Dark Matter Resolution and Critical Density with No Missing Matter

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ABSTRACT
Cosmologists are currently facing major challenges. For over a century, measurements of the velocity outward from the center of a galaxy indicates that the velocity remains high. Newtonian mechanics indicates that the velocity should decrease. Some are exploring whether there is "dark matter" in the outer portion of the galaxy that would flatten the velocity profile. The true source of this discrepancy is demonstrated based on the accepted concept of gravitational redshift. Instruments that measure velocity profiles are picking up a signal that is the sum of velocity and potential energy redshift. Since potential energy plus kinetic energy is constant this signal is constant. After accounting for the potential energy signal, it is shown that velocities obey Newtonian gravity. This is detailed in Part 1 of this document.

The other major challenge is related to WMAP and PLANCK mission that measured and analyzed the cosmic background radiation. They confirmed $V/R=2.26\text{e-}18$ 1/sec for the current expansion rate and calculate the critical mass rhoc with $V/R=(8/3 \pi G \rho_c)^{0.5}$. Rhoc was $9.14\text{e-}27$ Kg/m^3. Using this as the denominator, the indicated composition is about 4% is normal matter, 23% dark matter and 72% dark energy. Dark energy is related to V/R measurements of supernova "standard candles" that indicate the expansion rate is unexpectedly accelerating.

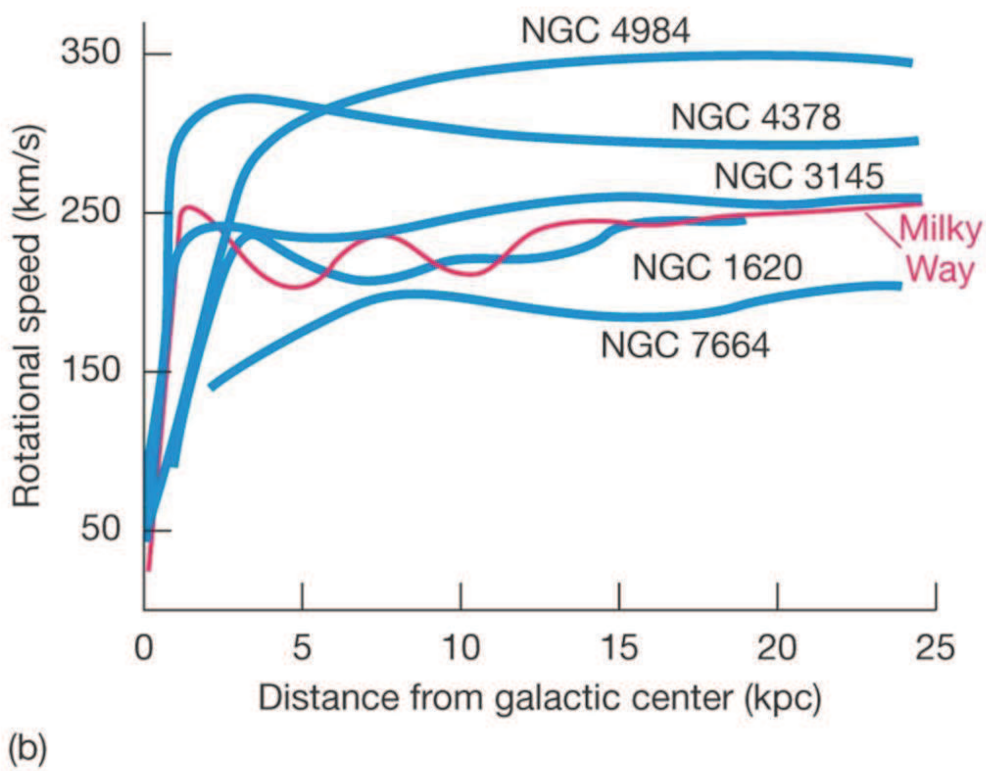
The author's proton model and low energy scale gravitational relationships allows the measured Hubble's constant to be better understood. The basic equation is correct but applies separately to each of three energy sources. When the original energy source decreases to 0.11 MeV, conditions cause He4 to fuse and release additional energy. This increases the radius and temperature and is the point that establishes the measured baryon-photon ratio. Near the end of expansion stars light-up and release energy for further expansion. When these three sources of

energy are accounted for individually critical density is based on one proton. This means there is no missing matter. Dark energy is probably due to energy released by stars. This is detailed in Part 2 of this document.

Gravity is still an active research area for scientists even though English mathematician Isaac Newton published his work entitled *Principia* in 1667. Some of the best theorists have been working on quantum gravity because there is a basic disconnect at the heart of gravity. The problem is that although Isaac's equations are correct, they describe large scale behavior of objects. Einstein's general theory of relativity is the modern theory of gravity but again, it describes large scale behavior of objects following paths curved by mass. This leaves small scale (quantum scale) gravity a subject of research. The relationships in Part 3 for quantum gravity build on the best science available but correlates data with tools from the field of information theory. This approach is new and leads to a fresh view of cosmology data. The author believes that the proton is a manifestation of the laws of physics. Use of a proton mass model [1][9] and a concept called cellular cosmology allows us to understand gravity and expansion based on the space associated with each proton (called a cell). Gravity is currently based on the Planck scale but three alternative sources of the gravitational constant at a low energy scale are discussed. Part 3 contains the details.

Part 1 Explanation of galaxy flat rotation curves with no dark matter

Flat galaxy rotation curves are unexpected observations.



Most cosmologists today attribute the observed flat rotation curve to a calculated halo of dark matter. But it has not been detected.

Physics for flat galaxy velocity curves is proposed that preserves Newtonian gravitation and explains the flat velocity profiles. The proposal shows that there are two components to the redshift measured to determine velocity. One component is the normal Newtonian velocity that decreases with distance from the center of the galaxy. But potential energy increases with distance from the center and the two energy components add to a constant value. Calculations are presented for the velocity doppler effect (Lorentz transformation). If measurements are based on this, ke/m+pe/m=constant, where m is a proton. The more conventional wavelength shift is (delta lambda/lambda=v/C). With z=dlam/lam=v/C, there is a velocity v for ke and v for pe that makes dlam/lam+ dlam/lam=constant. The calculation procedure is straightforward and matches data for five galaxy data sets examined. Dark matter is not required in this approach.

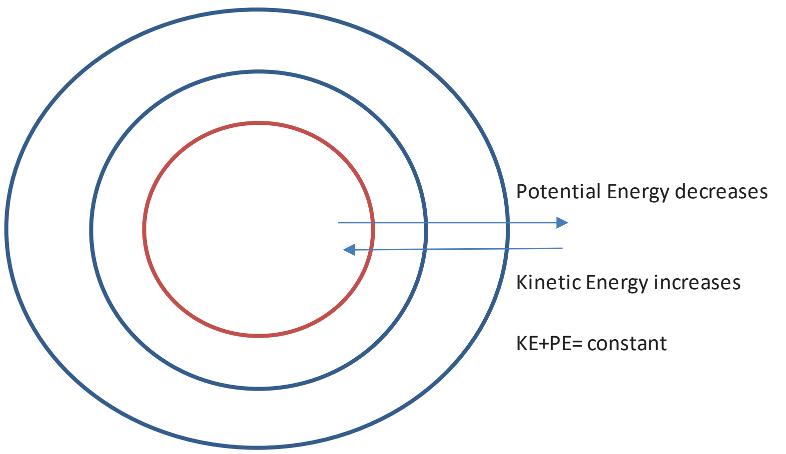
Example: Protons have expanded outward during most of the history of the universe. Gravitational accumulation [15] starts with energy/particle above the eventual orbit kinetic energy. We will examine a galaxy that orbits stars at 227000 m/sec. This velocity was created from the “fall” into the galaxy from the expansion determined spacing of the protons. In this example they accumulate into a galaxy of 2e41 Kg central mass. The (test) proton falls toward the central mass M and orbits at V=(GM/R)^0.5. We call this the proper Newtonian orbit.

The radius R responds to kinetic energy and the accumulation of mass (Mgalaxy). Radius R=GM/V^2 but we will examine a range of orbits from 1 to 10 times the base orbit of 2.56e20 meters.

M galaxy=2e41 Kg			Fnewt=6.67e-11*2E+41*1.67E-27/Vnewt^2 (Nt)			
Radius R	V=(Gm/R)^2	(MeV)			Finertial=1.67E-27*2.27e5^2/R (Nt)	
	(meters/sec)	ke=.5mV^2		Vmeasured		Ratio
2.56E+21	7.22E+04	2.72E-05	3.40E-39	2.27E+05	3.36E-38	9.89
2.30E+21	7.61E+04	3.02E-05	4.20E-39	2.27E+05	3.74E-38	8.90
2.05E+21	8.07E+04	3.40E-05	5.31E-39	2.27E+05	4.20E-38	7.91
1.79E+21	8.63E+04	3.88E-05	6.94E-39	2.27E+05	4.80E-38	6.92
1.54E+21	9.32E+04	4.53E-05	9.45E-39	2.27E+05	5.60E-38	5.93
1.28E+21	1.02E+05	5.43E-05	1.36E-38	2.27E+05	6.73E-38	4.94
1.02E+21	1.14E+05	6.79E-05	2.13E-38	2.27E+05	8.41E-38	3.95
7.68E+20	1.32E+05	9.06E-05	3.78E-38	2.27E+05	1.12E-37	2.97
5.12E+20	1.61E+05	1.36E-04	8.50E-38	2.27E+05	1.68E-37	1.98
2.56E+20	2.28E+05	2.72E-04	3.40E-37	2.27E+05	3.36E-37	0.99

The base orbit is the bottom row with V= 2.27e5 m/sec. With this velocity a proton will follow curvature caused by the central mass. It is a proper (Newtonian) orbit, and the forces are balanced with F=GMm/R^2=mV^2/R= 3.4e-37 Nt for a test particle of one proton. Its kinetic energy and potential energy are equal at this radius.

There will also be mass in the outer radii, and we would expect the Newtonian velocity to decrease with distance away from the center V=(GM/R)^.5. But measurements indicate that velocity curves around galaxies are flat. The dark matter problem is that as you move away from the proper Newtonian orbit on the bottom, the forces are out of balance by about a factor of 10. Our goal is to understand these measurements. This analysis does not assume dark matter, nor does it violate Newtonian gravitation. The diagram below indicates that kinetic in the red (proper orbit) is higher than the outer orbits, but its potential energy is lower.



The kinetic energy column (and associated velocity) is for Newtonian orbits. The potential energy and kinetic energy are equal at the radius but both change with radius. In fact, since there is no friction, the potential energy plus kinetic energy will remain constant.

Measurements of velocity profiles are redshift measurements. First, we will use the Lorentz equations to predict the energy shift. We evaluate the shift with the equations: 1-gamma1=1-m/(m+ke)= ke/E. But it is well known that light is redshifted by gravitation. Wiki gives the redshift:

Z=rs/re where rs is Schwarzschild's solution [Wiki].

