Zero Dark Matter and Zero Dark Energy

The origin of things

Gene H Barbee

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Is there an overarching theory that will finally allow us to fully understand nature? What is the universe made out of? Where do the laws of physics reside? What is space-time? Quantum mechanics applies at the small scale but the general theory of relativity is large scale gravitational theory. Are they compatible?

Cosmology discoveries provide useful clues for building a full model of nature. The core of the author's cosmology model is based on information from a mass model of the proton. This information represents reality through the Schrodinger equation. The proton model energy values describe space and time around the proton and scale to the universe since the relationships are everywhere the same. The beginning could have started with zero energy and probability 1. Information processes I call the Mind of creation separated energy into equal and opposite parts. Probability 1 was separated into many (exp(180)) neutrons each with probability (1/exp(180)).

A neutron→proton mass model and cellular cosmology were combined into what the author believes is a first principles cosmology model that resolves many questions. Some of the current challenges in cosmology are listed below:

Flat galaxy rotation curves were observed in the 1930's by Dutch Astronomer Jan Oort. Most cosmologists today attribute the difference between observed flat and calculated declining Keplerian velocity curves to dark matter despite decades of failed efforts to identify it. There are other difficulties:

Recent WMAP [4] and PLANCK mission scientists believe neutrons and protons are only 4.6% of critical density (the total mass and energy in the universe).

What is dark energy and why is it 72% of critical density?

Understanding space and gravity more thoroughly than Einstein's general theory of relativity requires bridging small and large scale physics.

These are not easy problems to solve. Any claim regarding different percentages of critical density must address baryon/photon ratios that determine observed fractions of Deuterium, Helium3 and Lithium7. Different claims must also address conditions at equality of photon and mass density and the temperature anisotropy observed at decoupling (where the plasma clears and electrons can orbit protons).

Background

Apparent creation strategy
Start with zero energy, probability 1 and creative acts that separate information related to energy into equal and opposite components.

> Note: Shannon [6] defined information is a number N related to probability (p). The equation is (N)= -ln(p) where ln means "the natural logarithm". By this equation there is zero information in probability 1. Information is created when p is separated into p=one thing/everything. Example: if probability=1/2, N= -0.693.

Creation appears to be a two level process; (1) information separation and (2) use of the information in a quantum mechanical equation to represent energy reality.

Level 1---information. It appears there was original information (the Mind of creation) that we learn about by "reverse engineering" energy data with Shannon based probability. Information specifies mass, kinetic energy and fields of the neutron (that decays to the proton, electron and anti-electron neutrino).

Level 2— energy based reality through the Schrodinger equation.

Schrodinger equation derivation [5]:

1=exp(-i*1)*exp(i*1). The imaginary number i is separation of 1 into two parts.

1=exp(-i*Et/H)*exp(i*Et/H), where Et/H=1 means Energy*time/Planck's constant.

> This equation is one basic equation for quantum mechanics. The components exp(-i*Et/H) and exp(i*Et/h) are known as complex conjugates or wave functions. The result of the multiplication is Probability =1 but it represents perceived information about the energy components.

> Note: exp(power) means the natural number e to a power. Example exp(-0.693)= e^(-0.693)= 1/2, where e is the natural number 2.712.

Level 1 probabilities (p=1/exp(N)) define energy E=e0*exp(N). The Schrodinger equation uses exp(i*Et/H) for the mass and kinetic energy components and exp(-i*Et/H) for field energy components. After addition of energy components, these values are multiplied. For example if the energy components are for the proton, multiplying the wave functions (by design of the proton system of components) is probability 1. This represents our reality of the proton at level 2 based on its component energies, replete with space time properties.   The mass plus kinetic energy components are positive and the field energy components are equal and opposite.

> The energy plus mass components of the proton are improbable p=1/exp(90). Likewise the field energy components of the proton are improbable p=1/exp(90). These are probability separations of 1=exp(180)/(exp(90)*exp(90)). The related energy separation is 0= mass+kinetic energy minus field energy.

Step 3—create the electron and the electromagnetic field by neutron decay.

Step 4---fuse neutron and protons into atoms that create sophisticated electron orbitals.

The universe consists of exp(180) proton-electrons that each have a probability 1/exp(180). Conceptually the particles are part of an entire information system (probabilities) that represent the energy of each proton-electron. These energies are Et/H=1 in complex conjugates (wave functions) exp(iEt/H) and exp(-iEt/H). After addition of all the exp(180) individual proton energies, the overall complex conjugate multiplication equals 1. This GREAT probability 1 represents the universe with overall zero energy.

			P= 1=exp(itE/H)*exp(-itE/H)			
		E				E
		Mass plus	1=exp(180)/exp(180)			Strong Field Energy
		Kinetic Energy				Gravitational Field Energy
		E=fn(p)				E=fn(p)
1	protons--electrons	p=1/exp(90)	1	p=1/exp(90)		protons fields
2	protons--electrons	p=1/exp(90)	1	p=1/exp(90)		protons fields
3	protons--electrons	p=1/exp(90)	1	p=1/exp(90)		protons fields
	protons--electrons	p=1/exp(90)	1	p=1/exp(90)		protons fields
exp(180)	protons--electrons	p=1/exp(90)	1	p=1/exp(90)		protons fields
	Energy Reality		Information Core			Energy Reality

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The Proton model

Component probabilities for the proton and electron are listed in Appendix 1 of this document. They are called "Fundamental N values". The probability core (level 1) is defined by N= -ln(p). Energy is defined by E=e0*exp(N). The Schrodinger multiplication (iEt/h) times (-iEt/h) represents energy reality.

						P=1=exp(itE/H)*exp(-itE/H)				
		E							E	
		Mass plus							Strong Field Energy	
		Kinetic Energy (MeV)							Gravitational Field Energy	
N	E=2.02e-5*exp(N)		Diff KE	N	p=EXP(N)	1=p/p	p=1/EXP(N	N	E=2.02e-5*exp(N)	
Down Quark		101.95	646.96	15.43	1.99E-07	1	2.69E-08	17.43	753.29	Down Strong Field
Kinetic E		5.08		12.43	3.99E-06		2.95E-05	10.43	0.69	Grav Field component
Up Quark		13.80	83.76	13.43	1.47E-06	1	1.99E-07	15.43	101.95	Up Strong Field
Kinetic E		5.08		12.43	3.99E-06		2.95E-05	10.43	0.69	Grav Field component
Up Quark		13.80	83.76	13.43	1.47E-06	1	1.99E-07	15.43	101.95	Up Strong Field
Kinetic E		5.08		12.43	3.99E-06		2.95E-05	10.43	0.69	Grav Field component
Strong residual KE		10.151								
neutrino ke		-0.671								
borrow			-0.62	-10.33	3.25E-05					
ae neutrino		-2.02472E-05		0.00E+00		1	2.73E-05	10.507	0.740	Grav Field component
E/M field		-2.72E-05	-30.4538103							
Proton M		938.27206								
E/M field	outside	2.72E-05		0.296	7.44E-01					
electron	proton	0.511		10.14	3.96E-05					
Kinetic E		0.111								
v neutrino		0.671		10.41	3.02E-05					
t neutrino		0.740								
e neutrino		2.02472E-05								
Expansion KE		10.151								
Expansion PE		10.151								Grav Field Total
Total M+KE		959.9859	sum m+ke	90.10	7.42E-40		7.42E-40	90.10	959.986	-2.801

The model gives the mass and kinetic energy of the proton 938.27201 MeV (in red) accurate to within 2e-8 MeV. This value is sum of component energies values above it. The fundamental N values totaling 90.0986 and related probability 7.42e-40 are at the bottom of the two columns. There is energy outside the proton, listed on the left hand side under the Proton mass and the total energy 959.985 MeV is at the bottom of the two outside columns (equal and opposite). The other energy components of the model underlie the laws of nature [11].

Energy values for the four interactions in nature originate in the table. If the original information had been different the laws of nature would be different.

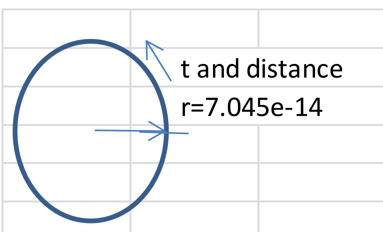
The equal and opposite electromagnetic fields are created from zero by separation when 27.2e-6 MeV is borrowed from the proton. There are other separations and the “borrowed negative values” marked in grey have positive counterparts.

The subject of interest here are the laws that underlie cosmological observations. There are only a few values in the proton model (highlighted in red) required for an excellent cosmology model.

1) The gravitational field energy 2.801 MeV.
2) The value 10.15 MeV near the bottom of the diagram is the kinetic energy of the neutron at the big bang. Gravitational attraction associated with 2.801 MeV resists expansion, converting kinetic energy to potential energy (the subject of cosmology [12]).
3) The value 10.15 MeV labelled strong residual kinetic energy (fusion energy).
4) The value 0.11 MeV is the energy required to initiate fusion.

Quantum circles

Space and time originate with a quantum circle related to the gravitational field energy 2.801 MeV.



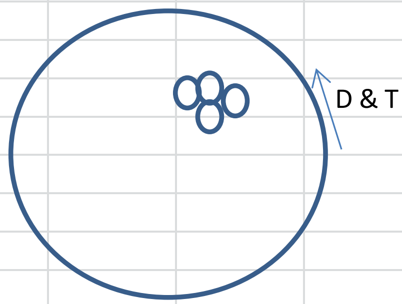
Et/H=1 with t=2pi r/C leads to r=HC/(2pi)/E. H=Planck’s constant=4.14e-21 MeV-sec.

r=HC/2pi=1.973e-13/2.8011=7.0445e-14 meters
Fundamental time increment= 2 pi R/C= H/2.801 MeV=1.476e-21 sec

Fundamental time*C defines fundamental space increment. Space/time=C.

The quantum radius 7.045e-14 meters and time 1.476e-21 seconds are fundamental to space and time. Time progresses in increments of fundamental time around the quantum circle.

There is a space-time-energy representation of the GREAT probability 1. The huge number of protons exp(180) and their associated space are contained in a sphere we call the universe. The space associated with each proton is called a quantum sphere (a quantum circle in three dimensions). If you place exp(180) quantum spheres in a large sphere, time and distance for the universe are defined.



A=4/3pi R^3=exp(180)*4/3 pi r^3	
R=r*exp(60)	
Et/H=1	
t=H/E	
t=2pi r/C	
r=HC/2pi*1/E	
r=7.045e-14 m	
t=1.47e-21 sec	
Time=2 pi r*exp(60)/C	
1.69E+05	sec
Distance=T*C	
5.06E+13	m

The spheres above are empty but the volumes are equal. The large volume is exp(180) small volumes, yielding the relationship R=r*exp(60). We will show below that these volumes increase with time, expanding the universe. Time will be measured around the large circle. Distance around the circle is C*time. "Around" is a fundamental concept in cosmology.

Cellular Cosmology

If mass is distributed uniformly within a sphere the mass toward the outside will be in a preferred position. Since Newtonian gravity is based on central mass, the mass toward the outside will move toward the center. This would make gravitational laws non-uniform throughout the sphere. A model with no preferred position places the mass on the surface of a sphere. But it doesn't have to be a large sphere. It can be many small spheres that have the same surface area. The author developed a concept called cellular cosmology that defines space as N=exp(180) spherical "cells" each with a proton.

Gravitational relationships define geodesics that are surfaces where particles orbit. Equating a large surface area with many small surface areas yields the following relationship discussed below under the heading "Cellular Cosmology": Area= area*exp(180) yielding R=r*exp(90)

Cellular cosmology obeys the rule "there can be no gravitational preferred position for mass" because all mass is on the equivalent of a large sphere. The number of cells in large R (representing the universe) is exp(180) [Appendix 2].

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

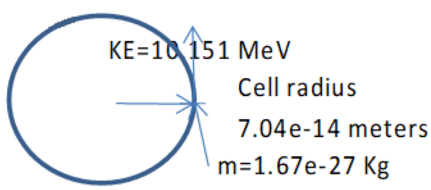
For gravitation and large space, we consider velocity V, radius R and mass M as the variables (capital letters for large space and lower case r, v and m for cellular space) that determine the geodesic (the radius with balanced inertial and gravitational force). G large space= G cellular space with mass substitution M=m*exp(180) and surface area substitution is R=r*exp(90).

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) is the coupling constant for gravity. When measurements are made at the large scale to measure G, the above derivation indicates that we must multiply cellular scale values (r*v^2/m) by 1/exp(90) for equivalent G. Geometric and mass relationships give the cell "cosmological properties". Velocity V=v for small cell orbits and large scale cell orbits.

Calculating the gravitational constant G

Important cell properties quoted above originate in a Schrodinger based mass model of the neutron (that decays to a proton, etc.) [Appendix 1 and 2]. The specific values 2.801 MeV for the gravitational field energy and 10.15 MeV of kinetic energy allow the gravitational constant to be calculated.



The neutron at Velocity V= (2*10.15/1.67e-27*1.6e-13)^0.5= 4.4e7 meters/sec circles the small radius 7,045e-14 meters producing inertial force f=3.78e-38 Nt opposing the 2.801 MeV gravitational field. The gravitational constant G= F R^2/(M/g)^2 = 6.69e-11 [16]. The left column below determines the gravitational constant [9][10] based on the cell above containing one neutron with kinetic energy 10.15 MeV. The second column indicates that G is almost constant throughout expansion of the universe except for small effects related to gamma.

GRAVITY	0.028	**expanded**
	neutron	
Neutron Mass (mev)	939.5654	**939.565**
Neutron Mass M (kg)	1.675E-27	**1.675E-27**
Field Energy E (mev)	2.801	**2.801**
Kinetic Energy MeV Ke=10.15*r/7.045e-14	10.151	**0.001**
Gamma (g)=939.56/(939.56+ke)	0.9893	**1.0000**
Velocity Ratio v/C=(1-g^2)^0.5	0.1458	**0.0015**
Velocity (meters/sec)	4.383E+07	**4.41E+05**
R (meters) =(HC/(2pi)/(E*E)^0.5	7.045E-14	**7.045E-10**
Inertial Force (f)=(m/g*V^2/R)*1/EXP(90) Nt	3.784E-38	**3.784E-46**
Calculation of gravitational constant G		
G=F*R^2/(M*m/g)=NT m^2/kg^2	6.621E-11	**6.693E-11**
Published by Partical Data Group (PDG) [10]		**6.674E-11**

Note: as expansion occurs KE decreases with R'/R and gamma (g) becomes 1.0. G was slightly lower at the beginning but approaches the value above.

In three dimensions the relationships give G for the surface of a sphere (or the equivalent area of many small spheres). If not it violates the "no preferred position" principle.

Potential energy defining relationship for G

Expansion is resisted by the force of gravity. Over time, kinetic energy is converted to potential energy and KE is now 2e-12 MeV (but in addition there is some energy release from stars). PE=20.302 MeV. (Excerpt from the Proton model is shown below).

	E=2.02e-5*(	Diff KE	N	P	N	E=2.02e-5*exp(N)		
Proton M	938.27206	MeV				MeV	MeV	
E/M field	2.72E-05		0.296					
electron	0.511		10.136					
Kinetic E	0.111							
v neutrino	0.671		10.408					
t neutrino	0.740		0					
e neutrino	0		0					
Fusion release		0				E*Pfusion=10.151*(1-exp(-2/2))		
Expansion KE	outside	2.00E-12						
Expansion PE	Proton	20.302					Grav Field Total	
Total M+KE	959.9859	sum m+ke	90.10		90.10	959.986	2.801	

The total expansion energy is converted from kinetic energy to potential energy.

