1.05E-34	NT m sec
	hbarC in NT-m^2=K	3.16E-26	NT m^2
F=(5.9068e-39)*K/R^2			
F=(5.9068e-39)*3.16e-26/(7.22e-14)^2=3.58e-38 NT			
3.579E-38	NT		

This result agrees with the simple Newtonian force within adjustments for gamma:

F=Gmm/R^2 (nt)=6.67428e-11*1.6726e-27^2/7.224e-14^2=3.666e-38 nt

Note the force (3.58e-38 NT) derived from the accepted coupling constant is identical within gamma to the calculation above (3.66e-38 NT) under the above heading "Source of Gravitational Constant G". Based on this the author believes the coupling constant for G is in fact the small factor 1/exp(90). This is the derived value 1/exp(90) in the heading above entitled "Cellular Cosmology Model".

The sources of information for this table are the neutron/proton orbits identified in the diagram above and the neutron/proton information model. Coupling constants to the proposed Higgs energy are shown since it appears to be at the top of the mass/energy hierarchy.

Force Table

Physics utilizes a coupling constant to give the force (interaction) for each of the four fundamental forces in nature. The coupling constant for gravity was presented above. The table below reviews the coupling constant for the hierarchy of additional interactions. The strong interaction values come from the proton model. The author notes that the quarks in the model are in high energy states [3] and that the accepted energy states (up and down quarks) have the same total energy (lower mass and higher kinetic energy). The electron and its field have many states, some separated by low amounts. The Rydberg energy is the accepted field energy and the author notes that the N value (0.2958) gives a value through the equation E=2.025e-5*exp(N) that must be slightly reduced due to field shielding. The key value for the strong residual interaction is the kinetic energy 10.151 MeV. Atomic binding energy results from reductions in this value and two smaller affects as described in "A Simple Model of Binding Energy" [1]. The particle mass is 938.272-10.151=928.121 MeV. The strong residual energy is a field since it is missing in the following balance: The proton model shows a total of 959.92 MeV balanced by 959.92 MeV field energy, but the proton itself is only 939.272. The difference (959.92-(938.272+1.293+.05)=20.3) acts as a field.

Unification Table		**cell ax74**		**Strong**		**Electromagn**	**Gravity**
Higgs energy (mev)				**Combined**	**Strong Residual**		**proton**
*****Field coupling to Higgs field Energy**							
	Potential energy of proton falling into gravitational field (mev)						**20.115**
Field Energy E (mev)				**957.18**	**20.303**	**2.72173E-05**	**2.732**
Mass Coupling to Higgs field energy							
Particle Mass (mev)				**130.16**	**928.121**	**0.511**	**938.272**
Mass M (kg)				**2.32E-28**	**1.65E-27**	**9.11E-31**	**1.6726E-27**
Kinetic Energy (mev)				**798.58**	**10.151**	**1.361E-05**	**10.111**
	Rydberg energy from PDG					**1.361E-05**	
Gamma (g)=m/(m+ke)				**0.1401**	**0.9892**	**0.99997**	**0.9893**
Velocity Ratio		**v/C=(1-(g)^2)^.5**		**0.9901**	**0.1467**	**7.298E-03**	**0.1456**
R (meters) =((HC/(2pi)/(E*M/g)^0.5)				**2.0929E-16**	**1.4297E-15**	**5.291E-11**	**7.2238E-14**
Electromagnetic R minus proton R=5.291627e-11-1.4297e-15						**5.291E-11**	
Force	**Newtons**	**F=E/R*1.6022e-13**		**732765.9**	**2275.2**	**8.242E-08**	**3.6556E-38**
						7.250E-09	**7.2238E-14**
Inertial F	**Newtons**	**F=M/g*V^2/R**		**710992.321**	**2262.86246**	**8.241E-08**	**3.6556E-38**
Force=HC/(2pi)/R^2=3.16e-26/Range^2 (n				**721797.0**	**15466.9**	**1.129E-05**	
HC/(2pi)	**3.16E-26**	**(4.13e-21*3e8*6.24e12/(2*pi())**					
	F=(5.907e-39)*hC/R^2 (nt)						**3.5786E-38**
	F=6.67428*m^2/R^2						**3.5782E-38**
Coupling constant derived from this work				**1.0152**	**0.147099**	**137.03047**	**1/exp(90)**
Derived c^2 (E*R) mev m				**2.00E-13**	**2.90E-14**	**1.44E-15**	**1.19E-51**
Derived c^2 joule m				**3.21E-26**	**4.65E-27**	**2.31E-28**	**1.91E-64**
Derived exchange boson (mev)				**942.856**	**138.02**	**0.0037**	**2.732E+00**
***published c^2 mev m**					**1.56E-14**	**1.44E-15**	**1.17E-51**
***published c^2 joule m**					**2.5E-27**	**2.31E-28**	**1.87E-64**
***Range**						**5.29E-11**	**8.82E+25**
***http://www.lbl.gov/abc/wallchart/chapters/04/1.html**						**5.29177E-11**	
Published coupling constant (PDG)				**Rydberg data from PDG**		**137.03599**	