Rs=GM/C^2 (mass in Kg)

In part 3 of this document it is shown that, based on one proton, rs is given by:

rs= G*1.67e-27/3e8^2*(exp(90))= 1.5e-15 meter.

The following equation for the gravitational constant G is also in part 3.

G= 20.3 MeV*7.045e-14 m/1.67e-27^2 Kg^2*1.602e-13*(1/exp(90))= 6.67e-11 Nt m^2/Kg^2.

This G equation will be substituted for G in the rs equation.

rs= 20.3*7.045e-14/mass^2* mass/C^2= 20.3*7.045e-14/(mass*C^2) (the scale factors exp(90)/exp(90) cancel and mass*C^2 becomes E.
With re= 20.14*7.045e-14/pe a lot of terms cancel, and z becomes:
z=rs/re=pe/E

doppler shift =1-(1-(v/c)^2)^.5		
v/c=7.22e4/3e8		
doppler shift		
2.90E-08		
de/E=ke/938.27		
2.90E-08		

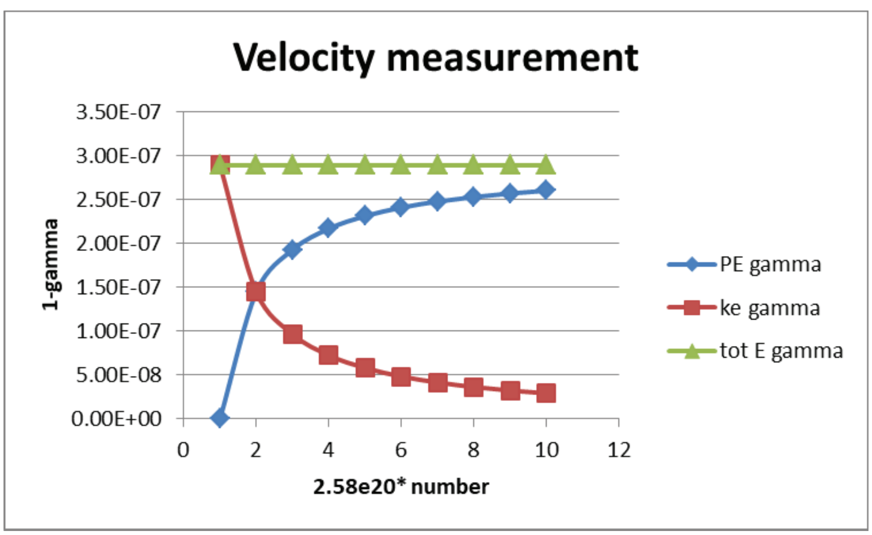
z for the pe shift is revealed as a Lorentz related shift just like de/E above.
The values ke/E and pe/E are incorporated into the table below:

						re=20.3*7.045e-14/pe				
							Rs=6.67e-11*1.67E-27/3e8^2*EXP(90)			
							1.51E-15	meters		
	Radius R	V=(Gm/R)^.5	(MeV)	pe=2.7e-4-ke	1-(938/(938+ke))		redshift	tot doppler	Measured ke	meters/sec
	(meters)	(meters/sec)	ke=.5mV^2	(MeV)	de/E	(meters)	z=rs/re	de/e+dlam/lam	(MeV)	Measured Vel
2.72E-05	**2.56E+21**	7.22E+04	2.72E-05	5.16E-04	2.90E-08	2.77E-09	5.45E-07	5.74E-07	5.39E-04	3.21E+05
3.02E-05	**2.30E+21**	7.61E+04	3.02E-05	5.13E-04	3.22E-08	2.79E-09	5.42E-07	5.74E-07	5.39E-04	3.21E+05
3.40E-05	**2.05E+21**	8.07E+04	3.40E-05	5.09E-04	3.62E-08	2.81E-09	5.38E-07	5.74E-07	5.39E-04	3.22E+05
3.88E-05	**1.79E+21**	8.63E+04	3.88E-05	5.05E-04	4.14E-08	2.83E-09	5.33E-07	5.74E-07	5.39E-04	3.22E+05
4.53E-05	**1.54E+21**	9.32E+04	4.53E-05	4.98E-04	4.83E-08	2.87E-09	5.26E-07	5.74E-07	5.39E-04	3.22E+05
5.43E-05	**1.28E+21**	1.02E+05	5.43E-05	4.89E-04	5.79E-08	2.92E-09	5.17E-07	5.74E-07	5.39E-04	3.22E+05
6.79E-05	**1.02E+21**	1.14E+05	6.79E-05	4.75E-04	7.24E-08	3.01E-09	5.02E-07	5.75E-07	5.39E-04	3.22E+05
9.06E-05	**7.68E+20**	1.32E+05	9.06E-05	4.53E-04	9.65E-08	3.16E-09	4.78E-07	5.75E-07	5.39E-04	3.22E+05
1.36E-04	**5.12E+20**	1.61E+05	1.36E-04	4.08E-04	1.45E-07	3.51E-09	4.30E-07	5.75E-07	5.40E-04	3.22E+05
2.72E-04	**2.56E+20**	2.28E+05	2.72E-04	2.72E-04	2.90E-07	5.26E-09	2.87E-07	5.77E-07	5.41E-04	3.22E+05

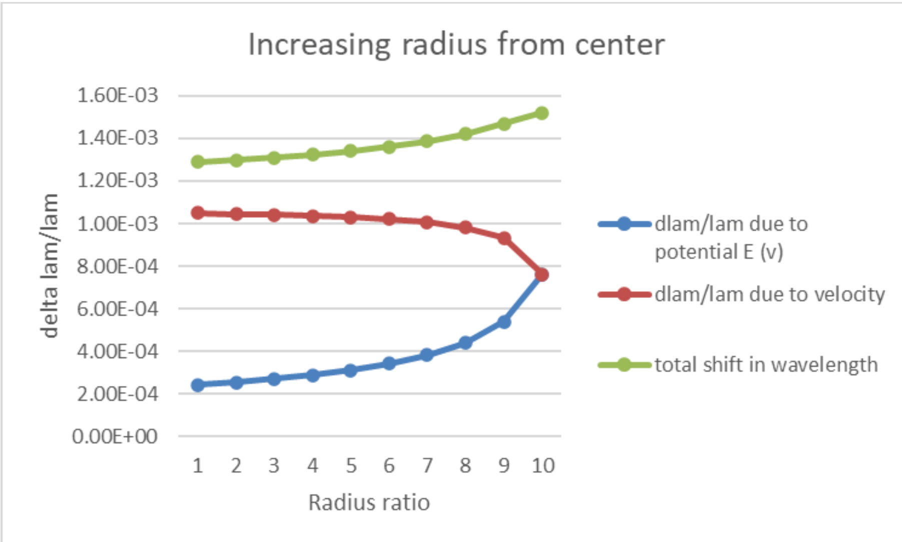
Light must climb out a potential energy field and experiences energy shift pe/E plus it is influenced by the energy shift de/E. When the two effects are added, the predicted velocity is a flat velocity curve. In retrospect this was straightforward since:

If ke+pe= constant = ke/E+pe/E

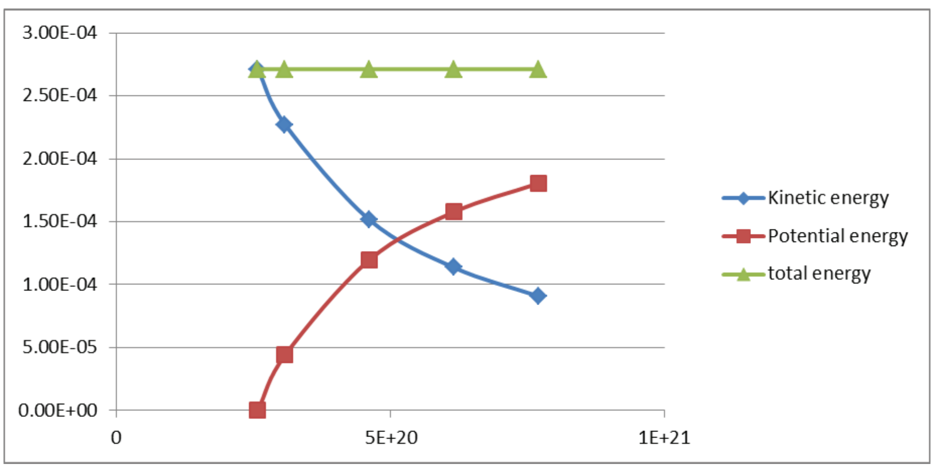
When the proton (star) is in orbit around a distant star we measure gamma not realizing that there are two components. We interpret the signal as a flat velocity curve.



Some will point out that we measure velocity with shifts in wavelength; i.e. (delta lambda)/lam=v/C for velocities well below c. The following graph shows this measurement.



In the graph below, mass has fallen into orbits outside the "proper" position. But there are many possible Newtonian orbits. The flat velocity associated with the constant kinetic energy agrees with measurements.



The data and analysis above are plotted below. The top line (in green is the flat velocity curve we measure). Appendix 3 contains data and analysis for five galaxies with flat rotation curves. They all follow the physics above and this resolves the flat velocity curves for galaxies. Dark matter is not required.

Galaxy data

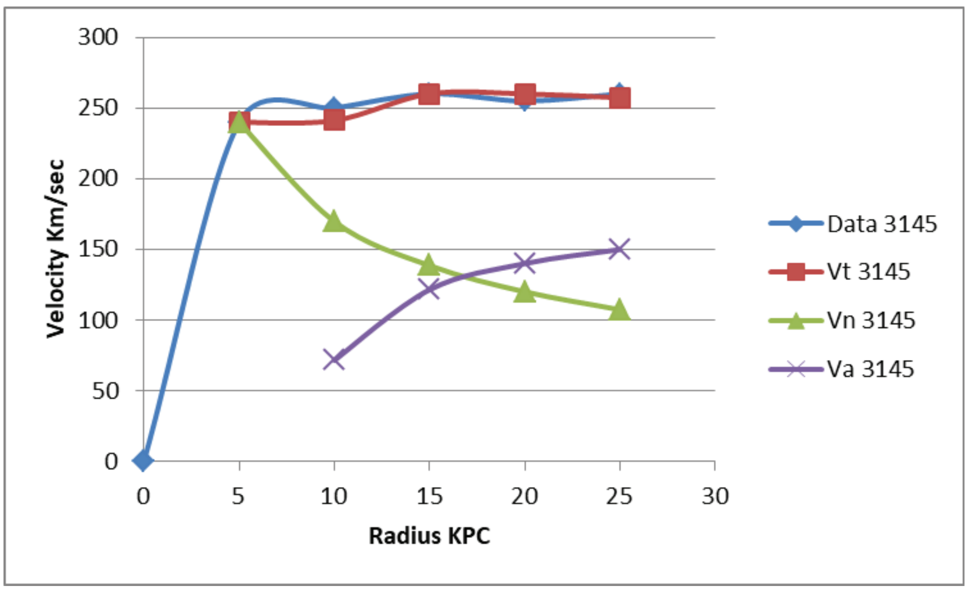
All the following galaxy profiles (search Wiki for velocity curves) are nearly flat:

Using the procedure above, Data for NGC 7664 is compared with calculations that incorporate potential energy changes. We will calculate and use a "false" velocity called va=(2 pe/1.67e-27*1.6e-13)^.5/1000 to illustrate how the two velocities add to a constant total in km/sec.