The defining relationship below for the gravitational constant G uses potential energy value 20.3 MeV from the neutron/proton models in Appendix 2. (Expansion of the universe starts with 10.15 of potential energy and 10.15 of kinetic energy but in the fully expanded condition each proton contains 20.3 MeV of gravitational potential energy. It is shown that G is simply potential energy 20.3 MeV*radius 7.045e-14 m. It depends on the small factor 1/exp(90) from cellular cosmology, the conversion constant 1.6e-13 Nt-m/MeV and the mass of two attracting neutrons (1.675e-27 kg). Cellular cosmology is based on area equivalence r=R/exp(90) and exp(180) protons.

G=10.15124*2*7.045e-14*1.602e-13/EXP(90)/1.675e-27^2			
6.69E-11	Grav Const Nt m^2/Kg^2		

Cells contain protons and they allow us to understand the large universe with principles established at the small scale. This equation can also be written without the small factor 1/exp(90) and a central mass of exp(180)*1.67e-27=2.49e51 kg attracting a proton.

G=20.3*1.6e-13*8.59e25/(2.49e51*1.67e-27)

G=6.69e-11 Nt m^2/kg^2

The large circle has radius 7.045e-14*exp(90)=8.59e25 meters, consistent with gravity being a long range force. Gravity is determined by the large scale and cellular cosmology is the small scale equivalent. This provides an understanding of gravity and a bridge from the quantum scale.

Expanding cells maintain G

Understanding that the gravitational constant G can be calculated with ke0= 10.15 MeV/proton of kinetic energy in a cell of radius r0= 7.045e-14 meters allows further development of cellular cosmology gravitational relationships. As kinetic energy decreases and potential energy increases each cell expands. Kinetic energy associated with each of exp(180) cells is related to pressure acting outward on the surface. This expands the universe (small m below for the proton=1.67e-27 Kg).

G remains constant during expansion			
ke0=10.15 MeV/neutron			
r0*V^2/m=r*v^2/m			
(mv/mV)^2= (r/r0)			
ke/ke0= (r/r0)			
r=r0*10.15/ke			

What is Dark Matter?

Using relationships from cellular cosmology and Newtonian gravity, the total velocity of mass in a galaxy can be calculated.

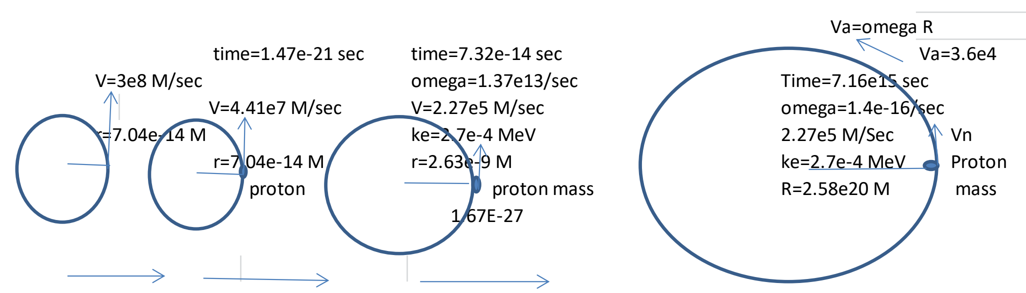
Orbital R for galaxy= GM/V^2 where Mgalaxy is the central mass		
substitute G=r0 v^2/m*(1/exp(90))		
R= r v^2/m*(1/exp(90))*Mgalaxy/V^2		
v^2/V^2=1 (cell v and large V equal)		
R= r/m*(1/exp(90))*Mgalaxy		
substitute r=r0*10.15/ke		
R= r0*10.15/ke/m*(1/exp(90))*Mgalaxy		
m is the test mass at R, 1.67e-27 kg		
R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90))		
R above is the geodesic for central Mass galaxy		
Since this is an "enlarged cell", it also has a radial velocity V		
time to move around the cell at velocity V is		
t=2*pi()*R/V		
omega=V/(2pi*R)		
V=omega*R=(GM/R)^.5/(2pi*R)		
omega=(Gm/R)^.5/(2pi*R)		
Omega =1/(2*PI())*(G*M*EXP(90))^0.5/R^1.5		
Va=Omega r	this is the angular velocity of the enlarged cell	
	it is a property of central mass R above	
But mass "riding with" Omega obeys Newtonian gravity		
vn=(Gm/R)^.5	this velocity varies from center to edge	
Vtotal=Va+vn	the galaxy velocity curve is always the sum of both components	

One of the relationships above (R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90)) where r0=7.045e-14) is another way of writing R=GM/V^2 but it provides an understanding of the cosmology involved. From a gravitational viewpoint, the central mass is orbited by one proton (1.67e-27 Kg). The volume of space associated with each cell merges with other cells and becomes the cumulative volume of space surrounding the central mass. The quantum scale r=r0*10.15/ke is increased (fundamental increments of time and distance remain the same but there are many of them around a circle). This expands the universe. A cell is the proton and its gravitational space but it can be quite large when many protons accumulate. Radius R defined by a large central mass (R=GM/V^2)^.5 is the gravitational equivalent of one proton moving at velocity V. Large R retains the small scale spin property. Maintaining G equivalence between the large scale and cellular scale requires multiplying small scale values by (Mgalaxy/1.67e-27)*(1/exp(90)).

The diagram below traces fundamental particle spin directly to the galaxy scale. Spin for the quantum cell is E/H = 2.801MeV/H= 1/fundamental time= 6.78e20 reciprocal sec. The cell enlarges from the quantum scale (circle on the left) to the next cell that has mass. Because the velocity is no longer C, I call this omega. For the lower velocity 4.4e7 m/sec omega=2.801 MeV/H*4.4e7/3e8=9.9e19 reciprocal sec. Omega can be calculated for each successive diagram by the equation developed above. The point is that Omega for all the diagrams is related to E/H, a fundamental value.

O =1/(2*PI())*(G*M*EXP(90))^0.5/R^1.5

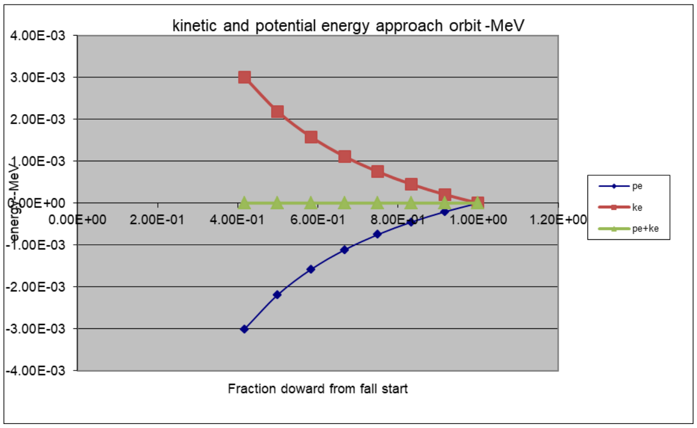
The velocity associated with the cell with 10.15 MeV defines the gravitational constant. The third diagram from the left is for the kinetic energy of a cell that expanded and then fell from its expansion determined radius. Again, it retains fundamental omega. The diagram on the right is for a galaxy of 2e41 kg. The cell (space) on the right has low curvature because it has been enlarged by R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90)) but retains the angular velocity property omega=1/(2pi)*(GM)^.5/R^1.5 associated with central mass.



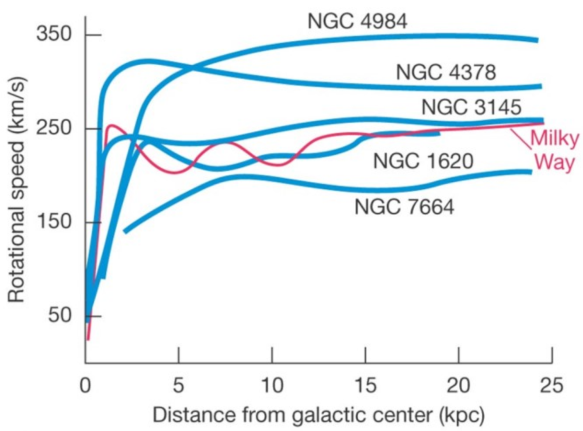
	Quantum cell	cell with mass		Galaxy cell Small	Galaxy "cell" Large
Gravitational Field E (Me\	2.80114439				
Mass (Kg)	1.67E-27	1.67E-27		1.67E-27	2.00E+41
Ke=0.5*mV^2/1.6e-13 (MeV)		10.15		2.70E-04	2.70E-04
r=7.04e-14*10.15/ke (m)	7.04E-14	7.05E-14		2.65E-09	2.65E-09
V (m/sec)	3.00E+08	4.41E+07		2.27E+05	2.27E+05
Rgalaxy (m)		**7.04E-14**		**2.65028E-09**	**2.60E+20**
Omega cell (1/t)		9.92E+19		1.36E+13	1.39E-16
O =1/(2*PI())*(G*M*EXP(90))^0.5/R^1.5		x44.4e7/C			
1/t=C/(2pi r)	6.78E+20		t	7.36E-14	7.20E+15
1/t=E/H	6.77E+20		tC	2.21E-05	2.16E+24

Example of a flat galaxy velocity curve

The kinetic energy and velocity of stars in a galaxy originate from conversion of potential energy to kinetic energy as their mass falls from their expansion determined radius. The fall is initiated by mass accumulation. Typical changes in kinetic and potential are shown below. The fall velocities are consistent with Newtonian V=(2*ke/m)^0.5.



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



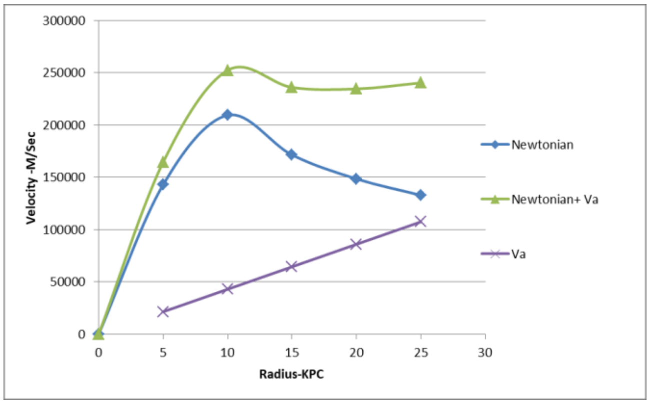
(b)

Calculating Flat Velocity Curves

The example below is for a galaxy with mass 2e41 Kg. Measurements of observed radius and observed luminosity are available (Wiki but astronomers have published data). The luminosity falls off rapidly with observed radius indicating that there is not much mass toward the outside (luminosity is proportional to mass). Calculations below sum the central mass (column 1) and calculate the Newtonian orbital velocity with the equation Vn= (GM/R)^.5 M/sec. Using this equation predicts incorrect low velocities toward the edge (the row labelled Vn is 2.1e5 m/sec at 10 kpc but only 1.3e5 m/sec at 25 kpc radius). If mass toward the outside of the galaxy is increased artificially by assuming that it contains dark (no light emitted) matter the velocity would remain high toward the edge.

0	5	10	15	20	25.0	Radius (kiloparsec)	
	1.54E+20	3.08E+20	4.62E+20	6.16E+20	7.7E+20	Radius Meters	
	1.19E+39	9.77E+37	8.01972E+36	6.58299E+35	5.4E+34	Luminosity=I0*exp(-2/r)	
	1.309E+41	1.535E+40	1.25974E+39	1.03405E+38	8.5E+36	Kg within each luminosity band	
	1.87E+41	2.023E+41	2.03568E+41	2.03671E+41	2.0E+41	Central mass for each radius	
0	1.43E+05	2.09E+05	1.71E+05	1.49E+05	1.3E+05	Vn=(G M/R)^.5	
	2.15E+04	4.30E+04	6.45E+04	8.60E+04	1.07E+05	Va=Omega *R	
0	1.64E+05	2.52E+05	2.36E+05	2.34E+05	2.40E+05	Vn+Va	

The last three lines represent the correct way to calculate flat velocity curve without assuming dark matter. From our viewpoint each radius across the galaxy has angular velocity Omega 1.39e-16/sec associated with its cells. Multiplying Omega=1.39e-16*Radius at various points across the galaxy = Va (line labelled Va above). Added its Newtonian velocity (Vn) at various points across the galaxy to the velocity we see (Va) determines the galaxy velocity profile. The sum of declining Vn and increasing Va produce a flat galaxy rotation curve matching measurements. Angular velocity looks like a distant merry-go-round but within its reference frame protons move at Vn determined by Newtonian gravity.



It is important to point out that the kinetic energy associated with 227000 m/sec was created from the "fall" into the galaxy from the expansion determined spacing of the protons that accumulate to create the galaxy. This kinetic energy wasn't dissipated and nature responded by allowing the space to spin around the central mass. This seems abnormal but it supported by data. Data from five galaxy velocity curves are compared with measurements in Appendix 4.

Problem Resolution; What is Dark Matter?

When we look at a galaxy we observe real distances and real velocities. They have flat velocity curves. If all else fails, believe the data (flat rotation curves). Also believe Newtonian gravity and consider the possibility that the know quantum effect called spin becomes angular velocity for large galaxies. The calculations presented are straightforward and allows one to calculate the flat rotation curve. I believe that the Mach Principle (galaxy rotation randomized) is obeyed overall. It is clear that velocity profiles in galaxies make them appear as spinning disks. If the velocities obeyed only Newtonian gravity the spiral arms would wrap tightly around the center more over time. The proposal above explains flat velocity curves without inferring dark matter.

Hubble distances

For the moment we will use two facts from WMAP:

The age of universe is 13.7 billion years.

Density of the universe is 9.14e-27 kg/m^3.

If the universe is now 13.7 billion years old, we can calculate distance by multiply time*C. This value is called Hubble distance. Time below is calculated with fundamental time. T= 1.47e-21*exp(N) seconds. There are two interpretations of this distance.

88.572	N			
1.48E-21	fund time			
4.32E+17	time=exp(N)*fund time			
1.30E+26	distance light travels			
13.69	time Byrs			
if Hubble distance is R		If Hubble distance is circumference/pi		
1.30E+26	R	4.12E+25	radius M=dist/(pi)	
9.14E-27	dens	9.14E-27	density kg/m^3	
9.10E+78	vol	2.94E+77	volume	
8.32E+52	wrong ma:	2.683E+51	mass=vol*density	
		2.495E+51	exp(180)*1.67e-27 kg	

After 13.7 billion years, distance times C= 1.36e26 meters. Many cells have been combined above but each quantum cell defined space and time by a circle; i.e. fundamental time is around a circumference and fundamental time*C defines fundamental distance.

We can compare the two columns by knowing that critical density is 9.28e-27 kg/m^3. The column of calculations on the left yields the volume of the associated sphere. Multiplying vol*dens= 8.52e52 kg. But the column on the right is calculated with radius= 1.3e26/pi= 4.1e25 meters. From the radius, we can calculate the volume and mass (vol*density=2.94e77*9.14e-27= 2.68e51 kg. This compares favorably with exp(180) protons each with mass 1.67e-27 kg. The value 2.5e51 kg is fundamental in the Proton model. There is no mass in the universe that is not specified by the Proton model. It is an information/energy model of the universe.

From this we conclude that the entire mass of the universe is accounted for with baryons. The other estimate of mass (8.32e52 kg) leaves most cosmologists with a big problem. Where is all the missing mass?

The age of the universe is the amount of time that cells have had to expand. We can learn a great deal about the universe by creating a cellular model (later).

Many will disagree with the above simple calculation of 4.12e25 meter radius. The problem is they associate the Hubble time*C with light. I associate Hubble time*C with distance, not light. I agree that there is light being emitted from cells and that the universe is now transparent to light. It can move in any direction. The argument will be that we are just seeing light from distant objects formed only 375,000 years after the beginning. They assume that light traveling for 13.7 billion years establishes the Hubble distance across a diameter. But this does not agree with the fundamentals of space and time as circles. The large "surface" of cellular cosmology is related to fundamental distance (exp(N)*fund time*C) associated with the quantum circle. Time moves forward in increments of 1.48e-21 sec. Each cell is larger and this means the number of time increments around the circle have increased (distance is just C*time).