Comparison of force table coupling constants with published results

The Higgs energy is thought of as the source of field and mass through energy coupling constants. Strong interaction coupling constants in the literature are 1.0 based on the field energies acting as exchange bosons (gluons). The author did not find coupling constants for the strong interactions (they are not observed independently).
Conventional physics forces are F (NT) = HC/(2*pi)/R^2=3.16e-25/R^2 NT. From this a coupling constant is calculated as the ratio of this force divided by the force in the box.

Note the use of the new coupling constant 1/exp(90). The calculated electromagnetic coupling constant is very close to the published value. The Strong Residual coupling constant is 0.147.
The author found published coupling [21] constants for further comparison. The values were labelled c^2 and the values were in Joule-MeV. Good agreement is shown between derived values and published values although no attempt was made to calculate forces.

The concept of gauge forces utilizes bosons moving at velocity C and exchanging inertia to explain action at a distance. For example the strong residual energy is described historically by the Yukawa potential and a pion exchange particle. Boson masses calculated in the table above and shown below using boson energy (MeV)=HC/R=1.97e-13 MeV-m/R. The literature value for the exchange pion is 131.5 MeV, slightly lower than the author's calculation for this boson is 138 MeV.

Derived exchange boson (mev)		**942.856**	**138.02**	**0.0037**	**2.732E+00**

Range of the gravitational force

The factor exp(90) may be the reason that the gravitational force has a large range compared to the other forces. The analysis could involve dh proportional to dp*dx or de*dt. Multiplying dx by exp(90) makes the most sense and the long range could be 8.9e25 meters.

Summary

The author believes that nature's underlying laws are information laws based on the large number exp(180). This paper appears to decode some of the information laws applicable to well documented particles. Particles are assigned information values N that give the Energy E=e0*exp(N). The value e0 is 2.025e-5 MeV based on the recognizable electron with N=10.136. Nature apparently assembles N values into other recognizable particles and a allowed the author to develop a mass model of the neutron and proton. Considering the proton as a manifestation of underlying law information was extracted that appears to be the sources of information for the four fundamental interactions. An interaction hierarchy was condensed into a table the author labels as the Force Table and comparisons were made between accepted coupling constants and predicted values.

Gravity in known to be the geometry of space time but current gravitational theory produces infinities and quantum foam like space under some conditions. It is generally accepted that the source of the gravitational constant (G) is the Planck scale. The fundamental relationship gives the Compton wavelength (for gravity the Planck length L), L=(\h*G/C^3)^.5 as a function of the reduced Planck or Heisenberg constant (\h pronounced hbar), G and C the speed of light. The Compton wavelength is 1.61e-35 meters and this is associated with the Planck energy 1.2e22 MeV. Technical endnote 3 compares that Planck scale with the proton scale proposed and concludes that the protons scale is more reasonable. Based on the proton mass model a field energy of 2.732 MeV appears to define a radius (7.22e-14 meters) that the proton falls into and establishes a geodesic. The inertial force is considered in this paper as the source of gravitational constant G. The theory required a new approach to modeling cosmology. Cells were defined as small spaces associated with each proton that has a geometrical relationship to the universe as a whole. This allowed two substitutions in the equation G=RV^2/M. The first substitution is M universe= m proton*exp(180). In general relativity the metric