Potential energy redshift adjustment upward produces a flat rotation curve

Radius (KPC)	NGC 3145	0	5	10	15	20	25	
Radius (meters)	NGC 3145	0	1.54E+20	3.08E+20	4.62E+20	6.16E+20	7.7E+20	
Data V (km/sec)	NGC 3145	0	3.84852E+15	250	260	255	260	
Vk (km/sec)=(G*1.33e41/R)^0.5/1000			2.40E+02	1.70E+02	1.39E+02	1.20E+02	1.07E+02	Vk
ke=G/2/(1.602e-13*R/((1.33e41)*1.675E-27			**1.8E-04**	**1.5E-04**	**1.0E-04**	**7.6E-05**	**6.0E-05**	ke (MeV)
pe=ke-ke funct r				2.66E-05	7.70E-05	1.02E-04	1.17E-04	pe (MeV)
Va (im/sec)=(2*pe/1.67E-27/6.24e12)^0.5/1000				71.5	121.5	140.0	150.0	Va
Vt (km/sec)=Vk+Va			240.00	241.22	260.11	260.01	257.33	Vt (m/sec)

The flat rotation curve below is a galaxy that has an observed high velocity out to the edge of the galaxy. The calculations above are based on calculating the measurement shift due to potential energy. In the graph below the adjustment upward is stated as a false velocity (Va) that adds to the actual decreasing Newtonian velocity. This keeps the velocity flat which agrees with observations. Four additional galaxies are in Appendix 3.



Problem Resolution; there is no dark matter

In has been known for many years that the velocity of stars out from the center of galaxies are nearly constant (the jargon is flat rotation curves). Some have theorized that there is a halo of “dark matter” causing this non-Newtonian behavior. This paper shows that in fact the velocity decreases with radius as expected. Observations are based on interpreting redshift signals as velocity. Nature keeps potential energy plus kinetic energy constant. Gravitation redshift is well known but it is shown that the gravitational (potential energy) redshift must be considered when interpreting the redshift signal. Calculations indicate that when the offsetting redshift is taken out of the signal, the velocity of stars outward from the center follow Newtonian gravity. When we look at a galaxy, we observe real distances. They have flat velocity curves. The calculations presented are straightforward and allows one to calculate the flat rotation curve. The proposal above explains flat velocity curves without inferring dark matter.

Part 3 Re-evaluation of critical density for three expansion energy sources

The WMAP [3] and PLANCK missions and data reduction efforts resulted in estimates for the composition of the universe. Their work is based on what is known as critical density. The derivation for critical density [2] is as follows:

ke	pe
1/2Mv^2	Fr
1/2Mv^2	GMM/r
ke/M	pe/M
1/2v^2	GMMr^2/r^3)/m
	GMr^2/r^3)
	4/3*Gr^2(M/(4/3*pi r^3))
1/2 v^2	(4/3 pi G rho) r^2
2 ke/M	2 pe/M
v^2	(8/3 pi G rho) r^2
(v/r)=H=	(8/3 pi G rho)^(1/2)

Critical density is correctly derived above. Mass with kinetic energy (disguised as a density to make the left-hand side V/R) expands the universe. The value V/R is Hubble's constant. The measured Hubble constant V/R= 2.26e-18/sec determines critical density and the accepted value of rho 9.14e-27 kg/m^3.

The above derivation is for conversion of a single kinetic energy source to potential energy, but it leads to major problems. Using this equation and data from missions that measured the cosmic background radiation, scientists arrived at the following values known as "concordance" values for the components of critical density.

2.26E-18	H0		
8809	Temperature at equality (K)		
	Photon mass density		
	Proton mass density		
2973	Temperature (K) decoupling		
0.0106	Spot angle (radians)		
0.254	baryon number density		
5.77E+08	Photon number density		
4.400E-10	baryons/photon		
0.235	Dark matter fraction		
6.57E-27	dark matter density in kg/m^3		
4.24E-28	baryon matter density in kg/m^3		
0.719	Dark energy fraction		
9.14E-27	critical density		
0.0464	Baryon fraction		

These published values [3] initiated the searches for "dark matter" and "dark energy". The central question is why is the baryon fraction (protons and neutrons) only about 5% of everything? There appears to be "missing matter".

An alternative is proposed that solves the above problems. I believe that dark matter is zero and that star energy adds late stage expansion. An equivalent derivation of V/R is possible using the quantum gravity concepts in part 3.

V/R derivation based on quantum gravity

ke		pe		
ke		Fr		
ke		Fr=.5*mv^2*r/r*(1/exp(90))		
2ke/m		2 fr/m		
		v^2m/m*(1/exp(90))		
V^2		v^2*(1/exp(90))		
V		v*(1/exp(45))		
V/R		v/r*(1/exp(45))		

V/R is expansion outward from a center. Lower cap v/r is velocity around a circle divided by the radius of the cell. This is based on exp(180) protons in nature each with kinetic energy. The quantum gravity result F=mv^2/r*(1/exp(90)) has been used to calculate potential energy (see Part 3). It produces the Newtonian force F=6.67e-11*mass^2/r^2 but can be reduced to 2 fr/m the equals 2 ke/m. Furthermore, right-hand side velocity is kinetic energy through the equation v=(2ke/m)^0.5.

The equation V/R=v/r*(1/exp(45)) allows one to understand the kinetic energy values (ke=.5mv^2) that expand the universe. We will deal with velocities on the order of 86 meters/sec and three sources of kinetic energy.

The radius and time relationships that underlie conversion of kinetic energy to potential energy during expansion are:

Kinetic E ke	Potential F r
1/2M(v)^2	GMM/r
1/2M(r/t)^2	GMM/r
1/2Mr^3/t^2	GMM
1/(2GM)*r^3	t^2
(r/r0)^3 increases as (t/t0)^2	

(r/r0) increases as (t/alpha)^(2/3) (kinetic energy requirement).

Why V/R and critical density are special

Expansion rate does not depend on the radius since this is like a loaf of bread. Its expansion rate is everywhere the same. This means we can examine the expansion rate of one cell and understand the total.

V/R (1/sec)	2.26E-18
rho=(V/R)^2/(8/3*PI()*6.67e-11) kg/m^	9.14E-27
Volume=rho/1.67e-27 (m^3)	5.47E+00
r=(3*vol/(4*PI()))^(1/3) (meters)	1.0933
V=V/R*R*exp(45)	86.31
ke=0.5*1.672E-27*V^2/1.6022e-13 (MeV	3.89E-11
The calculation below use the QM gravity derivation V/r=v/r*(1/exp(90))	
match ke=pe (this is the goal of pe=ke derivations)	
Vapparent=V/R*R*EXP(45) (m/sec)	86.31
pe=0.5*1.672E-27*v^2/EXP(90)/1.6022e	3.89E-11
time=1/(V/r) in seconds	4.42E+17
time = alpha*(r/r0)^(3/2)	
alpha (sec) =r/(r0/7.045e-14)^(3/2)	0.00724
Force outward= 0.5*mv^2/r*(1/exp(90)	1.40E-61
Force inward=g*1.67e-27^2/r^2	1.40E-61
mass=(F/6.672e-11*r^2)^0.5 (Kg)	5.00E-26
density =mass/m^3	9.14E-27

The fundamental V/R=(8/3 pi G rho)^0.5 identifies the condition where potential energy equals kinetic energy at the end of expansion (where V/R=Hubble's constant=2.26e-18 1/sec and 9.14e-27 kg/m^3). The kinetic energy value is 3.88e-11 MeV and equal to potential energy 3.88e-11 MeV. The line labelled V apparent will be discussed later.

The table also illustrates why critical density 9.14e-27 kg/m^3 is special. Forward inward force= 1.56e-64 Nt above in red is for two protons obeying Newtonian gravity. But the inertial outward force outward is higher than the Newtonian force. WMAP results indicate that the “the universe is flat”, meaning that inward and outward force must be equal. The line labelled mass calculates the required mass from Force outward for this radius. The required mass is 5e26e-27. The density for 5.4 m^3 volume means that the forces match with 9.14e-27 Kg/m^3. This is known as critical density and is the denominator for the composition fractions listed for WMAP. Critical density is special because it is associated with a flat universe. This result sent many searching for dark matter and dark energy that add up to density 9.14e-27 Kg/m^3.

The analysis above for critical density does not clearly identify the source of expansion. There are three sources. The first source is the original 10.15 MeV from the proton model. But this decreases with expansion and when it decreases to 0.1 MeV, He4 formation occurs releasing the second source of expansion energy. Late in expansion, the force required to expand the universe is low and even the energy released by stars can cause expansion and some acceleration. This is the third energy source.

V/R=2.26e-18/sec has been carefully measured and appears to be correct. I also believe the Hubble radius is currently 1.25e26 meters like the above analysis suggests. But there is another way of understanding critical density. This does not negate the relationship V/R= (8/3 pi G rho)^.5 but applies it to each energy source rather than the total of the three energy sources. For one cell, r=1.25e26/exp(60)=1.09 meters. Radial v/r becomes V/R*R*(exp(45))=2.26e-18*1.09*exp(45))= 86.2 m/sec (using the relationships for one cell).

Critical density based on the mass of a proton

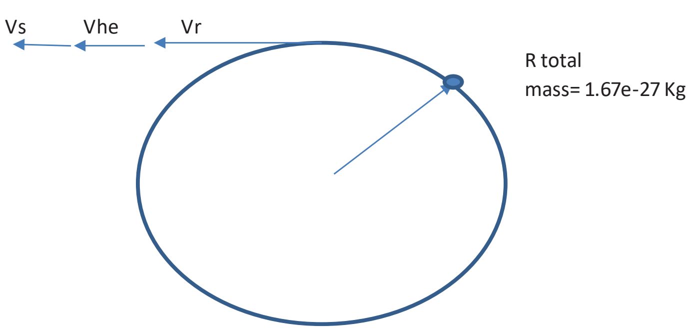
An analysis is carried out below that leads to a different critical density when the three energy sources for expansion are analyzed separately. I believe velocity 86.2 m/sec is correct but it will be the sum of the three contributions.