Everyone agrees that light is deflected by curved space time. The extreme case is a black hole but Einstein's calculations predict deflections around massive objects. It is clear however that light does not orbit galaxies like mass. Could light curvature be 1/4.1e26 reciprocal meters? For the radius of a galaxy (2.6e20 meters), the curvature would only be 1e-6*2.6e20 meters different than a straight line. Would we notice this deviation?

Constructing the expansion radius

A first principles cellular expansion model with the following capabilities was used to determine cosmological parameters.

1. Early history of helium formation including Deuterium, Helium3 and Lithium7 residuals.
2. History of the period from equality (matter and photon density) to decoupling (clearing of the plasma and cosmic background radiation pictures).
3. History of energy additions during expansion.
4. Star formation and its effect on expansion.

An expansion model calculates the radius of the universe as a function of time.

There is uncertainty in current literature regarding the initial radius of the universe. Some say it was a point and an exponential expansion known as inflation quickly increased the radius. The WMAP [4] expansion model (called the concordance model or Lambda Cold Dark Matter model) calculates expansion with R'=R*(time'/time)^2/3 plus a second component based on a constant called lambda suggested by Einstein.

Expansion model based cellular cosmology

An expansion model can be constructed with a few facts (results of huge efforts throughout history):

Facts from WMAP and Planck [14]: The current temperature called Cosmic Background Radiation (CBR) temperature =2.801 K. The current Hubble constant =2.26e-18/sec. The Hubble constant is strongly associated with the current density 9.14e-27 Kg/M^2 in a flat universe. This is also considered critical density. The current age of the universe =13.7 billion years.

Facts from Proton model: Values in the neutron mass model determine the starting radius ro=7.045e-14 M. The gravitational field energy E=2.8012 MeV determines r0. R0=7.045e-14*exp(60)=8.04e12 meters. The Proton model provides the initial kinetic energy=10.15 MeV/proton.

Based on probabilities for the neutron components the number of protons= exp(180) and the mass of the universe= exp(180)*1.673e-27=2.49e51 Kg. [Appendix 2 topic entitled "The number of neutrons in nature"]. Cellular cosmology places N cells in a large sphere. For this calculation we will assume that the critical density is neutrons but this will be checked several ways. This means that one cell of radius r represents the universe with R=r*exp(60). Initially all exp(180) cells are identical and one cell provides a great deal of information if we know the properties of the cell.

Facts from Astrophysics: During early expansion the temperature falls to 8e8 K and the SAHA equilibrium value approaches unity where He4 is readily formed [1][5][6][7]. The measured fraction of He4 is in the range 0.23 to 0.27.

Radius and temperature history from beginning to He4 fusion

First we construct a time scale based on the age of the universe (13.8 billion years =4.33e17 sec). Fundamental time 7.045e-14*2*pi/3e8=1.47e-21 seconds (nature counts forward as this time repeats). Logarithms will be used to decrease the number of computational iterations. Natural log(4.33e17/1/5e-21)=88.6 will be the current time. Natural log 45 is a good starting point (exp(45)*1.47e-21=0.051 sec). Time in seconds for the x axis will be exp(45+increment)*1.47e-21 seconds. The increment is the number of calculation columns from 45 to 88.6.

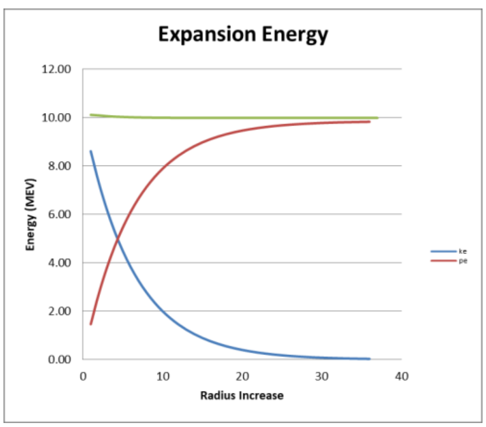
Next we will calculate the cell radius (r) as a function of time. The force f on the cell surface is calculated two ways and is equal: f=(m/g)*V^2/r*(1/exp(90))= G(m/g)^2/r^2 where m=1.673e-27 Kg. Gamma g=938.27/(938.27+ke) and velocity=C*(1-gamma^2)^.5 in meters/sec. Each cell is an expanding orbit with ke'=ke*(time/time')^0.5 and r=r0*10.15/ke (primed values mean the next value in an incremental calculation over time) Velocity is calculated from V=C*(1-g^2)^0.5 or V=((2*ke/m)/1.6e-13)^0.5 when g becomes very close to 1.0.   G was slightly different at the beginning but calculations near the end of expansion G= 6.6743e-11 Nt M^2/Kg^2.

Energy changes during expansion

The initial radius of each small sphere is, as explained above, r0=7.045e-14 meters. This means that the initial radius is 7.045e-14*exp(60)= 8.25e12 meters (in three dimension, exp(180)/3=exp(60). This same sphere has a surface area =4 pi*r0^2*exp(180)= 4 pi*R^2. The gravitational constant G remains constant throughout expansion. Kinetic energy follows the relationship below:

G remains constant during expansion		
ke0=10.15 MeV/neutron		
r0*V^2/m=r*v^2/m		
(mv/mV)^2= (r/r0)		
ke/ke0= (r/r0)		
r=r0*10.15/ke		

The proton mass model has initial kinetic energy= 10.15 MeV/neutron associated with the measured value G=6.674e-11 Nt M^2/Kg^2. Expansion converts kinetic energy to potential energy (10.15 MeV total energy/proton is constant).   This calculation is made possible by the use of the simple equation f=(mV^2/r)*1/exp(90) and potential energy = integral F*dR, dR is the increase in gravitational radius of each cell.



For convenience cosmologists use ke'=ke*(time/time')^(2/3). (Primed values mean the next value in incremental calculations across time). The universe expands because kinetic energy is being converted to potential energy. Cell radius increases as kinetic energy decreases r'=r*ke/ke'. Combining the relationships above, r'=r*(time'/time)^(2/3). The gravitation constant G=Fr^2/(m/g)^2 is maintained throughout expansion where lower case g= gamma= 938.27/(938.27+ke).
Potential energy (PE)= 0.5*F*(delta R)/(1.6e-13 Nt-m/MeV).

Temperature changes

Initial temperature=10.15/(1.5B)=7.6e10 K, where B=Boltzmann's constant 8.6e-11 Mev/K and T'=T*(R/R'). The calculations below are the first few steps. Lower case letters will be used to represent cellular values and upper case letters will be used for the large sphere (the universe). The equations are shown. If you are following this with an Excel® spreadsheet, copy these equations to 809 seconds. The information in green exists in each proton. The proton provides further cosmology properties as subsequent events occur.

Note: The reader may have to move back and forth in the document. For example, the finding that this is the proton is discussed further in the section entitled "Conclusions".

Potential energy + kinetic energy (MeV)	20.30	20.34	20.36	20.39
Potential energy (MeV)=.5FdR/1.6e-13	10.15	12.49	14.30	15.70
r0=7.22e-14*10.15/ke	7.22E-14	9.34E-14	1.21E-13	1.56E-13
ke=10.15*(time/time')^0.5	10.150	7.85E+00	6.07E+00	4.69E+00
g=938.27/(938.27+ke)	**9.8930E-01**	**9.9170E-01**	**9.9357E-01**	**9.9502E-01**
V=(1-(g)^2)^0.5*C	**4.3742E+07**	**3.8536E+07**	**3.3935E+07**	**2.9874E+07**
fgrav=(1.673E-27*V^2/(r0*EXP(90))	3.6702E-38	2.1973E-38	1.3152E-38	7.8700E-39
time (seconds)	0.052	0.076	0.111	0.164
G=fgrav*r^2/(m/g)^2	6.681E-11	6.722E-11	6.754E-11	6.778E-11

Facts from Appendix 5:

Increased radius dR=de/fcell*exp(60) where de is the energy available for expansion/proton. Force resisting expansion is fcell = f grav*exp(90). Pressure inside the cell p=fcell/(4pi*r^2). Temperature (T)= p/(nB) where p is pressure, n is the number density of neutrons and B is the Boltzmann constant.

The He4 transition

The calculations for the cellular base with decreasing kinetic energy continue across the time axis until the period below is reached. The calculation column for the He4 transition at 1190 seconds is shown in yellow below. When the temperature decreases to slightly lower than 8e8 K, He4 fuses (due to free neutrons and reduced Deuterium photodisintegration [15]).

After the He4 transition

The He4 transition is an explosion (0.25 of all matter releases fusion energy) and the initial result is an increase in radius but conditions stabilize at 1190 seconds. The release of 2.55 MeV fusion energy/proton increases the temperature from 7.7e8 K to 2.05e10K. This establishes the required baryon/photon ratio.

			Start	He4 transition	He4 Spike	Now	
KE MeV			10.15	0.11	2.84E+00	3.28E-10	
KE expansion algorithm		E=10.15*EXP(-1.4826-0.5*LN(time))			E=3.25*EXP(4.056105-2/3*LN(time))		
Expansion Time (sec)		Time (sec	0.052	431	431	4.32E+17	
Temp before He4 spike K=ke/(1.5*B)			7.87E+10	8.60E+08			
R meters=8.05e12*10.15/(E)			8.04E+12	7.42E+14			
R after spike=8.23e14+2.7*1.6e-13/(3.6e-42*exp(90)*exp(60)					1.20E+16	3.50E+25	R=4e15*E/e
Temperature after He4=KE/(1.5*B)					2.49E+10	2.55	
baryon photon ratio					4.74E-10		
		Stars energy delta radius (m)				5.0E+24	
		Temperature now (K)				2.73	
		Radius end of expansion (m)				4.00E+25	

At 4.3e17 seconds, the universe reaches the radius 3.5e25 meters and temperature 2.55 K. This radius will increase to 4.02e25 meters and the temperature will increase to 2.73 K after the second component of expansion is added. This is the subject of Problem 4 below.

Consequences of Baryon/Photon ratio

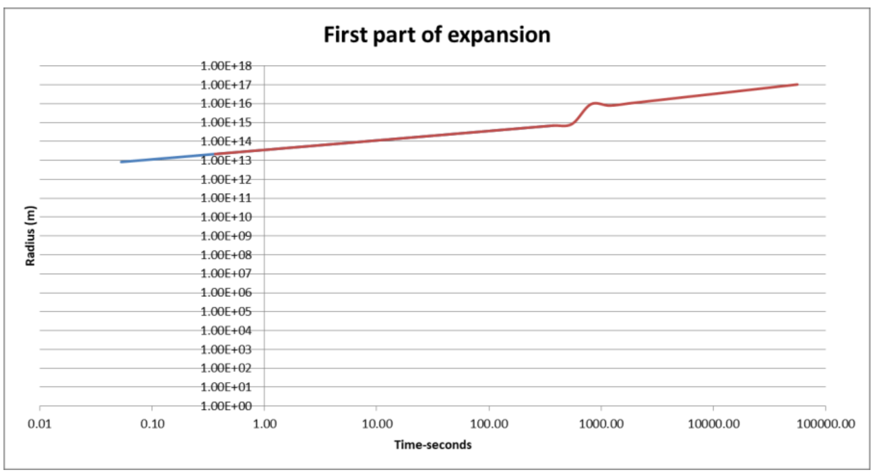
The calculation above at the He4 transition gave a baryon/photon ratio= 4.0e-10. This meets the astrophysical requirement with exp(180) neutrons. This means there is no missing matter. The residuals are formed in proportion to the He4 fraction and are relative fixed (see the discussion on the point in Peebles [1]). The values below under the heading "Calculated" agree with the measured values.

	Time seconds				810	1190
	Radius (meters)				9.32E+15	7.91E+15
	Temperature (K)			7.50E+08	3.37E+10	1.71E+10
	baryon/photon ratio				4.02E-10	5.00E-09
Measured	Formulas for D, He3 and LI7				Calculated	
2.37E-05	D=4.6e-4*(B/P*1e10)^(-1.67)*1/exp(SAHA)				4.51E-05	6.68E-07
6.65E-05	He3=3e-5*(B/P*1e10)^-0.5			3.3e-5 to 1e-4	1.50E-05	4.24E-06
6.00E-09	Li7=5.2e-10*(B/P*1e10)^-2.43+6.3e-12*(B/P*1e10)^2.43				2.03E-10	8.48E-08
http://cds.cern.ch/record/262880/files/9405010.pdf				-2.65E+00	3.67E+01	
				SAHA	SAHA	

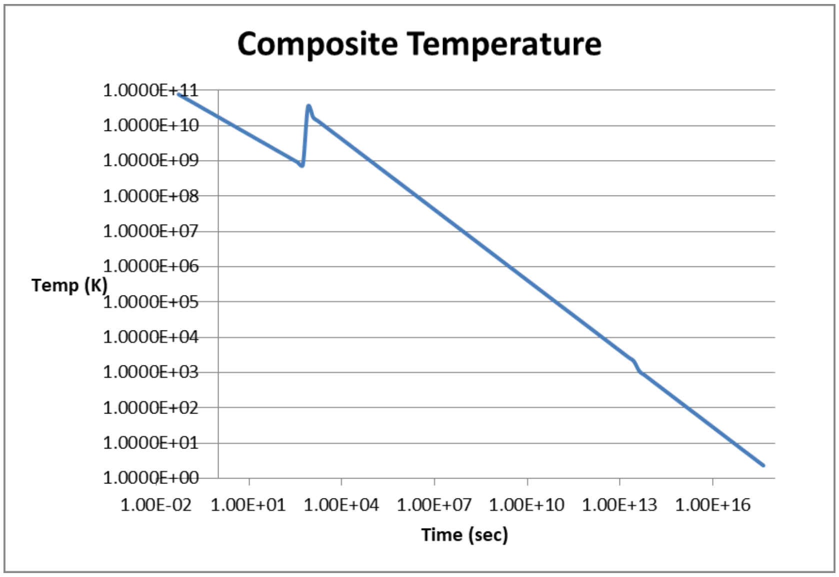
SAHA value=LN(4/3*((1*0.8)/((4.3E+67)/(0.5*EXP(180))))^(3/2))+LN((0.697^2)*(8.16e8/10000000000)^(3/2))-(2.58/(8.16e8/10000000000))

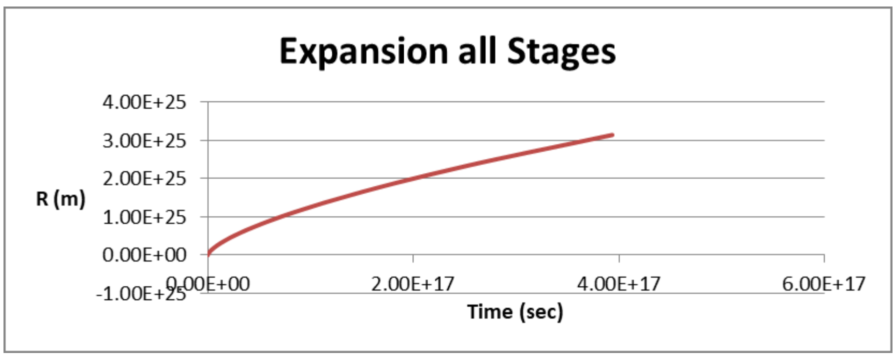
Summary of expansion and temperature history

Overall, the expansion radius and temperature is represented by the following graphs.



The temperature after the He4 transition is due to heat addition from He4 primordial fusion. As expansion occurs the temperature falls as Rh/R and yields 2.801K as the current value. Orbital KE (MeV) determines the temperature (T=KE/(1.5*8.6e-11) K. The slope following the spike is (time/time')^(2/3)





Energy history summary

Energy is available at the beginning and added at two additional places in the expansion curve. The original kinetic energy of 10.15 MeV/proton comes from the proton mass model [1] [10](Appendix 2). Secondly He4 fusion releases 2.7 MeV/proton when He4 forms (called primordial nucleosynthesis in the literature). Finally, stars light up and release radiation energy. The arrows labelled reduced show the change in the energy value/proton due to expansion. The temperature can be calculated from the Boltzmann relationship; T=ke/(1.5*B), where B is 8.62e-11 MeV/K.