tensor (ds^2) of a 2-sphere is and the second substitution is R universe= r cell*exp(90). Together the substitutions give G=rv^2/m*(1/exp(90). The small factor 1/exp(90) was shown to be the coupling constant for gravitation when forces were compared with currently accepted coupling constants. The author proposes that the basis of time and space are the values 7.35e-14 meters and 1.54e-21 seconds. In addition, it appears that this paper can be considered a reconciliation of the Standard Model [4] [5] and Einstein's general relativity.

A unified theory must meet other criteria to be of value. The neutrinos, electron, muon, taon, mesons and baryons should also be manifestations of the underlying laws. Although beyond the scope of this document, the author found a progression of energies underlying these particles [3]. This work should be considered tentative.

The binding energy curve should also be explained by the theory and this is successfully demonstrated [1].

In addition, a unified theory will also be fundamental to the field of cosmology. Equations for expansion were developed [24][18] for the cellular model that agree with WMAP [8] expansion history. The resulting expansion model was used to evaluate kinetic energy and potential energy of expansion. Conservation of energy is demonstrated but dark energy was shown to be negligible. Based on matching the Hubble constant with the accepted value (2.3e-18/sec) the current radius of each cell is 0.46 meters. The cellular approach, expansion history and the value 1/exp(90) were used to compare time dilation values for special and general relativity. Schwarzschild equations including time dilation dt (dt=1/gamma-1) are known to be solutions in general relativity. It was shown that (dt) values for general relativity and special relativity are equal for cells throughout expansion when the value exp(90) is introduced into the Schwarzschild equation. The equation becomes: dt=1/(1-exp(90)*GM/(C^2*R))^.5-1. Values for (dt) range from 0.01 sec to 1.67e-15 sec.

Technical endnote 1 Particle review and number of neutrons

unifying concepts.xls cell aw48			Proposed	IS Hughes
		Particle Data	Energy	Bergstrom
		Group energy	E=eo*exp	Randall
Identifier	N	(Mev)	(Mev)	energy
			e0=2.02e-	(Mev)
0.0986	0.0986			
e neutrinc	0.197	2.00E-06	2.47E-05	3.00E-06
E/M Field	0.296	0.0000272	2.72E-05	
	(3*.0986=.296)			
ELECTRO	10.136	0.51099891	0.511	
mu neutri	10.408	0.19	0.671	less than 0.2
Graviton*		1.75E-26	2.732	
Up Quark	11.432	1.5 to 3	1.867	1.5 to 4.5
vt ?	12.432	18	5.076	less than 35
Down Qua	13.432	3 to 7	13.797	5 to 8.5
Strange q	15.432	95+/-25	101.947	80 to 155
Charmed	17.432	1200+/-90	753.29	1000 to1400
Bottom Qu	19.432	4200+/-70	5566.11	4220
Top Quarl	21.432		41128.30	40000
W+,w- bos	22.099	80399	80106.98	81000
Z	22.235	91188	91787.1	91182
HIGGS	22.575	125300	128992.0	105000
* sum of 3 Ns of 10.431+10.408 (2.73/exp(60)=2.4e-26 mev)				
Mw/Mz	Weinberg radians		sin^2 theta	
0.87275	0.509993	0.48817152	0.23831	

The above table strongly suggests an exponential relationship in energy for the fundamental particles. The proposed N values compare favorably with data from various sources and sin^2 theta agrees with Erler [5] figure 10.1 at low energy.

Number of neutrons

The best data is from the recent WMAP project reported [8] and the Supernova Cosmology Project [11]. Recent data indicate that there are two components to expansion [8] [11]. Critical density [9] has been used historically to predict the size of the universe and early equations like the Friedmann equation [6][7][9][10] give expansion predictions. There are questions regarding components of the critical density WMAP [8] but data indicates that 0.27 of the value represents mass, comprising dark and light particles. For purposes of estimating the number of particles half are assumed to have mass of a neutron (1.675e-27 kg).