The requirements for each column representing cells below is that kinetic energy= potential energy and that all the forces are matched. The later requirement gives critical mass.

r=(2 G rho*(4/3*pi()*r^3)/(V^2/R^2))^.3	Critical density with one proton			
	E start 10.15	E he fusion	E stars	E total
V/R (1/sec)	1.22E-18	4.72E-19	1.23E-18	2.26E-18
rho=(V/R)^2/(8/3*PI()*6.67e-11) kg/m^3		3.99E-28		
Volume=rho/1.67e-27 (m^3)	0.62	4.19	5.500	5.500
r=(3*vol/(4*PI()))^(1/3) (meters)	0.5300	1.0000	1.095	1.0950
V=V/R*R*exp(45)	22.65	16.49	47.14	86.28
ke=0.5*1.672E-27*V^2/1.6022e-13 (MeV	2.68E-12	1.42E-12	1.16E-11	3.88E-11
The calculation below use the QM gravity derivation V/r=v/r*(1/exp(90))				
match ke=pe (this is the goal of pe=ke c	Vr (m/sec)	Vhe (m/sec)	V s (m/sec)	V total (m/sec
Vapparent=V/R*R*EXP(45) (m/sec)	22.65	16.49	47.14	86.28
pe=0.5*1.672E-27*v^2/EXP(90)/1.6022e	2.68E-12	1.42E-12	1.16E-11	3.88E-11
time=1/(V/r) in seconds				4.43E+17
time = alpha*(r/r0)^(3/2)				
alpha (sec) =r/(r0/7.045e-14)^(3/2)				0.00724
Force outward= 0.5*mv^2/r*(1/exp(90))	6.62E-64	1.86E-64	7.60E-63	
Force inward=g*1.67e-27^2/r^2	6.62E-64	1.86E-64	4.64E-63	
mass=(F/6.672e-11*r^2)^0.5 (Kg)	1.67E-27	1.67E-27		1.67E-27
density =mass/m^3	2.68E-27	3.99E-28		3.04E-28

By the end of expansion at 2.26e-18 1/sec, the original kinetic energy source 10.15 MeV (4.4e7 m/sec) has been converted to potential energy. It's kinetic energy is now 22.65 MeV of the total 86.3 m/sec. Ke and pe are matched at 2.19e-19 MeV. In addition, the force outward and force inward is matched at 6.62e-64 Nt. From the matching forces, we can calculate mass 1.67e-27 Kg. Critical density would be this mass over the volume but there is no mass missing.

When the original 10.15 MeV was reduced to 0.1 MeV, He4 formation released energy. The next column in the table shows that its velocity contribution is down to 16.49 m/sec. The radius of the cell has been increased to 1.0 meter. At this radius, the matching criteria (ke=pe) and (F=F) are satisfied. Mass for this column m=1.67e-27 Kg but it is the same mass as the previous column. This mass was forced to 1 meter by the new energy. The cell has only one proton and it is located at 1 meter. The following diagram applies:



Recall that V/R is outward from the center and v is radial. Late in expansion (perhaps about z=8), stars light up and start contributing energy. The column above labelled Estars shows the data (see Appendix 4). It adds 47.1 m/sec and the total velocity is now 86.2 m/sec. But this time, it is not balanced. The force outward is larger than the force inward. This explains the observed expansion acceleration. Again, it is the same proton forced to a higher radius. This radius is the Hubble radius/exp(60)=1.09 meters. With this radius and with V/R=2.26e-18 1/sec, time elapsed from the beginning=1/(V/R). Converted to years, the present time is 13.8 billion.

But the critical density is based on one proton. This means there is no missing matter. There is no dark matter and there is no cosmological constant in this analysis. I believe the component called “dark energy” is the star energy component.

Expansion model for three energy sources

The information from the Hubble analysis for three energy sources above can be combined with information from the proton model and quantum gravity. This allows an expansion model can be estimated.

	Start	at He4 Temp	After He rele	NOW		
rp=7.15e-13/ke		Force	2.20E-42	1.52E-63	force (Nt)	Radius (m)
ke stars				1.16E-11	Ke stars	
r total (proton+ He4+ star energy)				1.095		1.25E+26
ke He4 transition			2.64E+00	1.42E-12	ke He4	
r proton model +r He4 transition			1.02E-10	1.00		1.142E+26
ke from proton mod	10.149	0.11		1.35E-12	ke proton	
rp from proton mode	7.05E-14	6.50E-12		0.53		6.05E+25
V/R (1/sec)						
v proton model	4.41E+07	4.59E+06		86.24		
z=v/c				2.87E-07		
t =0.0072*(r/r0)^(3/2)		6.38E+00	3.94E+02	4.41E+17		
Billion years				13.99		
R=r*exp(60)			1.16E+16	1.25E+26	R Hubble	

The rows of calculations in the colored rows are based on initial kinetic energy from the proton model. We use the relationship developed above for quantum gravity:

G=hC/Mm*1/exp(90)= E*r/MM*(1/exp(90))

G is known to be constant. This means that E*r is constant since mass M does not change. All calculations for the expansion table will be based on one cell with one proton/cell. The initial value of E is known from the proton model. It is 10.15 MeV and r0= 7.045e-14 meters. This leads to the relationship:

E0*r0= 10.15* 7.045e-14= rp constant= 7.15e-13 MeV m= e*r

As e is converted to potential energy during expansion, we can calculate a new r. Radius r= 7.15e-13/e where r is meters and e is MeV.

This is the basis of time and radius scales across the expansion model (the colored area above). Initial E=10.15 MeV has associated velocity v=(2*10.15*1.6e-13/1.67e-27)^.5= 4.4e7 m/sec in the table. We select energy values e for columns in the table and calculate r= rp constant/e. With e we can put v across the page and fill in the V/R values. The column on the right contains the values discussed above for the critical density analysis with the first energy source.

The row of calculations above the colored rows represents the energy release from He4. We know that at 0.11 MeV, He4 will be formed and this will release about 2.64 MeV/proton. This will also increase the radius of the cell r as follows:

Delta r= 2.64*1.6e-13/(3.64e-42*exp(90))=1.02e-10 meters.

(The force 3.64e-42 Nt is mV^2/r. The values V and r appear in the table).

When He4 fusion occurred, the universe expanded and its temperature increased. This is consistent with data and explains what is called the “baryon photon ratio”.

```
B/P=(EXP(180)/(4/3*PI()*(R)^3))/(8*PI()/(1.23984e-12)^3*(1.5*8.6e-11*T)^3)
```

R	1.16E+16	meters= 1.02e-10*exp(60)	
T	2.04E+10	K=2.63/(1.5B)	

B/P= 9.4e-10. The baryon photon ratio must be on this order to be consistent with observation of various isotope fractions.

As stars light-up they release a significant amount of heat. Appendix 4 contains some details. Again, the procedure is the same for calculating the radius increase:

Force =1.67e-27 *(47m/sec)^2/1.09 *(1/exp(90))=1.52e-63 Nt

dr=0.095= 0.5*2.2e-11/1.52e-63*exp(90))*1.6e-13

r total= 1+0.095= 1.095 meters.

The total energy at the present is about 3.5e-10 MeV. It is associated with the present temperature of the cosmic background radiation 2.73 K (temperature (K)= ke/(1.5*8.6e-11) where 8.6e-11 MeV/K is Boltzmann’s constant). Above we added 1.16e-11 MeV star energy that makes the expansion curve more linear.

The radius total in red= 1.09 meters for each cell. The cellular radius*exp(60) represents the radius across exp(180) cells (exp(180)^.33=exp(60)). The radius is 1.24e26 meters.

Time scale for the expansion model

Since V/R is velocity and expansion rate, time will be 1/(V/R). For V/R=2.26e-18, time at the present is 4.38e17 seconds (13.9 billion years). But this value allows previous times to be calculated since:

Time (sec) = 0.0072*(r/7.045e-14)^(3/2). The value 0.0072 is for a composite of three energies. Its actual value is 7.045e-14/C*exp(45)=0.0083 seconds.

Conclusions for Part 2; there is no missing matter

According to WMAP and PLANCK mission results, the composition of the universe is only about 5% normal matter. The remainder is assumed to be dark matter and dark energy. The equation fundamental equation V/R=(8/3 pi G rhoc)^.5 is based on equating kinetic energy and potential energy. The measured Hubble constant with the value V/R=2.26e-18/sec leads to a value for rhoc= 9.14e-27 Kg/meter^3, also known as critical density. This is the denominator for composition calculations. This is also the mass density that balances inward gravitational forces F=GMM/r^2 with outward inertial F=MV^2/r required for the universe to be "flat" and consistent with WMAP data. The inertial force is calculated with V from the measured Hubble constant.

I believe there are three energy sources for expansion. When these are accounted for separately each energy source contributes to total expansion in a way that the critical density is based on one proton 1.67e-27 Kg. The alternate derivation of v/r for one cell gives the simple relationship v/r=V/R*(1/exp(45))= 86 for a Hubble constant V/R=2.26e-18 1/sec. In this analysis the velocity for the original and He4 energy sources meets the required F=F balance. But the third energy source is observed to accelerating expansion. The three individual velocities total 86.2 m/sec. There is no longer a need for dark matter; most of the universe consists of protons. The cell radius associated this v/r is 1.095 meters. This means that the total radius 1.095*exp(60)= 1.25e26 meters at time 13.9 billion years is consistent with observations.

This leaves the dark energy issue. Observations indicates that expansion may be slightly accelerating. Some believe that there may be a "cosmological constant" that becomes increasingly important late in expansion. But if there is another energy source for late stage expansion that solves the problem. With cellular cosmology it is straightforward to calculate the force required to expand cells. A great deal of expansion occurs with low energy addition. This is a part of 1.095 meters and enough to cause the expansion curve to remain upwardly sloped. As stars light up, their cumulative energy/proton is on the order of 1.5e-11 MeV.

Part 3 Quantum Gravity

The conventional Planck scale (candidate #1 for the source of G)

Accepted relationships [10]:

Et/H=1

> Where E=Energy (in this documents we will use million electron volts (MeV) and convert it with 1.602e-13 Nt-m/MeV where Nt is force and m is meters.
> Mass: M (Kg) =E/C^2, i.e. kg=MeV/C^2= MeV/3e8^2 m^2/sec^2*1.602e-13 Kg/Nt-m.
> Time in seconds to travel around a quantum circle of radius r at velocity C
> H Plancks constant= 4.136e-21 MeV-sec
> h or hbar (reduced Planck's constant)= H/(2*pi)= 6.582e-22 MeV/sec

Derived relationship r=hC/E, also written Er/C=h
If mass is orbiting the circle, the equation is:
r=HC/(2*pi)/(E*m/g)^0.5
r=1.973e-13/(E*m/g)^0.5 and sometimes=1.973e-13/E
where HC/(2*pi) =1.973e-13 MeV-m

F=G MM/r^2
Where G= gravitational constant= 6.672e-11 Nt meter^2/Kg^2
M=mass in Kg
r= distance in meters
F= force in Newtons (Nt)

E=Fr
Where E is the energy expended by a force acting through radius r. This leads to gravitational potential energy.

Rs=GM/C^2
Where Rs= Schwarzschild's solution to the metric tensor equations from General Relativity derived by Einstein.