Problem Resolution; Where is all of the normal matter (only 4% discovered)? What conditions existed when residual D, He3 and Li7 formed?

WMAP starts at a different radius and, as far as I can tell, does not add energy to account for primordial He4 formation (2.5 MeV). WMAP analysis used the astrophysics literature value of 4.4e-10 baryons/photons because it explains the measured residual isotopes. But they reduced the baryon content of the universe to a very low value (0.046) to meet the criteria. They didn't have the radius and temperature histories associated with cellular cosmology and, as discussed above, it appears that they misinterpreted Hubble distance. Using cellular cosmology, the temperature and radius calculations at this transition combine in a way that yield a baryon/photon density ratio of 4.4e-10 with exp(180) baryons. X is 1.0 in the following calculation, not 0.046. The critical density is exp(180)*1.67e-27 Kg/(4/3*pi*4.02e25^3)=9.14e-27 Kg/M^3.

Baryon/photon=(x*EXP(180)/(4/3*PI()*R^3))/(8*PI()/(4.31e-21*3e8)^3*(1.5*8.62e-11*T)^3)

Overall, the baryon/photon ratio does not cause baryons to be severely limited like WMAP [4] and other documents suggest. (X=1.0)

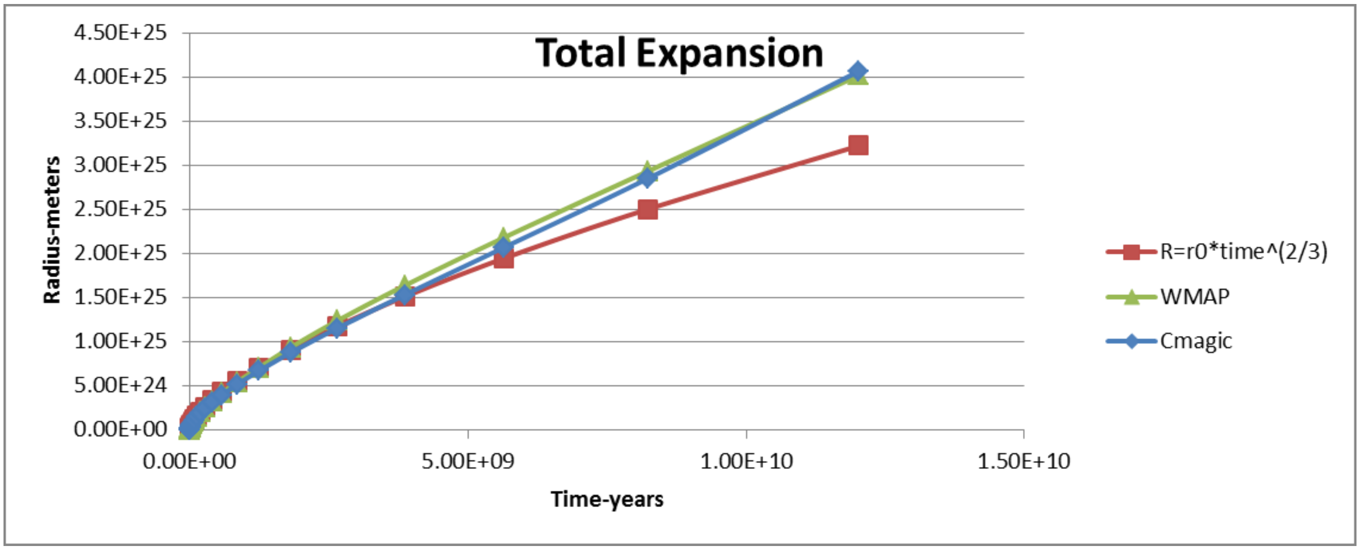
What is Dark Energy?

Observations of the universe's expansion created discussion regarding dark energy. 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. Two literature proposals (cosmological constant Lambda and quintessence) attempt to account for this unknown energy source.

This paper 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 (2.801K) since the above models ended at 2.45 K. Energy produced by stars is fusion energy and provides a physical alternative to dark energy. Concordance models use Lambda as the second expansion component but WMAP analysis concluded that there was dark energy and it was a large fraction (0.719) of critical density. The expansion curve, energy release points and associated temperature curve is presented. Analysis shows that although the density is 9.14e-27 kg/m^3, the mass fractions should be all normal matter.

Background

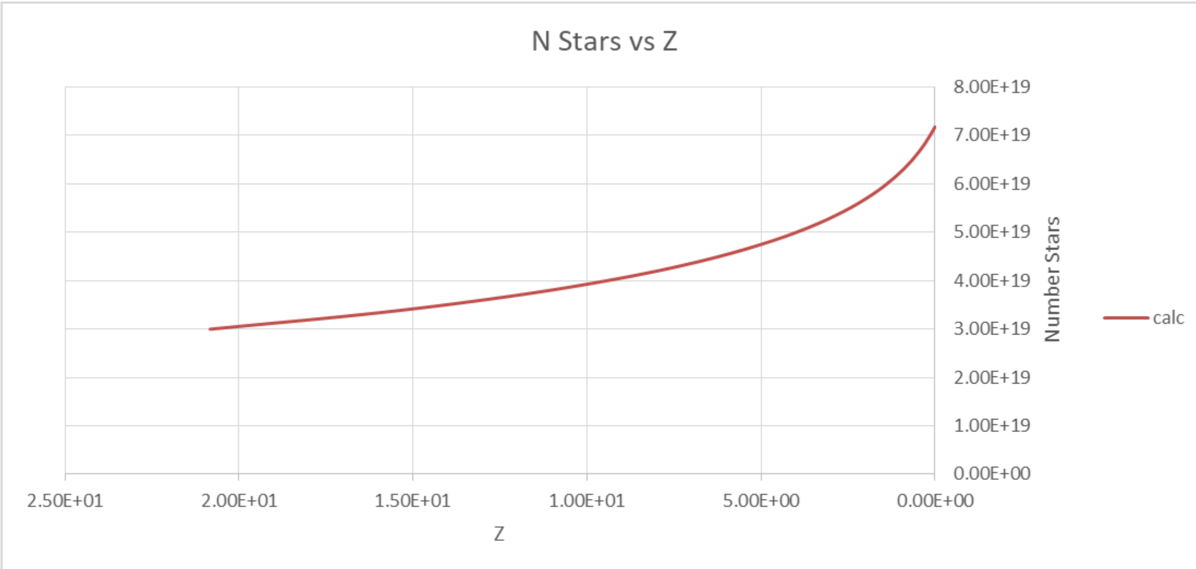
Expansion and cosmology parameters are currently based on differential radiometer projects known as COBE, WMAP [3][4], and Planck [14]. They are compared to supernova data from Cmagic [3] that suggest an accelerating universe. Expansion follows R=R'(time'/time)^(2/3) throughout almost all of expansion. But this gives the wrong Hubble constant (slope of the expansion curve/divided by the radius at the present time). The Hubble constant has been accurately measured by many projects and is equal to 2.26e-18/sec [4]). This means that a second expansion component is increasing the radius, but what causes it? The graph below shows the problem. Data suggests the upper curve but this requires an unknown energy source. The concept "dark energy" is a placeholder and the author explored the possibility that energy produced by stars is the unknown energy source.



Exploration

The sky temperature is 2.725K [2]. Star formation starts at about z= 16= (Rf/R-1). The average star is about 5e29 Kg [4] but there are potentially a significant fraction 2.49e51/5e29= 1.2e21 stars if their mass is 2e30 kg similar to our sun (fraction is about 0.1 of potential). The sun emits 2.37e39 MeV/second and has a lifetime of about 10 billion years. Since early star formation many atoms have moved through a well-documented solar burning cycle. Our sun is mainly hydrogen but a supernova in our vicinity produced the heavier elements that make up the earth and other planets. Heavier elements are measured throughout the universe and NIST publishes data regarding elemental abundance.

Our goal is to determine the expansion energy available after stars form. This expansion component will be called R3. The question is can this replace what cosmologists call the Lambda component of expansion? One might think that this energy is redshifted away but in cellular cosmology expansion is driven by energy, energy related to temperature and the energy is inside the cell. We will base our estimate on stars that are similar to our sun. The first step is to determine the number of stars as a function of time.



Star energy is added starting at z=16 where stars light up [Wiki]. Papers also present the rate of star formation. Each has a surface area and in cellular cosmology the surface area is mathematically the surface of a large sphere.

The basic equation for MeV/meter^2=3.54e5*T^4, where T is the surface temperature (K).

The surface area of all the stars with surface temperature 5778 K is giving off photons at 3.54e5*5778^4=3.59e20 MeV/M^2 but the remaining dark sky area is only giving off 3.54e5*2.44^4= 1.25e7 MeV/M^2.

Area overall sky= 4*pi*4.02e25^2= 6.77e51 M^2

Calculate the average temperature = (1.97e7/3.54e5)^.25=2.801 K. The average temperature is a composite of T=5778 K and 2.44 K.

area (M^2)	3.54e5*5778^4 (Mev/M^2)			
3.67E+38	3.95E+20	1.45E+59	area*mev/area	
2.03E+52	1.25E+07	2.55E+59	area*mev/area	
		6.77E+51	total area	
Temp (K)	Temp (K)	1.97E+07	mevtotal/area total	
2.44	5778	2.73E+00	(1.97e07/3.54e5)^.25	

In cellular cosmology all added energy counts and the stars add a significant amount of energy. Delta E is the difference between sky temperature with stars (2.801 K) and the temperature without stars (2.45 K). These values apply to the end of expansion at 4.02e25 M. Delta E= (2.801-2.45)/(1.5*8.6e-11)= 3.63e-11 MeV. This delta E increases the radius. Delta R= Delta E/F*1.6e-13=3.63e-11/6.69e-49*1.6e-13= 8.67e24 M.

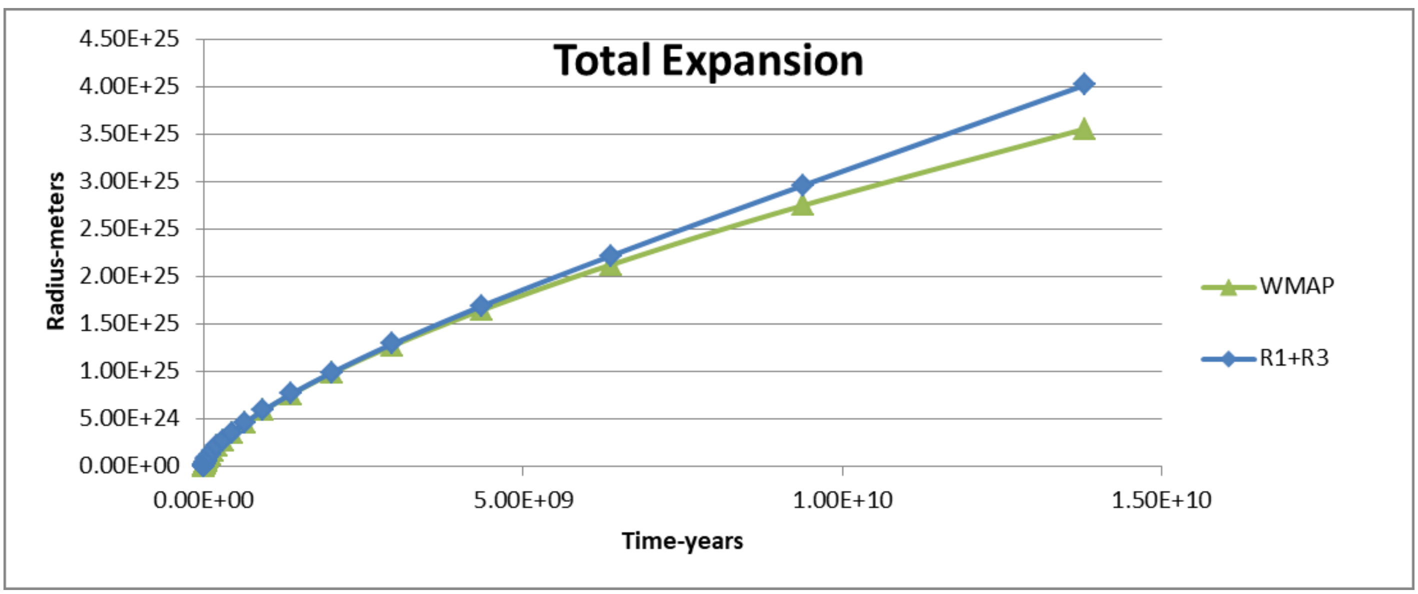
The calculations below represent energy released by stars as a function of time. The calculation procedure is an incremental calculation using the force in the cell and the energy addition by stars. Delta R=dE/F*1.6e-13 (1.63e-13 is an energy conversion constant).

The expansion curve for star energy

1.19E-02	1.53E-02	1.98E-02	2.56E-02	3.32E-02	4.29E-02	5.54E-02	rgrav = 7.22e-14*9.87/ke	
6.01E-11	4.65E-11	3.60E-11	2.78E-11	2.15E-11	1.66E-11	1.29E-11	ke (MeV)	
1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	gamma	
1.07E+02	9.43E+01	8.29E+01	7.29E+01	6.41E+01	5.64E+01	4.96E+01	Velocity (M/sec)	
1.3306E-60	7.9592E-61	4.7608E-61	2.8476E-61	1.7033E-61	1.0188E-61	6.0941E-62	Fcell=mV^2/r*(1/exp(90))	
6.67E-11	6.67E-11	6.67E-11	6.67E-11	6.6743E-11	6.67E-11	6.6743E-11		
3.67E+00	2.61E+00	1.80E+00	1.16E+00	6.72E-01	2.93E-01	0.00E+00	Z=Rfinal/R-1	1.21E+00
6.73E+24	8.72E+24	1.13E+25	1.49E+25	1.98E+25	2.74E+25	4.03E+25	R1+R3	9.30E+07
1.293E-01	1.000E-01	7.734E-02	5.981E-02	4.626E-02	3.578E-02	2.767E-02	star growth	-1.00E+00
5.82E+18	8.56E+18	1.26E+19	1.85E+19	2.72E+19	4.00E+19	5.88E+19	stars	3.69E+08
6.08E+09	2.18E+09	7.78E+08	2.78E+08	9.96E+07	3.56E+07	1.28E+07	3.54e5*2.73^4	1.00E+00
3.95E+20	3.95E+20	3.95E+20	3.95E+20	3.95E+20	3.95E+20	3.95E+20	3.54e5*5778^4	
9.3006E+50	1.5549E+51	2.5995E+51	4.3460E+51	7.2657E+51	1.2147E+52	2.0308E+52	Area sky w/o stars area	
3.54E+37	5.20E+37	7.65E+37	1.13E+38	1.65E+38	2.43E+38	3.58E+38	Area sky with stars	
1.15E+01	8.87E+00	6.87E+00	5.34E+00	4.19E+00	3.33E+00	2.73E+00	Temp with Stars	
1.14E+01	8.85E+00	6.85E+00	5.30E+00	4.10E+00	3.17E+00	2.45E+00	Temp w/o stars	
9.11E-13	1.73E-12	3.28E-12	6.18E-12	1.15E-11	2.10E-11	3.63E-11	Delta E (MeV)	
1.02E+22	3.25E+22	1.03E+23	3.25E+23	1.01E+24	3.08E+24	8.92E+24	dR=de/f*exp(60)*1.6e-13	

The radius without stars would be R1=3.5e25 meters at the present time if stars did not add energy. The calculations above show Delta E for earlier R where there were fewer stars and the associated Delta R (called R3). Adding R1 and R3 gives expansion with stars as a function of time.