Note: units used in this document are kilograms (kg), meters (M), newtons (nt), seconds (sec) and million electron volts (MeV).

Question about number of particles in universe		
Critical Density Predictions (kg/M^3)		
Density	**8.93E-27**	**pg 337 isHughes**
Density	**3.73E-26**	**rho zero pg 103 Peebles at H=.71**
Density rh	**9.5E-27**	**WMAP basic results Table 3**
R	**6.30E+25**	**meters**
N protons	**1.61E+78**	**N=rho*0.27*(4/3)*PI()*R^3/1.67e-27**
ln (N)	**180.0759**	

Technical endnote 2 The equation for R and the Lagrangian

There is a circle associated with the concept of frequency. One (1) divided by frequency is the time required for a wave at velocity C to move around the circumference of the circle. The table below gives us the radius of the circle in terms of H and E. This circle also allows us to relate the energy interaction of operation 7 to an orbital radius R. The radius is 1.93e-15 meters when the field energy E= 101.947 MeV is put into the equation R= (HC/2pi)/E. Because 101.947 MeV is also equal to 13.79/0.135 and 0.135 is gamma, E is also equal to m/g. The new relationship R= (HC/(2pi)/(E*m/g)^0.5 (mass with velocity orbits a field at radius R) tells us that the energy interaction establishes an orbit because this equation is a known equation [14]. This orbit is established and maintained by the energy interaction. The last part of the following table demonstrates the relationships with values from operation 7. The author is aware that because of particle-wave duality only a probabilistic determination of radius is possible and it is noted that all results using these radii are probabilistic in nature.

The time for one cycle of the wave is 2*pi*R/C since the wave moves at C (R is the radius of a circle).							
2*pi*R/C=1/frequency							
2*pi*R/C=H/E		where H=Heisenberg's Constant 4.136e-21 mev-sec.					
Using the same example as detailed in operation 6:							
Field energy E		101.947	mev				
2*pi*R/C	time	4.057E-23	seconds				1.973E-13
H/E	time	4.057E-23	seconds	mev-meters			pdg value
R=H*C/(2*pi)/E		1.936E-15	meters	E in the equation to the left can also be:			
				E=(E*E')^.5=(E*m/g)^.5			
convenient constant: HC/(2*pi)=1.973e-13 mev-meters				because in the equation to the left, E'=m/g=13.977/.1353			
			1.973E-13	(E*m/g)^.5=E=(101.947*13.797/.1353)^.5			
Substitute (E*m/g)^.5 for E in the above equation to give an equation for radius involving mass, field energy and gamma.							
R=(HC/(2pi)/(E*m/g)^0.5		This equation represents a force balanced orbit with kinetic energy 0.5*field energy.					
		It is also accurate for orbits determined by energy balances as demonstrated below.					
	From operation 6 definitions and the operation 6 example.						
Field energy E		101.947	mev				
mass (m)		13.7970	mev	mass divided by g is equivalent to the field			
ke		88.150	mev	Instead of g=1/exp(2) gamma can be defined from ke			
gamma (g)	g=1/exp(2)	0.13534			g=(m/(m+ke)	0.13534	
v/C	v/C=(1-(g)^2)^0.5	0.9908	297034325.2			101.9469	
v/c		1.9356E-15	R=(HC/(2pi)/(E*E)^0.5				
R	meters	1.9356E-15	R=(HC/(2pi)/(E*m/g)^0.5				
	The following conversion constant converts mev to kg:				1.783E-30	kg/mev	
	Convert mev to newton-meters with the following conversion constant:						(nt-m)/mev
	Check the force balance:						
	Inertial:	F=m/g*C^2/R	8438.623	newtons		Ef=F*R=m+ke=m/g*C^2	
1	Field	F=E/R	8438.623	newtons			
			8438.623	newtons			

The author refers to the equation above for orbital radius as the R equation.