Rs= de Broglie r assumption
This assumption is the basis of the Planck scale radius calculated from G.
The value r is the wavelength associated with the de Broglie wavelength hC/E.
When Rs=r associated with a mass m in the relationship Rs=GM/C^2
Derived relatioship combining Er/C=h with E= GM^2/r: G=hC/M^2
Derived Planck scale mass and energy:
M=(hC/G)^2=(6.5821e-22*3e8/6.67e-11*1.602e-13)^.5=2.176e-8 Kg=1.22e22 MeV.
Derived radius:
Rs=GM/C^2=hC/E=6.58e-22*3e8/1.22e22= 1.6e-35 meters

The value 1.62e-35 meters is known as the Planck scale and is **the accepted source for the gravitational constant G, specifically G= Rs C^2/M.**

The data

Newton could not estimate the number of particles in the universe. Further the whole concept of expansion of the universe was centuries in the future. In Newton's wildest dreams, he would not have anticipated that the sky temperature contains clues regarding the beginning we call the big bang. After cosmic microwave background (CMB) radiation was discovered around 1950, cosmologists started to analyze what the signature of the cosmic background radiation might reveal. They proposed and later received funding for a balloon project called COBE and satellite projects called WMAP [7] and PLANCK. Data has given us increasingly accurate estimates of rho, the density of the present universe and its radius [2][7][8]. WMAP published Hubble's constant 2.26e-18/sec and from this rho=9.14e-27 Kg/m^3. Furthermore, as discussed below this leads to the "Hubble radius" 1.25e26 meters. Below I will justify the ratio 1.67e-27/9.14e-27 but the number of protons can be calculated as follows:

Radius (m)	1.25E+26		
Volume (m^3)	8.18E+78		
Ln (Number)	180.00	LN(Vol*1.67E-27/9.14E-27)	

Cosmology texts [8][3][4] are consistent with the above number.

Quantum gravity based on de Broglie wavelength 1.5e-15 meters (candidate #2 for G)

We are face to face with where gravity originates. If it originates at the quantum circles level like the other forces, there is a huge scale gap. General relativity is the physics of large space. The first step toward quantum gravity is to consider gravity on a particle by particle basis like the other forces. This requires identifying the space/neutron. The space would be a circle but three dimensional making it a sphere, specifically its surface.

In general relativity [2] the metric tensor (scholarly matrix equations from general relativity) is based on (ds^2=three distances^2 and (C*time)^2). Note that ds^2 is a surface area and it is this surface that we will break into exp(180) small spheres. Let small r represent the radius of each small cell and big R represent the radius of one large sphere containing exp(180) cells with the same surface area. Position a proton like mass on the surface of each cell. The total energy will be that of one protons/cell plus a small amount of kinetic energy.

Bridging large scale gravity with the quantum scale

Consider large mass M (for our purposes the mass of the universe although the term universe seems a little presumptive) broken into exp(180) small cells [12], each with the mass of a proton labelled lower case m below. The mass (m) of a proton is 1.67e-27 kg. Fill a large spherical volume with exp(180) small spheres we will call cells. Consider the surface area of many small cells as a model of the surface of one large sphere with the same surface area. For laws of nature to be uniform throughout the universe there can be no preferred position. A surface offers this property, but the equivalent surfaces of many small spheres also offer this property if we do not distinguish an edge. We will call the small spheres “cells”. As such a surface model equivalent to the surface of many small cells is useful if the fundamentals of each cell are known (and we do). We will evaluate the gravitational constant G of a large sphere and compare it with G of small cells.

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)**

The extremely small value 1/exp(90) bridges large-scale and small-scale gravity. When measurements are made at the large scale as must done to measure G, the above derivation indicates that we should multiply cell scale values (r*v^2/m) by 1/exp(90) if we expect the same G. Geometric and mass relationships give the cell "cosmological properties".

Proton-space model

The cell properties are in the proton-space model. Using an information-based approach [1][9], energy components were identified that allowed the author to model the mass of a neutron and proton and the space they occupy. The probabilities (information) used to construct the model supports the value exp(180) as the number of neutrons. The proton-space model [14] is a specific list of energy components that add exactly to the measured proton mass 938.272 MeV plus energy associated with the space it is imbedded in. (Appendices 1 and 2 derive and explain the result below). It is a zero total energy model with mass plus kinetic energy in the left-hand side of the table (positive) exactly equal and opposite to the field energy total on the right-hand side of the table (negative). Below the proton mass 938.27 MeV energy values for space are listed. The total energy for both sides at the bottom of the table is 959.99 MeV. Overall 959.99-959.99=0.

Quark mass	Kinetic E			Field E
(MeV)	(Mev)			(MeV)
101.95	646.96			753.29
	5.08			0.69
13.80	83.76			101.95
	5.08			0.69
13.80	83.76			101.95
	5.08			0.69
Weak E	-20.30			
Weak KE	0.00			
Balance	0.00			
Neutrino ke	-0.67			0.74
ae neutrino	-2.0247E-05			
E/M field	-0.0000272			
938.27	MeV Proton			
	0.0000272			
	-0.6224			
0.5110	0.11			
electron ne	2.02472E-05			
Neutrino ke	0.67			
	0.74			
expansion p	10.15			
expansion k	10.15			
959.99				959.99
Total N values		Sum of yellow=Grav		2.801

Calculation of Gravitational constant from the Proton mass model

The proton is thought to be a primary manifestation of underlying laws and as such contains information that determines many aspects of nature. The space part of the model specifies the [14][6] potential and kinetic energy associated with each proton. The initial values are each E=2*2.02e-5*exp(12.431)=10.15 MeV. The total 20.3 MeV is conserved.

Scaling large scale gravitation values to the quantum level

Gravitation according to the general theory of relativity [2] is the geometry of space and time. We can find a radius r=hC/E knowing E. At radius r, the space/neutron of interest is called a cell. It has surface area A=4pi*r^2.

The area substitutions discussed above under the heading "Bridging large scale and small scale gravity" are used to find the source of gravity for neutron (or proton). The Schwarzschild equation Rs=GM/C^2 is a solution to Einstein's field equations [2][Wiki]. The equations are written for large scale curvature caused by a large mass and Rs is the value 1.24e-54 meters. The radius Rs is adjusted in the relationships below to represent one neutron or proton.

Rs=rs*exp(90) surface area substitution
M=m*exp(180) mass substitution

Scale adjusted Rs will be called rs (lower case).

Rs^2=rs^2*exp(180)	
Rs=rs*exp(90)	
M=m*exp(180)	
G=rs*exp(90) C^2/(m*exp(180))	
G=rs*C^2/m*1/exp(90)	
rs= G m/C^2*exp(90)	

The value rs will be set equal to a one neutron de Broglie radius. The de Broglie radius required is for mass only (excluding the kinetic energy inside the neutron). We know the value of mass through the proton-space model. It is 101.95+13.8+13.8=130.0 MeV (2.32e-28 Kg) (refer to the model in the section below entitled "fundamental space"). This true mass value is the same for the proton and neutron and the remainder is kinetic energy totaling 939.57 MeV (1.675e-27 Kg) for the neutron.

Radius r de Broglie= hC/E=6.58e-22*3e8/130.0= 1.518e-15 meters.
rs (solution to wave equations for one neutron)= GM/C^2*exp(90)= 6.674e-11*1.675e-27 Kg/3e8^2*exp(90) = 1.518e-15 meters.

Calculating the gravitational constant, G

The fundamental that allowed G to be used to determine r for the Planck scale was the assumption that Rs from the Schwarzschild's solution was equal to r, the de Broglie wavelength associated with 1.22e22 MeV. But at the low energy scale:
rs=GM/C^2*(exp(90))=r de Broglie=hC/E where E=mC^2
From this equality, G=hC/Mm*1/exp(90) for one neutron.
Example calc:
M=1.675e-27 Kg (939.57 MeV)
m=2.32e-28 Kg (130.0 MeV)
G=hC/Mm*(1/exp(90))
G=6.58e-22 MeV-sec*3e8 m/sec/(1.675e-27 Kg*2.31e-28 Kg)*1.602e-13*(1/exp(90))
G=6.674e-11 Nt m^2/Kg^2

This is the source of the gravitational constant at de Broglie scale 1.5e-15 meters.

Quantum gravity based on values from the proton model (candidate number 3 for G)

The specific proton model values are hC=E*r*m/M where m=130.0 MeV, M=939.57, E=20.30 MeV and r=7.045e-14 meters.

The proton model [14][6] above identifies the gravitational field energy= 2.801 MeV.

r(meters)=hC/E=1.973e-13 MeV-m/2.801 MeV= 7.045e-14 meters

G=hC/Mm*(1/exp(90)) but we substitute hC= E*r*m/M.
G=E*r/MM*(1/exp(90) (m is conveniently eliminated).

But E=F*r as force F acts through radius r converting kinetic energy to potential energy. When fully converted E=20.3 MeV and this can be used to calculate G.

Example calculation for G:
G=hC/Mm*1/exp(90)= E*r/MM*(1/exp(90))

G= 20.3 MeV*7.045e-14 meters/1.67e-27^2 Kg^2*1.602e-13*(1/exp(90))

G=6.678e-11 Nt m^2/Kg^2

The following statements use the gravitational constant G established above. Large scale gravity is the result of a mass m falling into curved space time defined by a central mass M. As mass m loses potential energy it gains kinetic energy and finds a geodesic (orbit) where it feels no force. For large space, the geodesic variables R,V and M combine to give G, the gravitational constant; G=R*V^2/M. Small scale gravity follows the same physics except the curvature is the radius r= 7.045e-14 meters equal to the geodesic radius r in G=r*V^2/m *(1/exp(90). The mass that falls to this radius is mass 1.675e-27 kg. When it achieves an orbit, its kinetic energy has increased to 10.15 MeV and its potential energy has decreased to 10.15 MeV.

Quantum gravity based on inertial force (candidate #4 for G)

The small-scale orbit described above is analyzed in the table below:

GRAVITY		
		neutron
Neutron Mass (mev)		**939.5654**
Proton Mass M (kg)		**1.675E-27**
Field Energy E (mev)		**2.801**
Kinetic Energy/neutron ke (mev)		**10.151**
Gamma (g)=939.56/(939.56+ke)		**1.0000**
Velocity Ratio v/C=(1-g^2)^0.5		**0.0000**
Velocity (meters/sec)		**4.407E+07**
R (meters) =(HC/(2pi)/(E*E)^0.5		**7.045E-14**
Inertial Force (f)=(m/g*V^2/R)*1/EXP(90) Nt		**3.784E-38**
Calculation of gravitational constant G		6.693E-11
G=F*R^2/(M/g)^2=NT m^2/kg^2		**6.69292E-11**
Published by Partical Data Group (PDG)		**6.6741E-11**
R (meters) =(HC/(2pi)/(E*E)^0.5=1.97e-13/2.801		**7.045E-14**

Above it was shown that G=hC/(Mm)*(1/exp(90)) was the source of gravity. But the following development shows that this is equivalent to a neutron orbiting a cell radius 7.045e-14 meters with 10.15 MeV of kinetic energy. The relationships below show that this is another source of the gravitational constant G, the force F in the table above.