Stars have a significant effect on expansion because the star Delta E (MeV) is a sizable fraction of normal expansion energy. Calculations show that this keeps the expansion curve from following the curve proportional to R'=R*(time'/time)^(2/3) after stars. But considering energy from stars an expansion curve is produced that replaces the Lambda component. It considers the rate the rate of star formation.



Hubble Check

We subtract the last two radius columns and divide by the difference in the last two times. The check Hubble, we divide again by R. The WMAP Hubble value was 2.26e-18/sec. The values match.

2.74E+25	4.03E+25	R1+R3	9.27E+07	Delta R
2.96E+17	4.35E+17	Delta time	2.31E-18	H=Delta R/R

Dark Energy Resolution

Currently very little energy is required for expansion since most of the original and He4 fusion kinetic energy has been converted to other forms of energy. The energy produced by stars as they light up must be considered in cellular cosmology. Delta R expansion from star energy is on the order of R3= 4e24 meters. The concept of dark energy was a place holder until the true cause was uncovered. Stars produce enough energy to explain observations. Photon energy released by stars flattens (or accelerates) the curve like the WMAP Lambda expansion component or the data reported by expansion model CMAGIC [3].

Baryon fraction at equality

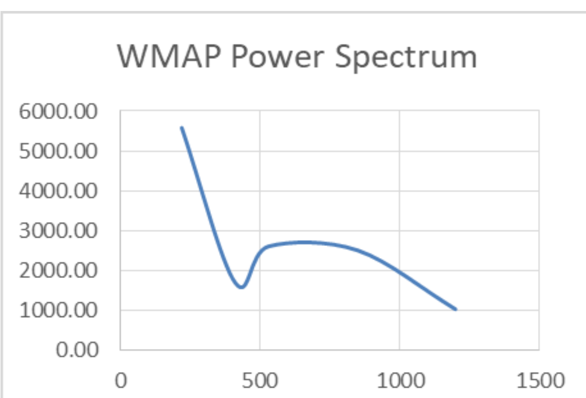
Another limitation is related to the radius and temperature where equality of radiation and mass occurs. The thought was that baryons had to be limited so that equality occurred early enough to allow development of the measured primary hot spot at decoupling. After equality waves occur. Their speed in the plasma is V= C/3^.5 meters/sec. The wave progression radius R=V*delta time= 2.31e21/(pi*Ru)=0.0106 radians at decoupling [4] (pi is used because they are measuring distance in radians against the radius of the universe at that point). WMAP data was updated for 9 years as additional data came in [4]. But listen to the language in the report: "The peak at 74.5 micro-degrees K is due to the baryon-photon fluid falling into pre-existing wells resulting from Gaussian disturbances from inflation and dark matter". Really?

WMAP interpretation that ratio of peaks determines dark/light ratio

The WMAP limitation on baryon fraction was based on the interpretation of hot spots measured by WMAP and refined by PLANCK scientists. We will first review the WMAP data [4] reduction (a power spectrum expected from acoustic waves).

L	L*(L+1)/2pi*cl micro K^2	La	L*(L+1)/2pi	cl	delta temp K	radius (meters
		0.735				5.10E+23
220	5580.1	299.32	7738.11	0.72	7.47E-05	2.32E+21
412	1681.0	560.54	27081.17	0.06	4.10E-05	1.24E+21
531	2601.0	722.95	45022.14	0.06	5.10E-05	9.60E+20
850	2500.0	1156.46	213038.79	0.01	0.00005	6.00E+20
1200	1020.0	1632.65	424496.26	2.64E-03	3.34664E-05	4.25E+20

The WMAP power spectrum for the above measurements is shown below:



Results from cellular cosmology model:

The calculations below show the period from equality to decoupling with 1.0 baryon critical density. Equality and decoupling occur at the correct radius and temperature combinations and wave progression produces the same primary 0.0106 radian hot spot.

Radius R (meters)	8.54E+21	1.10E+22	1.43E+22	1.85E+22	2.39E+22	3.09E+22	3.99E+22	5.16E+22	6.67E+22
Z=Rf/R-1	4707.77	3640.74	2815.51	2177.28	1683.67	1301.92	1006.68	15.51	11.77
photon density (Kg/m^3)	equality	← wmap calcs			→			decoupling →	
Temperature (K)	2.03E+04	1.57E+04	1.21E+04	9.39E+03	7.26E+03	5.61E+03	4.34E+03	3.36E+03	2.60E+03
8*PI()/(H*C)^3*(1.5*B*T)^3	2.38E+20	1.10E+20	5.09E+19	2.36E+19	1.09E+19	5.04E+18	2.33E+18	1.08E+18	4.99E+17
Proton mass dens=1.67E-27*EXP(180)/(4/3*PI()*R^3)	9.54E-16	4.41E-16	2.04E-16	9.45E-17	4.37E-17	2.02E-17	9.35E-18	4.33E-18	2.00E-18
photon mass dens=8*PI()/(HC)^3*(1.5*B*T)^3	**1.11E-15**	**3.98E-16**	**1.42E-16**	**5.09E-17**	**1.82E-17**	**6.51E-18**	**2.33E-18**	**8.34E-19**	**2.98E-19**
dens ratio= proton mass dens/photon mass dens	1.16E+00	9.00E-01	6.96E-01	5.39E-01	4.17E-01	3.22E-01	2.49E-01	1.93E-01	1.49E-01
progression of wave (spot) at C/3^.5	2.26E+20	3.32E+20	4.88E+20	7.17E+20	1.05E+21	1.55E+21	2.28E+21	3.35E+21	4.92E+21
Spot size (radians=spot/(2*pi*R)	0.0000	0.0048	0.0054	0.0062	0.0070	0.0080	0.0091	0.0103	0.0118

Radius R (meters)	3.05E+22	3.94E+22
Z=Rf/R-1	1029.61	15.89
photon density (Kg/m^3)	→	decoupling →
Temperature (K)	2.52E+03	1.95E+03
8*PI()/(H*C)^3*(1.5*B*T)^3	4.58E+17	2.12E+17
Proton mass dens=1.67E-27*EXP(180)/(4/3*PI()*R^3)	2.09E-17	9.68E-18
photon mass dens=8*PI()/(HC)^3*(1.5*B*T)^3	**2.66E-19**	**9.52E-20**
dens ratio= proton mass dens/photon mass dens	1.27E-02	9.84E-03
progression of wave (spot) at C/3^.5	1.30E+21	1.84E+21
Spot size (radians=spot/(2*pi*R)	0.0136	0.0148

Calculation of dt

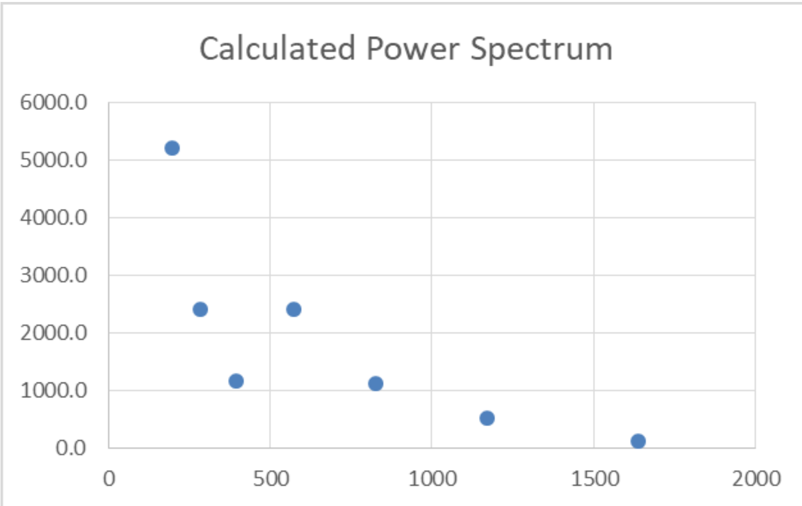
The temperature peaks called dt are in micro degrees (2.8010074 K). The thermal peaks are a function of density. There is a misunderstanding that progression of the wave causes densification. In fact the density of the universe (decoupling and slightly sooner) is recorded in the wave. The waves at that point become visible (the plasma clears). That period is recorded by radiometers but the radiation has been highly red shifted to 2.801 degrees, Density near the decoupling radius is provided by the cosmology model. This density is the key to understanding WMAP temperature anisotropy.

dt=2.73*(1.2*(9.14e-27/4.33e-18)^.5+1)^.333-2.73

Delta t (dt) is calculated from the density near decoupling compared to the final density (also critical density). Spots inside larger spots are earlier densities that are visible to radiometers in the CMB as time and the wave progresses. The following combinations of wave progression and temperature produce the power spectrum below. The important combination at decoupling yields exactly 74 micro degrees from first principles!

wave progress	5.30E+19	1.31E+20	2.46E+20	4.14E+20	6.62E+20	1.03E+21	1.56E+21	2.35E+21
radians	0.0015	0.0029	0.0042	0.0055	0.0068	0.0082	0.0096	0.0112
Delta t (dt)		7.299E-06	1.073E-05	1.578E-05	2.320E-05	3.411E-05	5.015E-05	7.373E-05

model result dt (K)	wave R progression	wave R with harmonics	L 5.1e23/prog	L*(L+1)/2pi*cl micro K^2	La 0.735	L*(L+1)/2pi	cl cl=(dt*1e6)^2/((L*(L+1)/2pi)	delta temp K
73.73	2.35E+21	2.35E+21	217	5436.1	295.38	7536.01	→ 0.72 ←	7.373E-05
		1.17E+21	434	1156.0	590.75	30074.94	0.04	3.400E-05
50.15	1.56E+21	1.56E+21	327	2514.8	444.31	17025.16	0.15	5.015E-05
50.15	1.56E+21	7.81E+20	653	2514.8	888.62	125816.33	0.02	5.015E-05
34.11	1.03E+21	5.13E+20	994	1163.4	1352.41	291312.81	0.004	3.411E-05
23.20	6.62E+20	3.31E+20	1541	538.2	2096.74	700029.01	0.001	2.320E-05
10.73	4.14E+20	2.07E+20	2463	115.2	3351.22	1787946.28	0.000	1.073E-05
7.30	2.46E+20	1.23E+20	4153	53.3	5650.66	5082714.20	0.000	7.299E-06



Result of possible baryon limitation from hot spot data

The entire equality to decoupling analysis was based of 1.0 baryon fraction of critical. The hot spots measured by WMAP were calculated. The density of the universe and how waves progress are the two variables of interest. There is no reference to dark matter in the calculation and the ratio of the first and second spots is NOT the dark to normal matter ratio (contrary to a WMAP statement). I believe I have characterized the hot spots and they do not limit baryon fraction to 0.046 fraction of critical density.

Mass Accumulation

At decoupling the plasma clears and normal matter can accumulate. The first accumulation is densification into a volume that will form clusters of galaxies. The wave (velocity=C/3^.5) that starts at equality and progresses to decoupling determines the first accumulation. The wave starts as high density and progresses outward. As it reaches decoupling, it determines central mass because matter inside the wavelength radius has more density than the outside radius (all gravitation is based on central mass and this defines what is central). Here is the calculation:

6.67E+22	R decoupling (M)
2.29E+04	N clusters
2.35E+21	Jeans at decoupling (M)
1.09E+47	Avg mass of cluster (Kg)

This determines the number and mass of clusters (N= 2.29e4= (6.67e22/2.35e21)^.33) and mass/galaxy=2.49e51/N=1.09e47 Kg).

Mass accumulation starts at this point and the equation derived below determines acceleration (a) toward the central mass (M) for a time period (t).

Touch down equation	
L=at^2/2=1/2*GM/R^2*(2R/at)^2=GM/(at^2)	
at^2=2GM/(at)^2	
a^3*t^4=2GM	
a=(2GM/t^4)^.333	

Mass M can be cluster central mass 1.09e47 Kg, galaxy central mass or star central mass.

Next, the radius that "reaches out" from (a) and "pulls in" mass during the time period (delta t) is calculated:

R (reach) =a*(delta time)^2/2.

From this the volume (4/3piR^3) multiplied by the density available determines the developing central mass for this time period.

Mass moved to center= volume*density.

The calculation is repeated, adding mass as time progresses (line 2):

4.24E+46	6.91E+46	1.09E+47	M Cluster	1.70E+02
3.67E+44	7.37E+44	1.28E+45	Mc accumulation=M+dM	
9.35E-18	4.33E-18	2.00E-18	density	
2.65E-05	1.87E-05	1.30E-05	touch dwn	
1.85E+20	2.73E+20	4.01E+20	Reach	
3.70E+44	5.44E+44	8.00E+44	Vol*dens	

However, for clusters the reach is limited to R=Vdt where V is limited to 4.4e7 m/sec (the kinetic energy of the fall cannot exceed 10.15 MeV). In addition, reach is later limited to 2.35e21 meters since that determined the central mass at decoupling. Clusters do not densify mass because they do not create an orbit. For stars, once a stable orbit is reached, expansion within the orbit stops. Recall that expansion is pressure driven. If there is no orbit, the pressure (and density) will everywhere be the same.

Galaxy Mass Accumulation

Galaxies form by the above process except the Jeans wavelength drops. The wave progression velocity was C/3^.5 before decoupling but after the plasma clears the speed drops to the speed of sound and the Jeans wavelength falls to approximately 1.9e19 meters.

2.4E+21	R decoupling (M)
1.8E+06	N galaxies in cluster
1.9E+19	Jeans for galaxy (M)
6.0E+40	Avg mass of galaxy (Kg)

This determines the number and mass of galaxies (N=(2.4e21/1.9e19)^.33) and mass/galaxy=1e47/N=6e40 Kg because the Jeans wavelength determines the boundary of the central mass. Mass accumulation is from "virgin density" (2.49e51/total volume).

Star mass Accumulation

The process again repeats determined by waves determining the volume of central mass. The fractional Jeans wavelength (empirical) 4e15 meter determines the average mass of the stars.

1.9E+19	R Jeans for galaxy (M)
1.0E+11	N stars in galaxy
4.1E+15	Jeans for stars (M)
5.2E+29	Avg mass of star (Kg)

Detailed WMAP ratios give number of clusters & stars				Ratio		Mass (kg)		
					1.67e-27 kg*exp(180)	2.5E+51	Kg Universe	
Taking values from table		R1+R2	6.67E+22					
Number of clusters/universe			2.3E+04	((4.72e22)/1.62e21)^3=2.6e4	divide by 2.6e4	1.1E+47	Kg Cluster	
		spot (m)	2.35E+21	(Radius/spot)				
		spot*2 (m)	2.35E+21					
Number of galaxys/cluster			1.8E+06	((3.17e21)/2.67e19)^3=1.7e6	divide by 1.7e6	6.0E+40	Kg Galaxy	
	Jeans lo speed	1.93E+19 →	1.93E+19	(Spot/Jeans length)		4.1E+10	numb galaxies	
		red-empirical				6.031E+40	data galaxy count	
		Jeans lo (m)	1.93E+19			data	http://universe-review.ca/F05-galaxy.h	
stars/galaxy			1.2E+11	(2.67e19/5.6e15)^3=1.1e11	divide by 1.1e11	5.2E+29	star mass	compare data
	Jeans fraction		3.95E+15	(Jeans length/Jeans fraction)		4.8E+21	number stars	3.17E+29
http://en.wikipedia.org/wiki/Jeans_instability					stars/universe=clusters/universe*galaxys/cluster*stars/galaxy			

Star formation rates

The cosmology model developed above in Problem 3 allows star formation rates to be calculated. The number of stars is used in calculations for expansion component R3 (Problem 4 Dark Energy). The calculation uses the number of clusters, galaxies and stars listed above.

Stars= sum(2.3e4*(Mc/1.1e47)*1.8e6*(Mg/6.0e40)*1.2e11*(Ms/5.2e29)).