An orbit based on R is a special case of a Lagrangian as shown below:

E=potential energy		
KE=kinetic enrgy		
Lagrangian		
L=0=potential energy-kinetic energy		
E=ke		
1=ke/E		
1=ke/(E*E)^.5		
1=ke/(m*E/g)^.5		
1=ke/c/(h/(2pi)*hc/(2pi)/(m*E/g)^.5		
	r=hc/(2pi)/(m*E/g)^.5	
1=ke/c/(h/(2pi)*r		
	pc=ke	(p=momentum)
1=p*r/(h/(2pi)		(pr=action)

Technical Endnote 3

TWO CANDIDATES FOR THE CORRECT GRAVITATIONAL ENERGY SCALE

Candidate #1 the conventional Planck scale

There are tests for quantum gravity: We will compare the Planck scale relationships [22] with the relationships above.

Nomenclature and review of the Planck scale

	Constants				
h	**6.58E-22**	**MeV-sec**	**reduced**		
E	**1.22E+22**	**MeV**	**Planck Energy**		
M	**2.18E-08**	**kg**	**Compton mass**		
G	**6.67E-11**	**Nt m^2/kg^2**	**gravitational**		
C	**3.00E+08**	**m/sec**			
	Relationships				
	L=G*M/C^2	**Compton wavelength**			
	L=G*M/C^2	**6.67e-11*2.18e-8/3e8^2**	**1.62E-35**	**meters**	
	L=C*h/E	**3e8*6.58E-22/1.22E+22**	**1.62E-35**	**meters**	
	L=h/(M*C)		**1.61E-35**	**meters**	
	G=h*C/M^2	**6.58E-22*3e8/2.18e-8^2*1.6**	**6.67E-11**	**Nt m^2/kg^2**	

The criteria for quantum level is "action" [22]. Action must be 1.0 to be at the quantum level (it just tests whether the variables make a little circle.) Action is the value P*L/h where P is momentum, L is the wavelength and h is Heisenberg's reduced constant (H/(2*pi) labelled \h, hbar or just lower case h). Compare action for two energy levels, the Planck scale (1.22e22 MeV and the much lower level 938.27 MeV proposed above. Either level could be a candidate for defining gravity since the action is 1 in both cases.

	action= p*L/h				
	Planck energy	**(MeV)**	**1.22E+22**		
	Planck L	**(meters)**	**1.62E-35**		
	Momentum	**p=E/C**	**4.07E+13**		
	p*L	**Mev-sec**	**6.58E-22**		
	action= p*L/h		**1.00E+00**		

Yes, the Planck scale meets the criteria for being at the quantum level because action=p*L/h is 1.

Candidate #2 quantum gravity (the "dark horse" candidate)

Proposal	(cell d305 "unified")		
Field Energy		2.732	mev
constant	HC/(2pi)	1.97E-13	mev-m
	R=constant/E	7.22E-14	m
	Field side	R side	
	H/E	2*pi*r/C	
time (t)	1.51E-21	1.51E-21	sec
Proposal p	(p=E/C)	9.11E-09	mev-sec/m
p*R/h		1.00	
qm test	M/C^2*R^2/t	6.58E-22	mev-sec
qm test/h	M/C^2*R^2/t/h	1.00	

The proposal also meets the action=1 requirement for a quantum level relationship since action =P*R/h=1.

Further comparison:

The proton mass is 938.27 MeV, not 1.22e22 MeV (1.67e-27 kg, not 2.17e-8 kg). Compare the calculation for gravitational constant for the Planck scale and the quantum gravity mass level and note that they differ by a large factor.

G=h*C/M^2

G=(6.58e-22*3e8/(2.18e-8)^2*1.603e-13)
6.66E-11 Nt m^2/kg^2

G=h*C/M^2
Proposed mass 1.67e-27 kg
G= (6.58e-22*3e8/(1.67e-27)^2*1.603e-13)/exp(88.03)

6.66E-11 Nt m^2/kg^2

Gravity, defined the Planck way requires a large divisor exp(88.03). Both candidates use a large divisor but there is a huge difference between exp(88.03) and exp(90). A divisor is required because gravity is shared among exp(180) protons and the surface area of each cell is 1/exp(90) of the surface area of the universe but this makes 1/exp(90) the correct coupling constant.

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