F=Gmm/r^2		
F=6.67e-11*1.67e-27^2/(7.045e-14^2)		
3.7836E-38		

Is belief in the Planck scale good science?

There is a historical perspective to this question. When physicists dealt with one electron and its field energy, they knew they were working with the quantum scale and it was normal to calculate de Broglie wave lengths. However, early physicists did not yet understand that gravity is the geometry of space time. When the Schwarzschild solution Rs became known it is admirable that they settled on equating Rs with a de Broglie wavelength. As pointed out above this is a way of deriving an equation involving the velocity of light and the gravitational constant. Rs=GM/C^2. It was reasonable, as a working assumption, to assign a de Broglie wavelength to gravitational mass and calculate a Planck length. But they derived a rather suspicious energy value 1.22e22 MeV (6.18e-8 Kg) by working backwards from a known gravitational constant. The mass did not correspond to the known neutron mass that should have been central to a gravitational theory. In addition, the Planck length 1.6e-35 meters was suspiciously low.

It was recognized that action at a distance was a problem and we must be grateful to Einstein for his recognition that space is curved and the associated wave equations. It was unfortunate that the great physicists of the 1900's did not have the advantage of WMAP [3] and Cmagic [4] expansion models, nor did they have the advantage of knowing the approximate number of protons in the universe. Perhaps they could not consider a cellular approach to bridge large scale gravitation with the quantum scale because they lacked information.

Comparison of quantum gravity candidates 2,3 and 4

Candidate 2 used G=hC/Mm*(1/exp(90))= 6.58e-22*3e8/(1.675e-27*2.31e-31)*(1/exp(90))= 6.6976e-11 Nt m^2/Kg^2 where M was 939.565 MeV and m was 129.54 MeV.

Candidate 3 used G=Er/M^2=20.3*7.045e-14/(1.675e-27^2)*(1/exp(90))= 6.6929e-11 Nt m^2/Kg^2

Candidate 4 used G=Fr^2/(M)^2= 3.784e-38*7.04e-14^2/(1.675e-27)^2= 6.6929e-11 Nt m^2/Kg^2

> Candidate 4 agrees with calculating the inertial force:
>
> F=mV^2/r=1.675e-27*4.4069e7^2/7.045e-14*(1/exp(90)=3.784e-38 Nt where V=4.4069e7 m/sec from V=(2ke/m)^.5

I believe candidate 2 is the correct source of the gravitational constant G since it is based on matching the de Broglie wavelength for a true mass with GM/C^2*(exp(90))= 1.523e-15 meters. If the true mass value 129.54 is 130.00 MeV, G is exactly 6.674083e-11 Nt m^2/Kg^2 matching the NIST and PDG [7] value for G. Candidate 3 and 4 are after the neutron falls onto the fundamental radius 7.045e-14 meters. It is quantum at this point but becomes non-quantum as the cell expands. But notice something interesting about the exact same inertial force:

F=mV^2/R*(1/exp(90))= 1.67e-27*4.407e7^2/7.045e-14*(1/exp(90))= 3.748e-38 Nt.

The inertial force is so large for one proton moving at this speed that the force must be reduced by (1/exp(90)) to give the same values as:

F=Gmm/r^2		
F=6.67e-11*1.67e-27^2/(7.045e-14^2)		
3.7836E-38		

This is the force between 2 neutrons because gravity is very weak even for this short distance. The interesting thing about this comparison is that there is no central neutron in F=mV^2/r. Radius r is based on r=hC/E and E is the gravitational field 2.801 MeV. Mass 1.67e-27 Kg is following the curve and the radius of that curve is 7.045e-14 meters.

Quantum gravity candidate #3 is the basis of an expansion model

There is an expansion model for the universe associated with the proton-space model. In this model fundamental space radius r= 7.045e-14 meters increases because the proton associated with each cell has kinetic energy. As the radius of each cell expands the potential energy increases. G remains constant and E*r=20.2*7.045e-14 remains constant. Nature is clever. If E*r were only hC, we would not understand the cause and energy associated with expansion. Quantum gravity is fundamental to expansion equations that give the size of the universe. Simple kinetic energy and potential energy equations are applied to expanding cells. Each particle of mass m has kinetic energy and an associated velocity V tangential to the cell surface. The model shows protons with about 20.3 MeV that fall into "orbits" with 10.15 MeV of kinetic energy and 10.15 MeV of potential energy. Initially the proton on the cell surface has high velocity (0.146C) and inertial force, the basis of quantum gravity. Tangential kinetic energy ratio decreases directly with expansion ratio and can be modeled as orbit that maintains the gravitational constant at G.

The proton model shows kinetic energy plus potential energy is constant

There are two sides to the proton model shown above. A mass side on the left and a field side on the right. They both total 959.99 MeV. The mass side shows energy outside the proton that represents expansion kinetic energy and potential energy. Both are initially 10.15 MeV but when stars form most of the energy is potential energy but as the accumulating mass picks up some kinetic energy (on the order of 2e-4 MeV) that forms orbits around a central mass.

Part 3 Conclusions

The quantum gravitational scale is the Schwarzschild radius GM/C^2=1.24e-54 meters. This is the same radius used in the conventional Planck derivation of G. However, this radius is a solution to wave equations for a large scale. This is not the same scale as one neutron imbedded in its own small space. A concept called cellular cosmology corrects the scale problem with the value exp(90). The quantum scale Schwarzschild value is 1.24e-54*exp(90)= 1.57e-15 meters. Like the Planck derivation, a de Broglie wavelength is required that equals 1.57e-15 meters. Wavelength=hC/129.54= 1.57e-15 meets the criteria. The mass (130.0 MeV) is provided by a proton model that indicates the neutron mass 939.57 MeV consists of 130.0 of true mass (m) plus 809.6 of kinetic energy. The gravitational constant is calculated with G=hC/Mm*1/exp(90)=6.674e-11 Nt Kg^2/m^2. The proton model provides two additional values of interest E=10.15 MeV and radius r=7.045e-14. An alternative for G= E*r/(1.67e-

27^2)*(1/exp(90)= 6.67e-11. This G definition is the basis of an expansion model where r is the radius of an expanding cell as E*r is held constant.

For quantum gravity mass curves space and a neutron falls into an orbit r called a cell with kinetic energy 10.15 MeV. Gravitational field energy 2.801 MeV from the proton model is consistent with the curvature of space at the cellular level radius r=hC/2.801= 7.045e-14 meters. Large space (R) is defined by gravity at the quantum scale but R=r*exp(60).

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Appendix 1 Information code

The following "information code" was a result of correlating fundamental energy data [7][NIST]. I do not know why this code is used by nature but it anchors energy values. The numbers are natural logarithms. There are four sets and total 90.

Details of the proton model

Probability=1/exp(N) is written below in tabular form. Information = negative natural log(p1*p2*p3, etc.) = 90.1 is written at the bottom of each fundamental N column. With these probabilities, the components become parts of the N=90 information system.

	N	P=1/exp(N)	N	P=1/exp(N)
Quad 1	**15.43**	1.99E-07	**17.43**	2.69E-08
	12.43	3.99E-06	**10.43**	2.95E-05
Quad 2	**13.43**	1.47E-06	**15.43**	1.99E-07
	12.43	3.99E-06	**10.43**	2.95E-05
Quad 3	**13.43**	1.47E-06	**15.43**	1.99E-07
	12.43	3.99E-06	**10.43**	2.95E-05
Quad 4	**10.41**	3.02E-05	**-10.33**	3.07E+04
	-10.33	3.07E+04	**10.41**	3.02E-05
Quad 4'	**10.33**	3.25E-05	**10.33**	3.25E-05
	0.00	1.00E+00	**0.00**	1.00E+00
	P1*P2*etc	8.19E-40		8.19E-40
	ln (Ptotal)	90.00		90.00

The next level involves placing the probabilities in the Schrodinger equation to produce the neutron and proton.

Probability 1=e0/exp(N). This probability is an energy ratio and leads to the equation E=eo*exp(N). The probability is 1/exp(N) and e0=1 in natural units or 2.02e-5 in MeV units, evaluated from the electron N from the table in Appendix 1.

Energy zero= 0= E-E. Energy is created by a separation but there are two types of energy. Appendix 2 explains how energy separations from zero and probability 1 represent the neutron and proton. Probability 1 represents the other initial condition, zero information. Everything was apparently produced by separations. The components of the neutron and its fields encode the laws of nature. It means that there are particles separated in distance, each with kinetic energy for expansion of the universe.

The work below derives Schrodinger based orbits that obey energy zero. This means there will be positive and negative energy terms created through separation. This E=0 constraint and related P=1 constraint are further defined. There are sets of four probabilities of interest that contain exponential functions 1/exp(N).

Evaluating E

Evaluating E in the RHS requires consideration of overall probability, not just the probability of particles. Initially there was a probability for many neutrons to make up the universe. Specifically, P= 1= probability of each neutron* number of neutrons= 1/exp(N)*exp(N).

1=1/1=exp(180)/(exp(90)*exp(90)) where exp means the natural number e to the power 90, where 90 is a base 10 number (count your fingers).

Information theory probabilities

C. Shannon [10] used S= -ln P to represent information and thermodynamics incorporates similar concepts except it is the statistics of many particles. The author's N identifies particles such as an electron and components of the electric field and E= e0*exp(N). In this system, dimensionless energy ratio e0/E=P probability. Since wavelength is proportional to 1/E=1/hv (h is Heisenberg's constant and v is frequency), the probability and a dimensionless wavelength are equivalent.

P=e0/E=(h v0)/(h v)=v0/v=wl/wlo.

p=e0/E=1/exp(N), i.e. E=e0/p.

With p=1/exp(N), E=e0*exp(N).

E1-E1+E2-E2+E3-E3+E4-E4=0
Identify E as E=e0*exp(N), using the same N values as the LHS.

0=eo*exp(13.431)-eo*exp(13.431)+e0*exp(12.431)-e0*exp(12.431)+e0*exp(15.431)-e0*exp(15.431)+eo*exp(10.431)-e0*exp(10.431)

Mass plus kinetic energy will be defined as positive separated from equal and opposite negative field energy. E1 is the only mass term, E3 and E4 are field energy and the remainder is kinetic energy.

E1+(E3+E4-E1-E2)+E2-E3-E4=0 (rearrange)
E1 is mass, (E1+E4-E1-E2)+E2 is kinetic energy.
E3 and E4 are equal and opposite field energies
mass1 + kinetic energy- field energy3-field energy4=0

The four N values discussed in the section entitled "Evaluating E" and their associated energy is called a quad. It is defined as the E values E=e0*exp(N) in a box to the right of each N value. The key to distinguishing mass (E1) from kinetic energy (E2) and two fields is shown below. The positions are not interchangeable.