The ratios (Mc/1.1e47), (Mg/6.0e40), and (Ms/5.29e29) are lower than 1 because R (reach=a*t^2/2) calculated with acceleration (a) from the touchdown equation is limited to the Jeans wavelength since the central mass was established at earlier points in expansion (Z). As the universe expands, the central mass associated with the wavelength does not change. This leaves some mass out of reach. As stars develop, star number= sum(stars formed per time increment).

1.14E+47	1.14E+47	1.14E+47	1.14E+47	1.14E+47	M Cluster	1.70E+02
2.07E+46	2.07E+46	2.07E+46	2.07E+46	2.07E+46	Mc accumulation=M+dM	
2.80E-25	1.25E-25	5.46E-26	2.29E-26	9.08E-27	density	
1.55E-10	9.29E-11	5.56E-11	3.33E-11	1.99E-11	touch dwn	
2.35E+21	2.35E+21	2.35E+21	2.35E+21	2.35E+21	Reach	
6.33E+40	6.33E+40	6.33E+40	6.33E+40	6.33E+40	M Galaxy	
4.83E+39	4.83E+39	4.83E+39	4.83E+39	4.83E+39	Mg accumulation=M+dM	
2.80E-25	1.25E-25	5.46E-26	2.29E-26	9.08E-27	dens	
2.26E-12	1.35E-12	8.11E-13	4.85E-13	2.90E-13	touch dwn	
1.90E+19	1.90E+19	1.90E+19	1.90E+19	1.90E+19	Reach	
1.54E+05	1.35E+05	1.19E+05	1.05E+05	9.22E+04		
1.78E+20	2.30E+20	2.98E+20	3.85E+20	4.96E+20		
2.05E-22	9.47E-23	4.38E-23	2.03E-23	9.45E-24		
5.42E+29	5.42E+29	5.42E+29	5.42E+29	5.42E+29	M Star	
3.76E+28	3.76E+28	3.76E+28	3.76E+28	3.76E+28	Ms accumulation=M+dM	
2.80E-25	1.25E-25	5.46E-26	2.29E-26	9.08E-27	dens	
4.67E-16	2.80E-16	1.67E-16	1.00E-16	5.99E-17	touch dwn	
4.10E+15	4.10E+15	4.10E+15	4.10E+15	4.10E+15	Reach	
5.78E+19	6.13E+19	6.48E+19	6.83E+19	7.17E+19	Sum stars	
				3.48E+18	Stars for dt	
Stars= 1.15*sum(2.3e4*(1.37e46/1e47)*1.9e6*(3.32e39/6e40)*1e11*(2.3e28/5.2e29))						

The star numbers calculated above are used (yellow below) for calculating temperature and expansion due to star energy addition (R3). The value 1.15 is in very good agreement with the energy required to raise the temperature from 2.45 K to 2.801K and accelerate expansion. This model indicates that stars developed earlier than observations, perhaps as early at 2e6 years. But the current time is only 13.8 billion years and stars can burn for 10 billion years. Starting early still allows two generations.

4.20E+07	1.50E+07	3.54e5*2.73^4
3.95E+20	3.95E+20	3.54e5*5778^4
9.3906E+51	1.5699E+52	Area sky w/o stars area
1.71E+38	1.80E+38	Area sky with stars
3.43E+00	2.73E+00	Temp with Stars
3.30E+00	2.55E+00	Temp w/o stars
1.35E-11	1.77E-11	Delta E (MeV)
2.26E+24	4.94E+24	dR=de/f*exp(60)*1.6e-13

Another interesting value from the cosmology model is; Velocity=a*time calculated with acceleration (a). It shows that the velocity produced by the star central mass and planet central mass is not enough to establish an orbit. This means that "solid" objects form. (Mass densification associated with clusters and galaxies form orbits from which stars develop but they themselves are not solid objects.)

Successive densification and black holes

The cosmology model indicates that stars normally develop from virgin density (2.49e51 Kg/(Volume of universe). Densification occurs when stars falls into orbits. Successive densification can occur where galaxies form. Taking Z=20 as the reference point (where early mass accumulation has been observed), a galaxy can contain high density. New or interacting bodies can develop from the high density matter. This accelerates mass accumulation and may promote black hole development.

Z=20	Radius	Kg	Density		
R universe	1.62E+24	2.49E+51	1.40E-22	virgin (Kg/M^3)	
Rfall Galaxy	2.28E+19	6.33E+40	1.28E-18	galaxy (Kg/M^3)	

Summary; Cosmological parameter comparison

WMAP parameters are compared below with the revised parameters from this document summarized in the rightmost column. The total mass/volume is exp(180)*1.67e-27 kg/1e79=9.14e-27 kg/m^3. Baryon density is given by exp(180)/volume at each of the radius values with no dark matter. Cosmological parameters with dark energy removed (and replaced with star photon energy) are shown below. The table shows normal matter fraction of critical density (1.0), dark matter fraction of critical density (0) and dark energy fraction of critical density (0).

WMAP					
			THIS PAPER		
NOW		equality	decoupling	NOW	
published					
4.02E+25	Inferred Radius (m)	3.89E+21	5.08E+22	4.02E+25	= R1+R3
				4.94E+24	= R3
2.26E-18	H0			3.53E+25	= rR1
8809	Temperature at equality (K)	3.48E+04		2.73	
	Photon mass density				
	Proton mass density				
2973	Temperature (K) decoupling		2668	2.73	
0.0106	Spot angle (radians)		0.0109		
0.254	baryon number density			5.473	
5.77E+08	Photon number density			5.77E+08	
4.400E-10	baryons/photon			4.00E-10	
0.235	Dark matter fraction			0	
6.57E-27	dark matter density in kg/m^3			0	
4.24E-28	baryon matter density in kg/m^3			9.14E-27	
0.719	Dark energy fraction			0	
9.14E-27	critical density			9.14E-27	
0.0464	Baryon fraction			1.000	
2.72E+77	Overall volume (m^3)		2.46E+65	2.72E+77	
2.814E-01	overall mass density		rhoC	Volume	
			9.135E-27	2.72E+77	
			mass=rhoC*Volume (kg)		
				2.486E+51	

Conclusions

WMAP measured a flat universe, what does that mean?

The standard method of simulating expansion involves the Friedmann-Lemaitre-Robertson-Walker (FLRW) model [10]:

H^2=H0^2*(OmegaMatter*(1+z)^3+OmegaR*(1+z)^2+OmegaLambda)
Where:
OmegaTotal=1 WMAP result
Rhoc=H0^2/(8/3 pi G) (critical density)
OmegaR(1+z)^2=0 (wrong shape)
OmegaMatter separated into =Omega cold dark matter and baryons
OmegaLambda is the cosmological constant
H0=2.26e-18/sec WMAP 9 year result
z=(rf/r-1) where radius is the developing radius and rf is the final radius.

Ho		2.26E-18	(1/sec)
rhoC	8/3 pi G/Ho^2	9.124E-27	(Kg/M^3)

Historically, the equations are written to be consistent with geometric models of the universe involving metric tensors that characterize a four dimension universe where ds^2= three distances^2 and (C*time)^2. If the overall density equals critical density the universe is considered to be flat. The term flat refers to possible shapes (hyperbolic, etc.) but also means that kinetic energy is converted to potential energy (a fact that most agree on). The model is also known as the Lambda Cold Dark Matter model or the concordance model. Lambda stands for the famous Einstein constant related to the concept of dark energy. WMAP scientists believes that Hubble's constant gives the critical density 9.14e-27 Kg/M^3. They believe in a flat universe but added lambda, dark matter and dark energy to make the total 9.14e-27. **The present work shows that the reason the universe is flat is that the density is actually 9.14e-27 KgM^3 but it is 100% baryons.**

What is space-time?

Space is defined by the Proton model gravitational field r0=hC/2.801=7.045e-14 meters. Initially space is comprised of exp(180) cells, each with the radius 7.045e-14 meters. Each cell contains a neutron (that decays to a proton). The cell radius is a balanced force orbit that establishes and maintains the gravitational constant G=6.67e-11 Nt M^2/Kg^2. The orbital radius is a function of its original kinetic energy and kinetic energy. As kinetic energy is converted to potential energy the cell (and the universe) expands. This is a function of (time/time')^(2/3). Time is measured around the fundamental cell circumference (cycle time=2*pi*7.045e-14/C=1.47e-21 seconds). Time counts forward by repeating this cycle. The value gamma equals (mass+ke)/mass. When performing orbital calculations, the orbital mass is mass/gamma (a result of special relativity). Gamma= (m+ke)/m is related to Schwarzschild dt=1/gamma-1. Time is slowed slightly and in this regard space-time is a proper concept. Space-time expands as kinetic energy (ke) is converted to potential energy. Space-time is very close to space since the only relativity effect is gamma and it approaches 1.0 early in expansion. If particles gain a huge amount of kinetic energy gamma becomes significant (mesons and baryons entering our atmosphere and artificially in high energy accelerators).

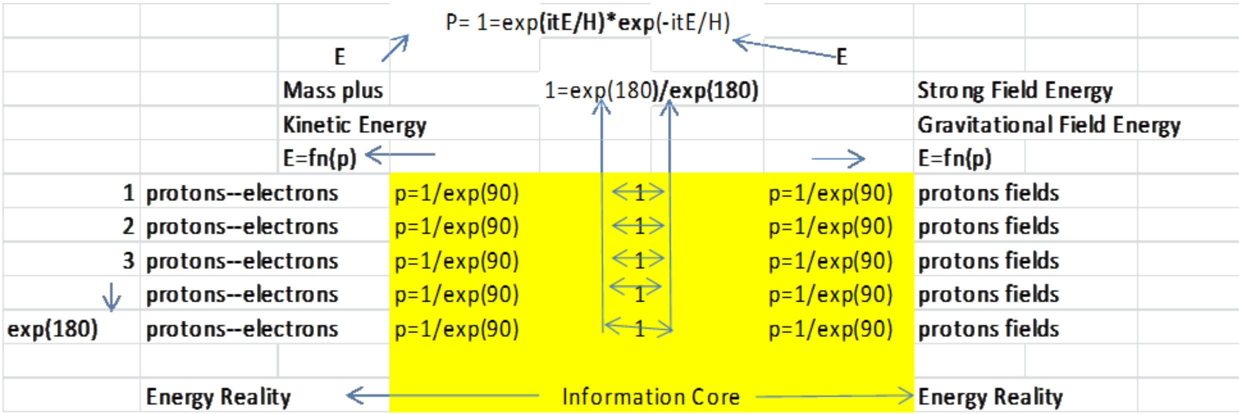
There is a Schrodinger based energy=0, probability=1 construct (Appendix 1) associated with orbits defined by the Proton model. These orbits are circular leading to the question what curves space-time? At the quantum level a sine wave varying with time is represented by a circle with one imaginary axis and one distance axis. However, real orbits like those of orbiting stars follow curves because the cells that make up space are curved and G equivalence exists between the large and small scale.

What is quantum gravity?

Gravity is defined and maintained by the neutron and its associated outer orbit (cell). The information we need about gravity is provided by the Proton model, cellular cosmology and the number of initial neutrons determined by probability considerations (1=exp(180)/(exp(90)*exp(90)). The Schrodinger equation is based on quantum theory and the Proton model is based on the Schrodinger equation. The Proton model gravitational field energy 2.801 MeV is a quantum value but cellular cosmology provides a bridge between small and large scales (M=m*exp(180) and R=r*exp(90)).

What does this model imply regarding creation?

The Proton model is anchored by the Schrodinger equation. The equation also appears to anchor properties of all mesons and baryons. This equation described by MIT as unitary evolution [15] is the basis of a broad theory. The equation gives probability P=exp(iEt/H)*exp(-iEt/H) where H= Planck's constant, E is field energy and time t is the time around a quantum circle at velocity C.



Probability in the left hand side of the Schrodinger equation is related to energy and time in the right hand side of the equation. Probability=1 occurs at the instant of wave function collapse. Historically observation is fundamental to quantum mechanics and the Copenhagen interpretation indicates that we can only describe the probability of an event within certain limits. If we use Shannon's definition of information (Information = -natural logarithm(Probability), the left hand side of the equation yields information. Many associate quantum mechanical probabilities with the process of observation but some authors [13] call it consciousness. Zero energy and probability 1 appear to be initial conditions [17]. This implies that creation is based on separations from zero and 1. The Schrodinger equation requires a proper set of probabilities to represent the Proton model. The probability 1, zero energy derivation naturally transitions from probability sets (p/p'=e/e') to energy sets that describes reality through the Schrodinger equation. This is supported by the proton model and cellular cosmology.

Where are the laws of nature?

The proton model is a manifestation of the laws of nature. Time emanates from inside the proton. The sum of kinetic energy and potential energy remain constant over time. Temperature emanates from kinetic energy in the proton and when it reaches 8e10 K, part of the fusion energy 10.15 is released to increase the radius of the cell. It is now low, close to 2.801K. As stars light up, their fusion energy, again part of the value 10.15 MeV, is released to once again increase the radius of the cell. The proton is the cell. Components of the proton are improbable (1/exp(180)) but there are exp(180) cells is the universe and the universe is huge (rcell*exp(60). Overall, the proton and interactions with other protons creates the universe!

References

Some references can be downloaded at http://vixra.org/ . Search at top of page Gene H Barbee.

1. Peebles, P.J.E., *Principles of Physical Cosmology*, Princeton University Press, 1993.
2. Bennett, C.L. et al. *First Year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Preliminary Maps and Basic Data*, Astrophysical Journal, 2001
3. A. Conley, et al, (*THE SUPERNOVA COSMOLOGY PROJECT), Measurement of Omega mass and Omega lambda from a blind analysis of Type1a supernovae with CMAGIC*.
4. Hinshaw, G. et.al, *Nine Year WMAP Observations*, draft June 5, 2013. http://arxiv.org/pdf/1212.5226v3.pdf Table 2.
5. Bergstrom, L. and Goobar, A., *Cosmology and Particle Astrophysics*, 2nd Edition, Springer-Praxis Books in Astrophysics and Astronomy, 2004.
6. http://cds.cern.ch/record/262880/files/940501.pdf Review of work by N. D. Schramm.
7. Patrick Peter, Jean Philippe Uzan, Primordial Cosmology, OUP Oxford, Feb 14,2013.

8. Barbee, Gene H., *A Top-Down Approach to Fundamental Interactions*, FQXi essay, June 2012, http://www.viXra.org/pdf/1307.0082 ,revised Nov, 2014. Reference Microsoft ® spreadsheet Unifying concepts of nature.xls.
9. Barbee, Gene H., *On the Source of the Gravitational Constant at the Low Energy Scale*, http://www.viXra.org/pdf/1307.0085 , revised Sept 2019. Prespacetime Journal Vol. 5 No. 3 March 2014.
10. Barbee, Gene H., *Discovery of Quantum Gravity*, http://viXra.org/pdf/1508.0120 , Aug 15 2015. Revised Sept, 2019.
11. Barbee, Gene H., *Schrodinger Fundamentals for Mesons and Baryons*, http://viXra.org/pdf/1710.15306, October 2017.
12. Barbee, Gene H., *Nature and Information*, http://www.vixra.org/pdf/1611.0302v1.pdf, December 2016. http://prespacetime.com/index.php/pst/issue/view/91
13. Edwin Klingman, private communication
14. https://web.archive.org/web/20130323234553/http://www.sciops.esa.int/index.php?project=PLANCK&page=Planck_Published_Papers
15. Search "MIT22 Evolution of Function Chap 6".
16. D. E. Groom et al. (Particle Data Group). Eur. Phys. Jour. C15, (2000) (URL: http://pdg.lbl.gov).
17. Barbee, Gene H., *Creation and Schrodinger's Equation*, http://www.viXra.org/pdf/1811.0334v1 , January 2018
18. Barbee, Gene H., *How Nature Computes*, Academia.edu, March 29, 2019.
19.

Appendix 1 Schrodinger Fundamentals of the Proton model

The work below derives relationships that obey energy zero and probability one initial conditions. Everything will be created through separation. One result is a model of the neutron, proton and electron that provides insights into physics and cosmology.

Restrictions: P=exp(-i Et/H)*exp(i Et/H)=1 where Et/H=1. This means we deal with the unitary point where the wave function collapses on a quantum circle. The time (t) to circle radius R=HC/(2piE) is t=2 pi R/C, where E is field energy and H is Planck's constant (4.13e-21 MeV-sec). We are dealing with circles that represent spheres, not translation of particles (x,y and z) like the Dirac equation.

The RHS of the Schrodinger equation will have pairs of complex conjugates exp(iEt/H)*exp(-iEt/H). Each pair of components will represent waves moving through time cycles. A sinusoidal wave is represented on a circle with a vertical imaginary axis and a real horizontal axis (exp(i theta)=cos theta +i sin theta). If there is mass and kinetic energy in the circles with balanced forces they are orbits with real vertical and horizontal axis. Looking ahead, four orbits in the proton mass model represent four fundamental interactions. The P=1 constraint and the E=0 constraint are further defined below.

Probability= 1 constraint

The probabilities contain exponential functions exp(N). The fraction 0.431=1/3+ln(3)-1.

Probability 1 Constraint

1=p1*p2/(p3*p4) but each probability=1/exp(N)

N1=13.431	N3=15.431
N2=12.431	N4=10.431
p1=1/exp(13.431)	p3=1/exp(15.431)
p2=1/exp(12.431)	p4=1/exp(10.431)

1=1/exp(13.431)*1/exp(12.431)/(1/exp(15.431)*1/exp(10.431))

These N values represent P=1, but it has four probability components.

Review of natural logarithms: Multiply probabilities by adding logarithms. Find the result with the anti-logarithm (exp(0)=1).

P	p1*p2=exp(-i Et/H)*exp(i Et/H)		
	with Et/H=1		
multiply by adding the logarithms			
ln P	ln(p1*p2)=-i+i=0		
P	exp(0)=1		

Example of exponent sign change:

exp(2)=7.39=1/exp(-2)

Evaluate the RHS of the Schrodinger solution

Energy= 0 constraint

Apply the constraint: Energy components have overall zero energy. Mass and kinetic energy are positive and field energy is negative. It will be shown that the Schrodinger equation becomes relativistic, like the Dirac equation with P=1 and energy=0. The example math below is similar to Dirac's development with Et/H=1. It allows us to separate energy terms from time terms.

Constrain Energy to zero

1=exp(itE/H)*exp(-itE/H)

take the natural log and divide boths sides by i

0=itE/H-itE/H

0=t/H*E-t/H*E

take the square root. Since Et/H=1, E=1/(t/H)

0=(E-E)*(t/H-t/H)

0=E1-E1

Example:		
a=1/b	a=.5	b=2
ab-ba		0
(a-a)*(b-b)=0	(0.5-0.5)*(2-2)=0	

The example math above is expanded to give the energy =0 constraint with four components, each with matching complex conjugates.

1=exp(itE1/H)*exp(-itE1/H)*exp(itE2/H)*exp(-itE2/H)*exp(itE3/H)*exp(-itE3/H)*exp(itE4/H)*exp(-itE4/H)

The natural log of the RHS is:

0=(itE1/H)+(-itE1/H)+(itE2/H)+(-itE2/H)+(itE3/H)+(-itE3/H)+(itE4/H)+(-itE4/H)

Using the square root procedure above with each t/H=1/E, we only need the energy terms that are equal and opposite. The square root also has a (t/H-t/H)= 0 solution that contains inverted terms.

E1-E1+E2-E2+E3-E3+E4-E4=0
E1+(E3+E4-E1-E2)+E2-E3-E4=0

Evaluating E

Next evaluate E. Looking ahead, there is another meaning associated with P=1. Overall the initial condition of the universe is probability 1, meaning it does indeed exist. There are many protons, each with mass that make up the universe. Specifically:

P= 1= probability of each proton* number of particles=1/exp(N)*exp(N). The probability of each proton is 1/exp(N). The proton itself is made of improbable components like quarks. We can evaluate the probability of particles that makes up the proton if energy is itself a probability, i.e. p=e0/E=1/exp(N), where e0 is a small constant.

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(-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

Probability 1 in the LHS gives the probability of finding mass1 with kinetic energy at the collapse point on the circle defined by exp(iE1t/H)*exp(-iE1t/H)*exp(iE2t/H)*exp(-iE2t/H), etc,.

Summary

The E= 0 construct was derived using the N's from the P= 1 construct. We then took the natural log of both sides of the equation. The (LHS) natural log of P=1 equals 0. The RHS natural log converts the values to additions and subtractions, depending on their sign. We then multiplied each value by e0 which gives E=e0*exp(N) for the eight matched energy values. We rearranged the N values. We define a probability component p =e0/E where e0 is a constant and has the same units as E. This means energy is increased by a low probability, i.e. E=e0/p. Schrodinger's equation shows exp(iEt/H) with the imaginary number i. Using complex probabilities on both sides of the equation eliminates imaginary numbers. The LHS imaginary numbers are eliminated because the four complex probabilities multiply with their four conjugates (1/1*1/1=1). The RHS imaginary numbers are eliminated because the imaginary probability multiples with iE (iE*i/P). This gives E= i^2 eo*1/(-exp(N))=eo*exp(N). Energy E=e0*exp(N) can be high since it follows an exponential relationship but Et/H=1 is maintained because each time t is corresponding low.

Appendix 2 The Proton model

Neutron components

Components of P=1

	M+KE		Fields	
N=-ln(p)	p	p/p	p	N=-ln(p)
0	1	1	1	0
separation				separation
90	8.194E-40	1	8.19401E-40	90
22.500	1.6919E-10	1	1.6919E-10	22.500
22.500	1.6919E-10	1	1.6919E-10	22.500
22.500	1.6919E-10	1	1.6919E-10	22.500
22.500	1.6919E-10	1	1.6919E-10	22.500
Susequently separate each 22.5 into 11.33+11.167				
11.333	1.1967E-05	1	1.19673E-05	11.333
11.167	1.4138E-05	1	1.41377E-05	11.167
The diagram below continues the process.				

The above process continues with further separations and rearrangement.

	Add across					
				Fundamental N m+Ke		
Split 90/4	Split 22.5	Rearrange	Add charge to mass		Fundamental N	
		12.167	Make Ke 3 Dimensional		Fields	
	11.167	4.167	0.0986	15.43195	17.432	Quad1
22.500	11.333		1.0986	12.432	10.432	
	11.167	2.167	0.0986	13.432	15.432	Quad2
22.500	11.333		1.0986	12.432	10.432	
	11.167	2.167	0.0986	13.432	15.432	Quad3
22.500	11.333		1.0986	12.432	10.432	
				-10.333	-10.333	Quad 4
0.0986	0.0986		0.075	10.507	10.507	
22.500	10.333			10.333	10.333	Quad 5
	12.167			0	0	
90.099	90.099			90.099	90.099	Sum

Separation and addition of components culminates in the two columns on the right entitled “Fundamental N values” that we can identify as parts of the neutron fields and mass. The N value 0.0986= ln(3/e) is associated with fields and is a basic information unit. These probabilities depend on “reverse” engineering the neutron and correlating fundamental data explained in Appendix 1.

There is a remarkable relationship between the natural logarithms 90 and the natural logarithm 180. Information (N) is a measure of how improbable an event is. It is very improbable that a single proton will form with exactly the N values listed in table 1. The probability that it will contain the particle and kinetic energy N values is: P=1/exp(N)=1/exp(90). Likewise, it is highly improbable that the proton will contain fields with the N values of table 2. Again the probability P=1/exp(90). Probabilities multiply and the probability of a neutron with these particles *and* field energies is P=1/exp(90)*1/exp(90)=1/exp(180).

But we know that neutrons exist. When we know something for certain, its probability is 1.0. Mass plus kinetic energy is equal and opposite field energy. Both exist and together they make up neutrons. Nature apparently creates mass equal to exp(180) to maintain probability=1 as an initial condition.

P=1=1/exp(180)*exp(180), where the probability of one mass with kinetic energy and its field is very low but there are many neutrons and fields.

The "big bang" duplicates the zero based neutron many times. Neutrons decay to protons, electrons and neutrinos in space.

Schrodinger's wave functions for the neutron

Details of the Proton model are in Appendix 2 but the table above labelled "Neutron components" specifies quad 2 (one of the quarks) below:

The Proton model energy values (E) are the exponents in the MIT unitary evolution equation [22] with four parts:

The E=0 construct is below with E= 2.02e-5*exp(N) MeV:

		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)=5.07, E3= 2.02e-5*exp(15.43)=101.95, E4= 2.02e-5*exp(10.43)= 0.69 (all in MeV).

Energy zero construct					
	E3+E4-E1-E2				
E1 mass	ke	E2 ke	E3 field1	E4 field2	Esum
mev	mev	mev	mev	mev	
13.80	83.76	5.08	-101.95	-0.69	0.00

Overall, above: E1+(E3+E4-E1-E2)+E2-E3-E4=0=(E1-E1)+(E2-E2)+(E3-E3)+(E4-E4)

Surprisingly this means mass E1 with kinetic energy (E3+E4-E1-E2) orbiting field E3 and mass+ke also orbiting field E4 with kinetic energy E2. The energy E2+E2= 10.15 MeV is fundamental to atomic fusion and expansion.

Schrodinger equation Left Hand Side:

P= 1= (1/exp(13.43)*1/exp(12.43))/(1/exp(15.43)*1/exp(10.43))

Schrodinger Equation Right Hand Side:

P (RHS)=exp(ie0*exp(N1) t/H)*exp(ieo*exp(N2) t/H)*exp(-ie0*exp(N3) t/H)*exp(-ie0*exp(N4) t/H)

N1= 13.43, N2= 12.43, N3= 15.43 and N4= 10.43 and e0= 2.02e-5 MeV.

Proton model review

For reference the Proton model is shown below. The left hand side defines N values for four probabilities associated with three quark (quads 1, 2 and 3) and N values that lead to the electron (quads 4 and 5). The right hand side of the table below describes the Energy=0 construct. This model shows 129.54 for the mass of the quarks. Study of mesons and baryons [17] indicated that 129.5 MeV transitions to 9.34 MeV + kinetic energy. The quark masses agree with Particle Data Group (PDG) [23] data, one with 4.36 and two with 2.49 MeV (multiples of 0.622 MeV from Quad 5).

				1.33E-06		Mass, Kinetic Energy and Fields for Neutron=0					
	N for Neutron Energy Interactions								Expansion		Gravitational
	mass	Energy	S field	Energy	Mass	Difference I	Weak KE		KE	Strong field	Field
	ke	MeV	G field	MeV	MeV	MeV	MeV	MeV	MeV	MeV	MeV
Quad 1	15.43	101.95	17.43	753.29	101.95	652.03				-753.29	
	12.43	5.08	10.43	0.69			753.98				-0.69
Quad 2	13.43	13.80	15.43	101.95	13.80	88.84				-101.95	
	12.43	5.08	10.43	0.69							-0.69
Quad 3	13.43	13.80	15.43	101.95	13.80	88.84			10.15	-101.95	
	12.43	5.08	10.43	0.69		-30.45	10.15		10.15		-0.69
Quad 4	-10.33	0.00	-10.33	0.00		0.00		-0.62	borrow		-0.74
	10.51	0.74	10.51	0.74				0.740	v neut ke		
Quad 5	10.33	0.62	10.33	0.62		0.62					
	0.00	0.00	0.00	0.00							
	90.10	sum	90.10	sum	129.54	799.87	939.5653460	0.118	20.30	-957.18	-2.80
							NEUTRON MASS		Total m+ke	Total fields	
							939.565346		Total positi\	Total negative	
									959.99	-959.99	

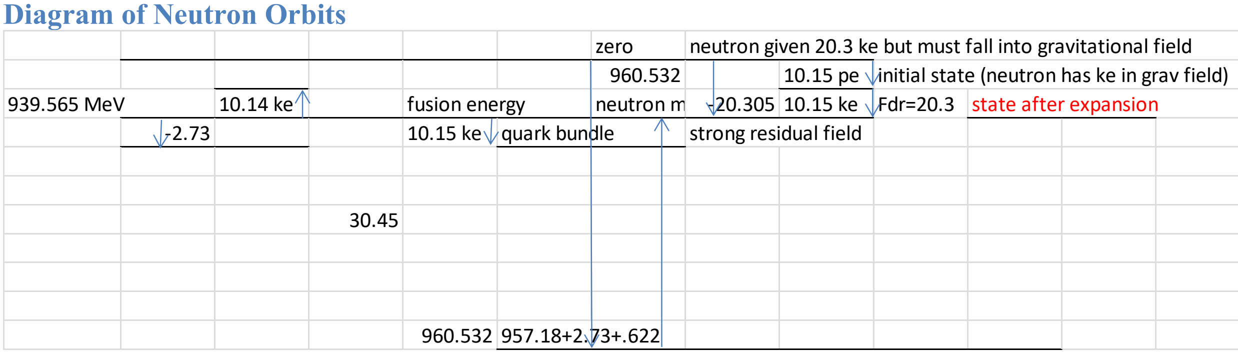
The neutron energy 939.5654 MeV is constant and agrees with the PDG [23] data within many significant digits.

Appendix 3 Orbits **associated with the Proton model**

The Proton model above is a P=1, E=0 construct that defines the quarks and their orbits (unification of strong interactions listed as Orbits 1, 2 & 3 below). Orbit 4 is associated with atomic fusion.

Summary of neutron model orbits		1.02608
Orbits 1,2,3	Three quark orbits are formed by quads 1,2 and 3, each with e*t=h.	
	Next, 30.45 mev of ke taken out of the quark bundle....quarks are now bound by a -30.15 MeV field.	
	(A quark bundle is the three quarks with their kinetic energy. Total=129.54+799.87= 929.41 MeV).	
	The quark bundle has 10.15 mev of kinetic energy (929.41+10.15=939.56 MeV).	
	But the energy zero criteria is 20.3 MeV "short" of being satisfied	
	This creates a -20.3 MeV residual strong field. (-20.3=(939.565+0.622-960.532).	
Orbit 4	The quark bundle mass 929.41 MeV orbits with 10.15 mev in the -20.3 mev field.	
	The energy zero components of this orbit are: 929.41+10.15+0.671-960.532=-20.3.	
	With the addition of 0.111 mev in the presence of a proton, fusion can occur	
	and this releases a portion of the 10.15 mev in the weak orbit.	
	Next, the neutron with 20.3 mev falls into a -2.73 MeV gravitational field. An orbit	
	is established with 10.15 MeV of kinetic energy and 10 PE.	
	(Fdr/2=3.656e-38*7.224e-14*exp(90)*6.24e12=10.06 MeV)	
Orbit 5	The neutron mass orbits with 10.15 mev in -2.73 mev gravitational field (the gravitational field emanates from the quark fields).	
	The energy zero components of this orbit are: 939.565+10.15+10.15+0.671-957.89-2.73=0. (some hidden).	
	The radius of this orbit is 7.22e-14 meters.	
	The attraction between exp(180) protons in the proper geometry creates the gravitational field	
	(see appendix 1 topic "cellular cosmology" and "quantum gravity".)	
	But the 10.15 MeV kinetic energy decreases as the cell expands against gravity converting ke to potential energy.	
	As the 7.22e-14 m cell expands, the universe expands.	
Electron orbit:		
	Separation creates opposite electromagnetic fields in the proton and electron	
	The bohr orbit is formed (electron mass with 13.6 ev of kinetic energy in 27.2 ev field).	
	The field energy is extracted from the proton mass.	