Mass	Field 3
Kinetic Energy	Field 4 (G)

		mev				mev	
		E=e0*exp(N)				E=e0*exp(N)	
N1	13.43	13.8	E1 mass	N3	15.43	101.95	E3 field
N2	12.43	5.1	E2 ke	N4	10.43	0.69	E4 field

E1=2.02e-5*exp(13.43)=13.79, E2=2.02e-5*exp(12.43)=5.08, E3=2.02e-5*exp(15.43)= -101.95, E4=2.02e-5*exp(10.43)= -0.69 (all in MeV).

Separation of energy from zero

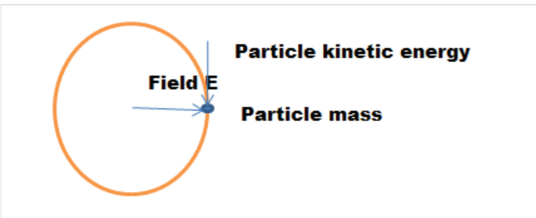
Overall E1+(E3+E4-E1-E2)+E2- (E3-E4) =0= (E1-E1)+(E2-E2)+(E3-E3)+(E4-E4) obeys the energy zero restriction. I call these diagrams energy zero, probability 1 constructs. They contain energy components of a quark.

Repeating the process for the quark quads and quads that lead to the electron yields the proton model in the text [11][12].

Comparison of proton model and PDG data

Compare the above values for the neutron and proton with measured values.				update feb 2017					
931.4940281	nist		0.510998946	0.510998946					1.30E-07
931.4940955	pdg	548.5799095	0.51099895		0.5110011		-2.15856E-06		2.40E-07
simple cell g67	Data		Data (mev)		Calculation (mev)	calculation	Difference	Difference	measurement
			Particle Data Group		Present model	(amu)	(mev)	(amu)	error (amu)
		(amu)		(an	(mev)				
Neutron	nist	1.008664916	939.5654133	939.5654135	939.5654127	1.0086649	5.629623E-07	8.71281E-10	6.20E-09
Proton	nist	1.007276467	938.2720813	938.2720813	938.2720767	1.0072765	4.620501E-06	4.98855E-09	6.2E-09
Neutron/electron	1838.683662		939.5654133	nist	939.5654127		5.6296233E-07		
Proton/electron	1836.152674		938.2720814	nist	938.2720767		4.6785007E-06		

Total energy is conserved to zero (102.634 MeV-102.634 MeV) using the convention that fields are negative. The numbers represent two orbits. The 13.8 MeV mass orbits with 83.76 MeV of kinetic energy in a 101.95 MeV strong field energy and a 0.69 MeV gravitational field energy component. Here is the strong orbit:



The particle mass 13.8 MeV is one of the quarks in a neutron. The neutron model below adds three quark energies together from quads 1 through 3. When these quads are treated the same way and added they make the neutron of mass 939.57 MeV within measurement error [Particle Data Group and NIST]. Their masses total 130.163 MeV and their kinetic energies total 799.25 MeV.

The proton is thought to be a primary manifestation of the underlying laws and as such contains information that determines many aspects of nature. The Proton mass model is the source of constants for unification of forces.

Appendix 2 Proton model

The Proton table shows the quads and associated energies after the exchange 2 operation.

	Unified.xls cell g191			
	mass	Energy-mev	S field	Energy
Charge	ke		G field	mev
0.667	15.432	101.95	17.432	753.29
	12.432	5.08	10.432	0.69
-0.333	13.432	13.80	15.432	101.95
	12.432	5.08	10.432	0.69
-0.333	13.432	13.80	15.432	101.95
	12.432	5.08	10.432	0.69
	-10.333	-0.62	-10.333	-0.62
	10.408	0.67	10.408	0.67
	10.33	0.62	10.333	0.6224
	0.000	0.0000	0	2.02E-05
	90.000	sum	90.000	

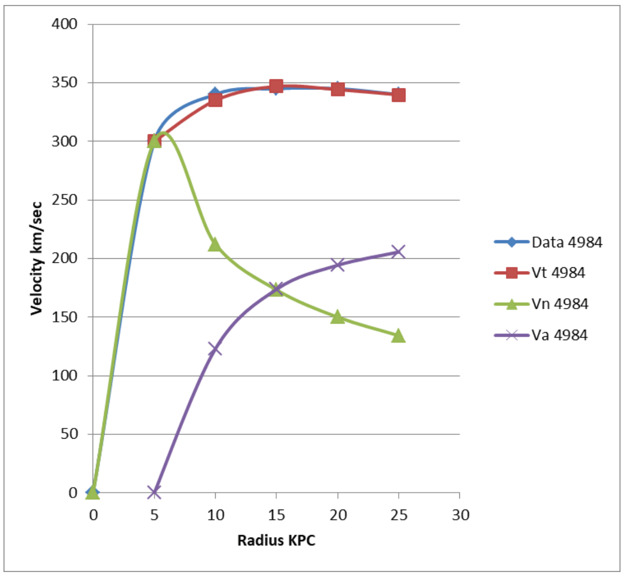
The proton-space model below lists the total mass, kinetic energy and fields associated with the neutron. Quad 4 of the code also gives us the 4th component of the gravitational field energy (-0.671 MeV) which totals -2.801 MeV.

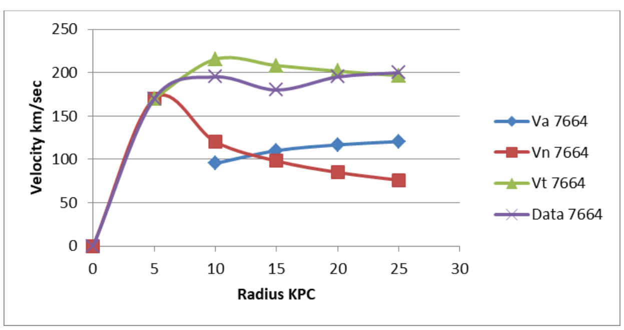
Quark mass (MeV)	Kinetic E (Mev)			Field E (MeV)
101.95	646.96			753.29
	5.08			0.69
13.80	83.76			101.95
	5.08			0.69
13.80	83.76			101.95
	5.08			0.69
Weak E	-20.30			
Weak KE	0.00			
Balance	0.00			
Neutrino ke	-0.67			0.74
ae neutrino	-2.0247E-05			
E/M field	-0.0000272			
938.27	MeV Proton			
	0.0000272			
	-0.6224			
0.5110	0.11			
electron neu	2.02472E-05			
Neutrino ke	0.67			
	0.74			
expansion p	10.15			
expansion k	10.15			
959.99				959.99
Total N values		Sum of yellow=Grav		2.801

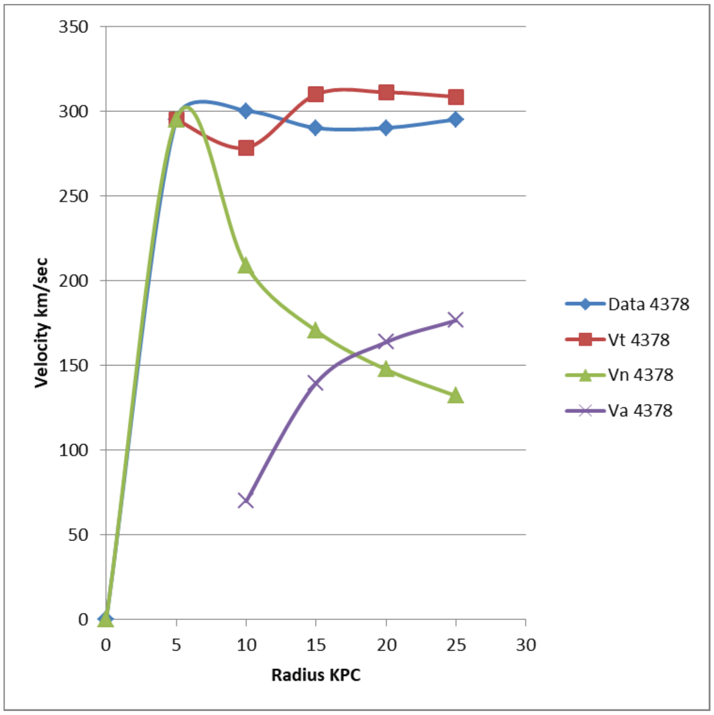
The neutron decays into a proton (above) an electron and a neutrino. This gives the measured proton mass 938.27 MeV. As the proton and electron split, they develop opposite fields of 27.2e-6 MeV. When the electron falls into the proton field it develops 13.6e-6 MeV.

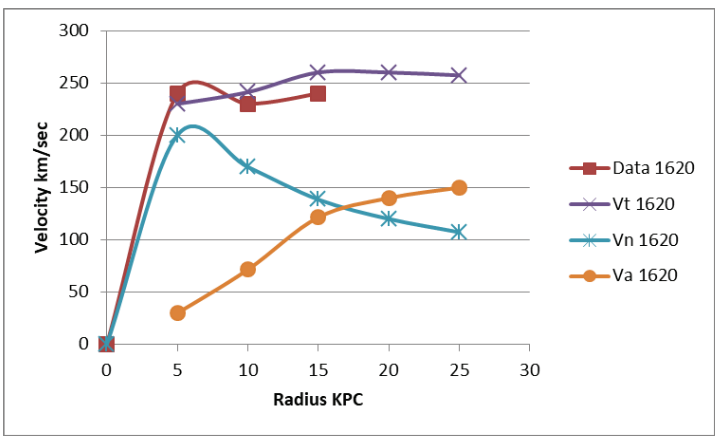
Appendix 3 Further examples of flat rotation curves

The four flat rotation curves for the four galaxies below are based on red shift of potential energy. The potential energy adjustment upward is stated as a false velocity that adds to the actual decreasing Newtonian velocity. This keeps the velocity flat which agrees with observations.









Appendix 4 Energy released by stars

Observations of the universe's expansion created discussion regarding dark energy. Concordance models (WMAP) use Lambda as the second expansion component. Two literature proposals (cosmological constant Lambda and quintessence) attempt to account for this unknown energy source. Lambda is Einstein's famous "mistake—no, wait" but there is an alternative. There is consensus that late stage expansion currently is more linear than the equation R'=R*(time'/time)^(2/3). Since this equation represents conversion of kinetic energy to potential energy and is a curve, data [3] showing that late stage expansion is linear or expanding appears to violate energy conservation and require a dark (unknown) energy source.

The author's paper entitled "Zero dark matter and zero dark energy" [reference 13]. presents calculations indicating that energy produced by stars causes the linear expansion curve. The analysis draws on the rate of star formation and the energy they release. A calculation procedure for expansion was developed that allows one to add energy and predict its effect on late stage expansion. It was surprising that a small amount of energy has a large effect on expansion. In fact, it will be shown that the energy addition is required to match the current temperature (2.73K) since the above models ended at slightly less than 2.73 K. Energy produced by stars is fusion energy and provides a physical alternative to dark energy. Calculations below show that there is enough energy coming from the surface of the stars to contribute energy on the order of 2e-10 MeV to each proton late in expansion. The calculation involves comparing the surface area of stars at high energy/area to the surface area of the sky at low energy (2.73 K). The total energy produced by each are almost equivalent at 6e60 MeV/sec. Dividing 6e60 by the sky area gives MeV/K^4. Using the conversion constant 3.54e5 gives K^4 and K. This can be converted to 4e-10 MeV available for expansion (only 1.16e-11 MeV may be required) but the temperature is consistent with 4e-10 MeV.

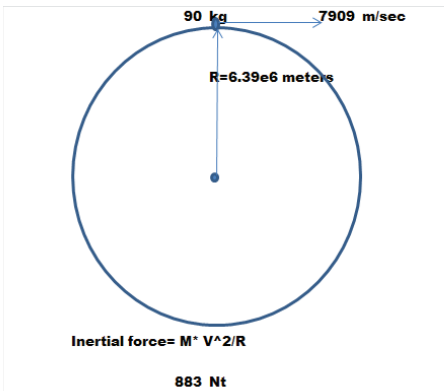
Temp surface K	2.73E+00	5778	Temp surface K	
mev/m^2/K^4	3.54E+05	3.54E+05	mev/m^2/K^4	
radius of universe (meters)	1.24E+26	6.96E+08	radius of sun (meters)	
Surface area of universe	1.93E+53	6.08E+18	Surface area of sun	
mev/sec for sky at 2.73 K	3.80E+60	2.40E+39	mev/sec/star	
		2.71E+21	stars	10
		1.65E+40	total surface area of stars	
		3.94E+20	mev/m^2 for each star	
		6.50E+60	mev/sec for all stars	
		3.36E+07	mev/sec/(sky m^2)	
			K^4=3.8e60/3.36e7	
		3.12E+00	K	
		4.03E-10	MeV available 1.5KT	

Appendix 4 Review of gravitational literature

GRAVITATIONAL FORCE ON THE EARTH

The proverbial apple that Isaac was watching when he conceived of gravity was a bit of pre-Hollywood. He was an observational based scientist that rolled objects down an incline and measured time and distance. But we have high standards for present day physics and should expect someone to find the source of the gravitational constant and its relationship to the other forces. During Newton's lifetime the concept of a small scale was not taken seriously although the idea of an atom came much earlier. The true source of the gravitational constant G is identified at the scale of the proton. During Sir Isaac's lifetime, the concept of a universe was pretty much limited to a solar system. He would not have believed how large the universe is, but he would have been fascinated as we all are about findings in the last 100 years.

The earth pushes up on our feet. Here on earth, the reason we feel force upward is that our velocity is too low to be on an orbit (geodesic) defined by the radius of the earth. A geodesic is a combination of velocity V, radius R and mass M that give G, the gravitational constant; G=R*V^2/M=6.6742e-11 N-m^2/kg^2. Astronauts are in orbit and on a geodesic. We can calculate the velocity V required to be on a geodesic. First, we calculate our acceleration at the surface of the earth. We need to know that the earth's mass is M= 5.98e24 kg and that the radius of the earth R = 6.39e6 meters. This gives us the gravitational acceleration on the surface of the earth a=G*Mearth/Rearth^2=9.8 meters/second^2 (abbreviated m/sec^2). Next, we calculate velocity V= (a*R)^0.5= 7909 m/sec. The force upward on our feet is F=mass*a=m*V^2/R. Your mass in kg is your weight in pounds divided by 2.2. If your weight is 198 lb =90 kg, the earth is pushing up on you with the force F =90*7909^2/6.38e6=883 Newton (Nt). Force upward from the earth is making up for the outward inertial force you are missing because your velocity is too low. The equation could also be written F=mass*(7909^2-Vlow^2)/R.   In this equation Vlow is fixed by us being on earth. Inertial force is outward force in an orbit and gravitational forces are inertial forces. The diagram below describes the situation.



Kids feel inertial force when you they are on a merry-go-round and you calculate it by F=m*a where acceleration a= V^2/r. Gravitational force is also inertial force and Newton recognized this because *Principia*, his book on physics also stated that F=m*a. Force is mass times acceleration. But if an astronaut has this velocity, why is she "weightless"? The essence of Einstein's general theory of relativity (GR) is that mass follows curved space-time and "doesn't know" about the forces involves. It simply says that the earth curves space-time and the astronaut follows the curve. When the astronaut has the right velocity, V=7909 m/sec in this case, she feels no force. She is falling but also circling the earth fast enough that she never becomes closer to the earth. There is a statement regarding this concept called equivalence of acceleration and gravity. The story goes "if you are in a free-falling elevator, how would you know about the force on you?" Since you do not feel it, you do not measure it.

Kinetic energy is converted to potential energy and visa-versa. The equation that applies is kinetic energy (ke) plus potential energy (pe) is a constant, i.e. ke+pe = constant. Potential energy is force times the distance the force pushes through, i.e. PE=F*R. To find the potential energy from the orbital kinetic energy we must get the origin (initial condition) correct. The origin is the big bang when particles with kinetic energy separate. Gravitation resists expansion and kinetic energy is converted to potential energy. Later when the mass starts its fall, potential energy is reconverted to kinetic energy. It either accumulates in bodies from a position established by expansion of the universe or it establishes an orbit. In both cases it has potential and kinetic energy. At the orbital position (the geodesic) the outward inertial force is balanced. We calculated the inertial force 883 N in the orbit if the astronaut had gained 7909 m/sec from the rocket. Here on earth, we are "off the geodesic". The earth must push up on our feet to make up for the inertial force that we are lacking. Yes, there is energy of position (potential energy), but this does not produce the gravitational force. Think about climbing the stairs. Where does your energy go as you climb? It goes into overcoming force F and the potential energy is

PE=F*R. It is the result of a force moving through a distance (force units are Newtons N and distance units are meters and energy is N-m). To calculate potential energy, you need a conversion factor (PE=F*R (Nt-m)*conversion factor) to know the potential energy in Million electron Volts (MeV). MeV is a convenient energy unit and represents the energy required to move an electron through a one-volt potential (eV) but since it is a small energy, it is multiplied by one million. The conversion 6.24e12 MeV/(Nt-m) is the main conversion used in the document.

Although this explains our gravitational situation here on earth there are still several questions: 1) how did we get on this curve? 2) Why is our kinetic energy low? 3) Deeper yet, where does gravity originate? 4) What is the resisting force that allows the earth to support us? Overall, we have not gone beyond what Newton wrote and Einstein taught us.

Literature [2][3][Wiki] regarding a coupling constant for gravity is reviewed below. The gravitational coupling constant α_G is the coupling constant characterizing the gravitational attraction between two elementary particles having nonzero mass. α_G is a fundamental physical constant and a dimensionless quantity, so that its numerical value does not vary with the choice of units of measurement:

α_G =Gm_e^2/(hC)=(m_e^2/m_p^2)=1.752e-45

where G is the Newtonian constant of gravitation; m_e is the mass of the electron; C is the speed of light in a vacuum; ħ is the reduced Planck constant; m_p is the Planck mass.

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 7.045e-14 meters, as proposed above, the force is:

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

If radius r for the conventional physics (Wiki) force calculation is 7.045e-14 meters, as proposed above, the force in Newtons (NT) is:

F=5.9068e-39*hC/R^2				
	hbar		6.58E-22	mev-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/(7.045e-14)^2				
3.76078E-38	NT			

This result agrees with the simple Newtonian force:

F=Gmm/R^2= 6.67e-11*1.67e-27^2/7.045e-14^2= 3.76e-38 Nt

Development of the equation clearly is based on mass with initial kinetic energy being converted to potential energy as the universe expands. But v (and v^2) above is initial velocity and radius r is the point in late stage expansion.

The factor 1/exp(90) is recognized as a bridge between large scale Newtonian physics and the quantum scale since the proton-space model is for one proton. With ke=10.15 MeV and r0=7.045e-14, the equation above can be used to define how the radius of a cell changes with kinetic energy. A cell is the space that the proton-space model defines. With G constant fundamental radius r0 can expand as kinetic energy decreases. Just like the electron's orbit, the proton's cellular orbit can change. In this case the energy is changed from kinetic energy to gravitational potential energy since the proton must do work on the cell to expand it and it resists expansion according to Newtonian gravity. The equation derived above for G with E*R can be re-written to give the change in the cell radius as kinetic energy is converted to potential energy.

G=E*r0/m^2*1/exp(90)
E=2*ke=2*10.15
G=2*10.15*r0/m^2*(1/exp(90))

This means that the E*r form of the equation for G becomes a powerful tool because the original E=2*ke=2*10.15 is known. Since m is always 1.67e-27 Kg, and G is constant the only variable in the equation is r0 and its original value is 7.045e-14 meters. The multiple E*r is fixed but E is inversely proportional to r.

Ke=0.5*mv^2 can be substituted into the equation above.

G=2*0.5*mv^2*r0/m^2*(1/exp(90))= r0*v^2/m*(1/exp(90))

The Newtonian relationship R=GM/V^2 can be combined with the above equation if we know the relationship between the cell v and large V (for example the velocity of an orbit around a galaxy). The following relationships apply with the two substitutions from cellular cosmology.

The relationship between v and V is: v^2=V^2.

The following box combines the relationships above.

Orbital R for galaxy= GM/V^2 where M is the central mass
substitute G=r0 v^2/m*(1/exp(90))
R= r v^2/m*(1/exp(90))*M/V^2
v^2/V^2=1 (cell v and large V equal)
m/M=m/(m*number of cells in galaxy)
R= r*(1/exp(90))*M/m
multiply top and bottom by exp(180)
R=r*exp(90)*M/(m*exp(180))
m*exp(180)=Muniverse
R=r*exp(90)*(Mgalaxy/Muniverse)
r=r0*10.15/ke=7.04e-14*10.15/ke
R=7.04e-14*10.15/ke*exp(90)*(Mgalaxy/Muniverse)
R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90))

The factor (1/exp(90) in the equation above scales Rs (Schwarzschild's solution to the wave equations) to one proton.

The equation R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90)) is another way of writing R=GM/V^2 because they both yield the radius R of a large orbit around a central mass (M). But the first equation helps understand what curves space for gravitation.

Opinion

In the author's opinion, a solution to the quantum gravity problem was delayed by general acceptance of an old relationship between fundamental constants. Literature states that the gravitational constant (G) originates at the Planck scale. The Planck length L= (h*G/C^3)^0.5 = 1.61e-35 meters where h is Planck's reduced constant (H/2pi) = 6.58e-22 MeV-Sec and C is of course the speed of light. The energy associated with the Planck length is 1.2e22 MeV (6.18e-8 Kg). This energy is far greater than the energy of a proton and the Planck length is incredibly small. Many physicists are reluctant to give up the equation that contains G, h and C in what appears to be a defining relationship. Theorists are exploring alternatives like string theory but have not fully gained acceptance of a new theory describing the origin of the gravitational constant.