Diagram of Neutron Orbits



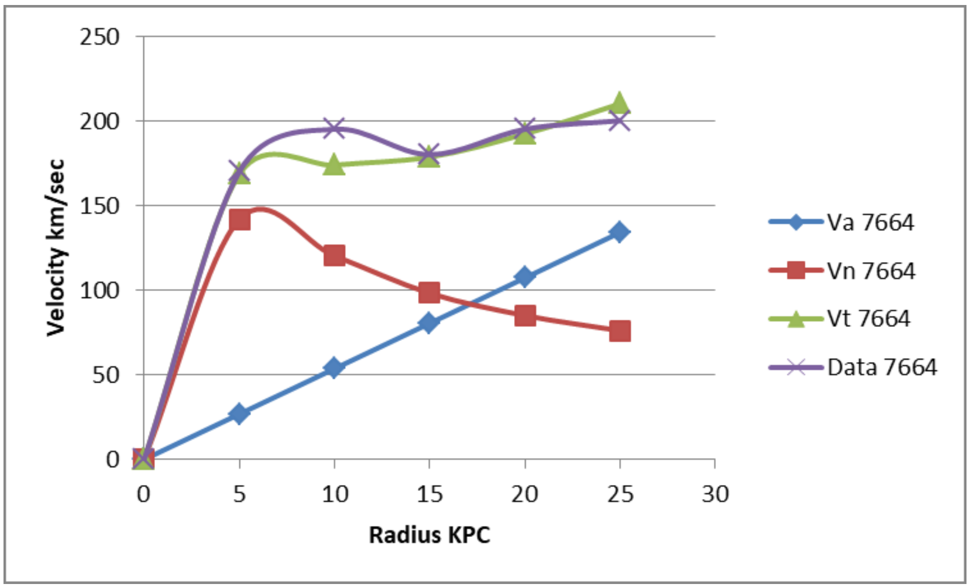
Note: change 2.73 above to 2.801 MeV

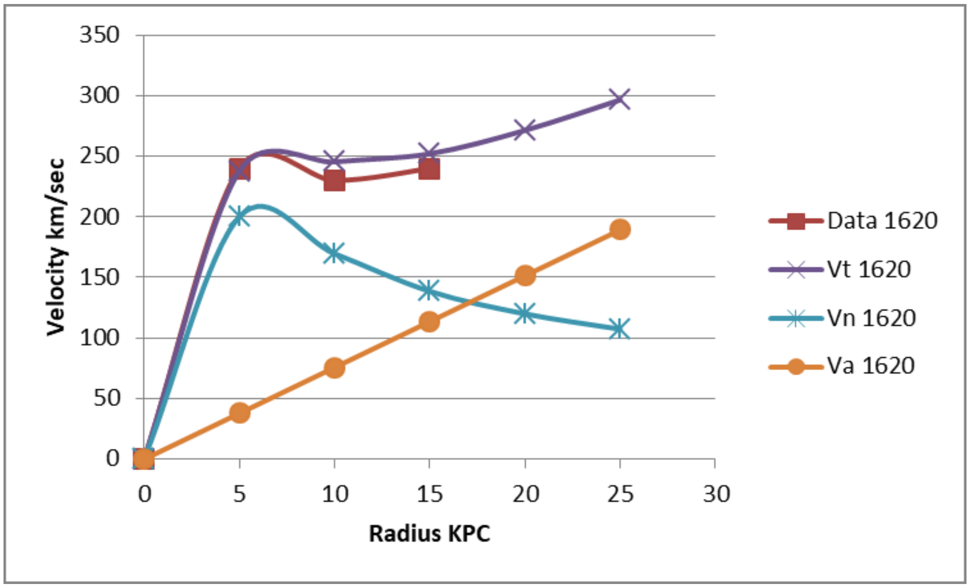
Appendix 4 Analysis of five galaxies with flat rotation curves

Show me the data

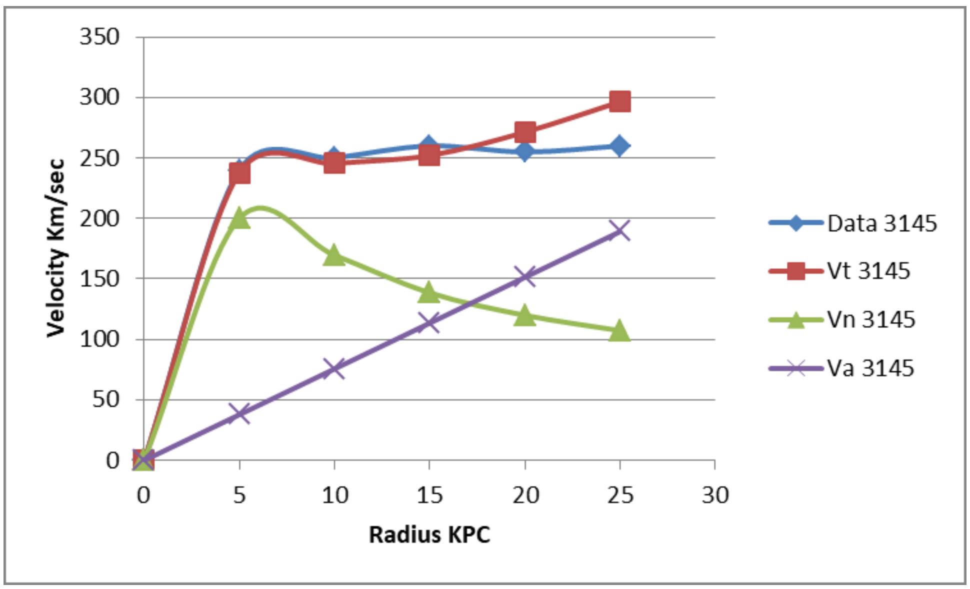
Using the procedure above, Data for NGC 7664 is compared with Vt=Vn+Va, Vn is Newtonian velocity and Va is Omega*R.

		Calculation Procedure NGC 7664				
Radius Kilo parsec (KPC)	0	5	10	15	20	25
Radius= 3.08e19*KPC (meters)	0	1.54E+20	3.08E+20	4.62E+20	6.16E+20	7.7E+20
Velocity Data (Km/sec)	0	170	195	180	195	200
Mass=(V*1000)^2*R/6.67e-11 (Kg)		6.67E+40				
Ke=0.5*1.67E-27*(V*1000)^2*6.24e12 (MeV)		1.51E-04				
rcell=10.15/ke*7.045e-14 (meters)		4.75E-09				
omega cell=1/(2*PI()*rcell/(Vdata*1000))		5.70E+12				
Mass scale		3.27E+28				
Omega galaxy= omegacell/Massscale		1.74E-16				
Va= Omega galaxy* Radius (km/sec)	0	26.81	53.61	80.42	107.23	134.03
Vn=(6.67e-11*Mass/Radius)^0.5/1000 (km/sec)		141.67	120.21	98.15	85.00	76.03
Vtotal=Va+Vn (km/sec)	0	168.47	173.82	178.57	192.23	210.06

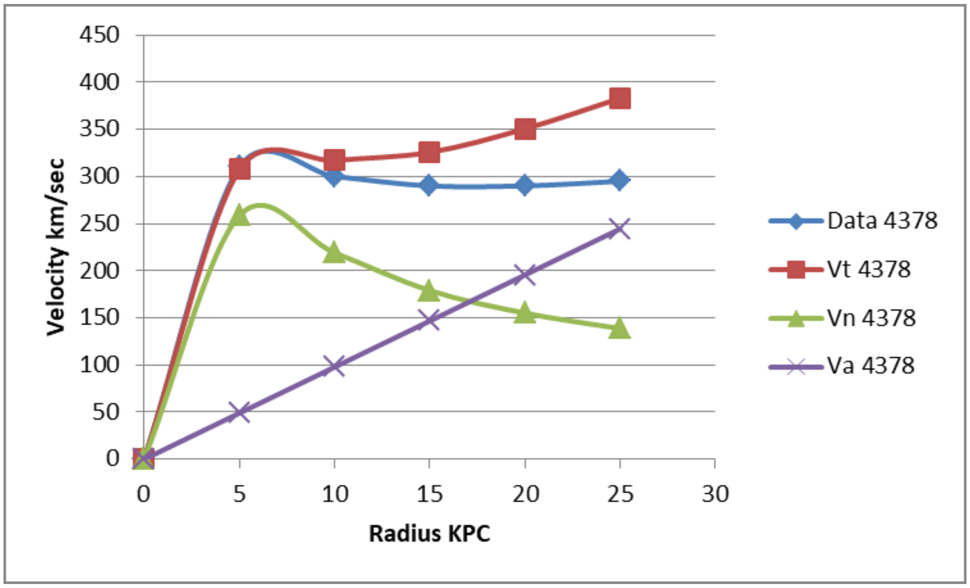


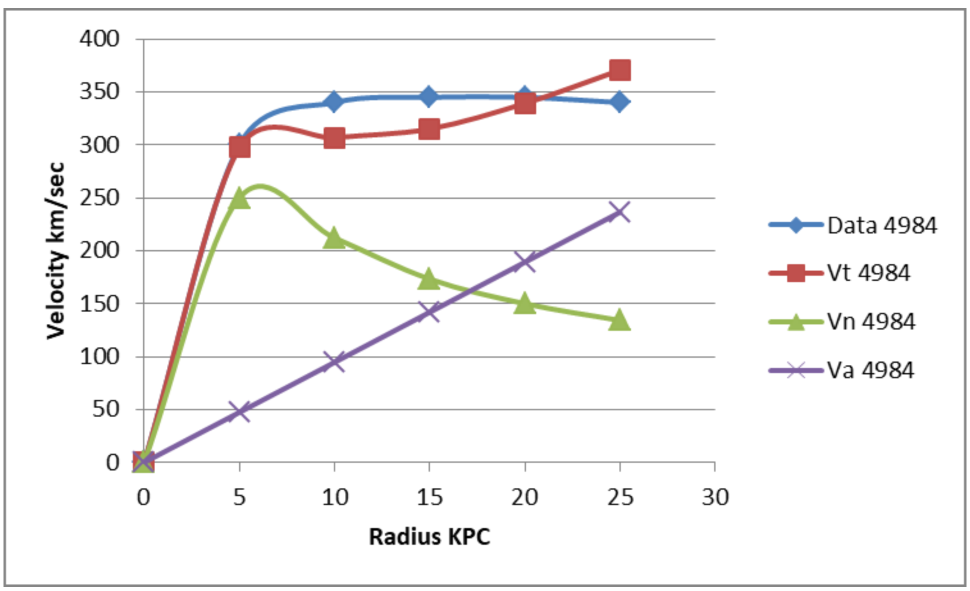


Velocity km/sec
Radius KPC
Data 1620
Vt 1620
Vn 1620
Va 1620



Velocity Km/sec
Radius KPC
Data 3145
Vt 3145
Vn 3145
Va 3145





What about our solar system?

One could reasonably ask "if the above is true, why don't the planets in our solar system all have the same velocity?" We will examine data for our 7 planets. Velocity measurements are based on observations regarding the period of each planet and the distance it travels through its orbit. Distance has been measured by various means including laser timing devices. The mass of the sun is determined by M=V^2 R/G (G =6.67e-11 Nt kg^2/m^2) and can be calculated for each planet's Velocity V and distance from the sun.

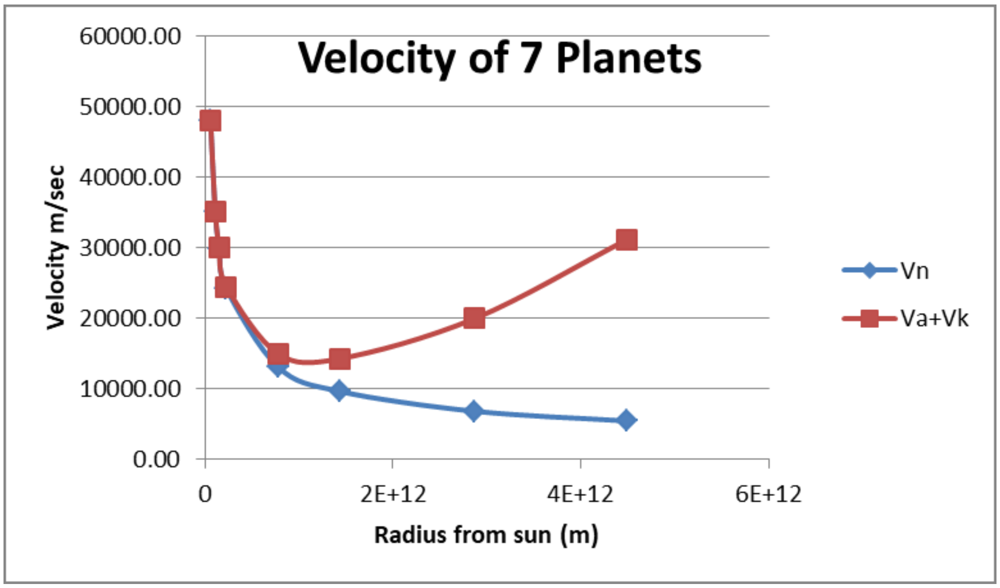
There are two cases:

Case 1: spinning reference frame

If our reference frame is spinning, there may be no Omega*R additions. We use observed velocities and distances in Newtonian formulas. But there is another case that should be considered. What observations could be made from a reference frame outside the solar system?

Case 2: stationary reference frame

The procedure above can be used to determine an Omega*R. It depends on V, mass of the Sun and R. The graph plot below is for the 7 planets. Even though we are using the same calculation procedure we used for galaxies, the velocity still falls off. This brings out one difference. Galaxies analyzed above have most of their mass about 8 KPC from the galactic center. The mass at this radius determines Omega. Our solar system has almost all of its mass centered in the sun. The other difference is that R is low compared to galactic radii. Omega*Rplanets is low except for the three outer planets.



The difference between observed and calculated total velocity is significant for the outer planets. This large difference if it existed would have been observed. Based on this result, it appears that case 1 is correct. In other words the space we are imbedded in is spinning slightly. The data and calculations for the planetary calculations are presented in Appendix 4.

The data and calculations for the planetary calculations are presented below.

iams, dave.williams@nasa.gov	
de 690.1	
NASA Goddard Space Flight Center	
Greenbelt, MD 20771	

Msun (Kg)	1.99E+30	1.99E+30	1.99E+30	1.99E+30	1.99E+30	1.99E+30	1.99E+30	1.99E+30	1.99E+30
Vt=Vn+Va (m/sec)	47917	35121	29944	24429	14919	14245	19953	31153	43688
Average Vt/Vobs	MERCURY	VENUS	EARTH	MARS	JUPITER	SATURN	URANUS	NEPTUNE	PLUTO
1.907	1.001	1.003	1.005	1.013	1.141	1.468	2.922	5.699	9.211
Vobs (m/sec)	47848	35018	29790	24124	13074	9700	6829	5466	4743
Vn= (GM/R)^.0.5 (m/sec)	47880	35025	29787	24133	13057	9623	6798	5434	4741
rcell=0.5*1.67E-27*(A70)^2*6.2e12 (r	1.19E-05	6.39E-06	4.62E-06	3.03E-06	8.91E-07	4.90E-07	2.43E-07	1.56E-07	1.17E-07
ke=10.5/rcell*7.045e-14 (Mev)	6.20E-08	1.16E-07	1.60E-07	2.44E-07	8.30E-07	1.51E-06	3.04E-06	4.75E-06	6.31E-06
Omega cell=1/(2*PI()*rcell/(Vobs)) (1/	6.38E+08	8.72E+08	1.03E+09	1.27E+09	2.34E+09	3.15E+09	4.47E+09	5.59E+09	6.44E+09
Mass scale= Msun/1.67e-27/exp(90)	9.76E+17	9.76E+17	9.76E+17	9.76E+17	9.76E+17	9.76E+17	9.76E+17	9.76E+17	9.76E+17
Omega planets =Omegacell/Mass scal	6.54E-10	8.93E-10	1.05E-09	1.30E-09	2.39E-09	3.22E-09	4.58E-09	5.72E-09	6.59E-09
Va=Omega Rplanets (m/sec)	38	97	157	295	1863	4622	13156	25719	38948