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Application of proton mass model to cosmology

Abstract and justification

Physicists are actively engaged in understanding new observations regarding our universe. There is agreement that achieving a new level of understanding may require an extension to what has been observed to date about matter and energy. Reference 1 described models for the neutron and proton mass based on Shannon type information theory and WMAP (reference 14) data regarding the number of particles in the universe. Application of this theory in reference 2 offered an understanding of the weak and long range character of gravitation. In addition, it proposed a way of unifying the electromagnetic, weak, strong and gravitational forces. The present document extends this theoretical groundwork to the field of cosmology. All of the information required in the model is generated from within the theory, i.e. the work is self contained.

This paper will apply information from the proton mass model to the beginning, expansion of the universe and observables from the field of astronomy. Can we characterize the fundamentals of space and find the relationships that accurately model its expansion, temperature, gravitational history and elemental abundance? Tentative results from an expansion model will be compared to the latest values reported in WMAP analysis and CMAGIC studies (reference 17). Three models of expansion are compared and a proposal regarding dark matter is discussed. Other topics covered are how the number of number of clusters, galaxies and stars are determined.

Proposal Overview

It is proposed that the proton contains information that determines many aspects of nature. The proton mass/information model is duplicated below from reference 1. The information important to cosmology is specifically its expansion energy, the way it expands and the number of particles. In the diagram below, the gravitational values (mass, kinetic energy and field energy) are used extensively. Also, the expansion energy (20.3 mev) is of specific interest. Many of the tables and figures are from reference 20.

	Unifying.xls cell g228				CALCULATION OF PROTON MASS			Mass and Kinetic Energy		Fields	
	mass	Energy-mev	strong field	Energy-me	Mass-mev	Kinetic energ	weak ke-mev	Neutrinos-r	Gravitational	Strong & E/M	Gravity
	ke		grav field						Kinetic energy	Field	Field
	15.432	101.947	17.432	753.291	101.947	641.880				-753.29	
	12.432	5.076	10.432	0.687							-0.69
	13.432	13.797	15.432	101.947	13.797	78.685				-101.95	
	12.432	5.076	10.432	0.687							-0.69
	13.432	13.797	15.432	101.947	13.797	78.685				-101.95	
	12.432	5.076	10.432	0.687							-0.69
~~(0+1)~~			-0.296	-2.72E-05			10.151		20.303	expansion ke	
Total proton charge			equal and opposite charge						0.000	expansion pe	
	10.408	0.67	0.075		0.000	0.000	-0.671	0.671	v neutrino at 0.048		
-10.33	-10.333	0									
Neutron separates here to form proton and electron					129.541	799.251	**938.272013**	**PROTON MASS**			
10.33	10.136	0.51	10.333	0.62	**0.511**	0.111				5.44E-05	-0.622
	0.197	2.47E-05	0.296	2.72E-05	**ELECTRON**			2.47E-05	e neutrino		electron fie
					130.052	0.111		0.671	20.303	-957.185	-2.683
	90.000		90.000						Total m+ke	Total fields	
									Total positive	Total negative	
									959.868	-959.868	0.00E+00

The proton model above is the source of constants for the table below. This table gives the mass, kinetic energy and fields for fundamental constants. Gamma is g=m/(m+Ke) and R=hC/(field energy*mass/g)^.5. Note that mass for gravity is the mass of three quarks inside the proton (without their kinetic energy) plus the mass of the electron. The residual strong force (related to the weak interaction) is determined by a mass of 928.792=129.5+799.251 mev, a kinetic energy of 10.15 and a field of -20.3. This is an orbit formed by a "bundle of quarks" with their kinetic energy orbiting in a field of 20.3 mev. This field is the missing energy required to balance 959.868 with negative fields of -959.868 mev. (Overall the energy is zero).

	Mass (m)	Ke	gamma (g)	R	Field (E
	(mev)	(mev)		meters	(mev)
Gravity	130.052	10.151	0.927595985	**1.0174E-14**	-2.683
Electromagı	0.511	1.36E-05	0.999973369	**5.2911E-11**	-2.72E-05
Strong	129.541	799.251	0.139472478	**2.0928E-16**	-957.18
Weak	928.792	10.151	0.989188618	**1.4292E-15**	-20.303

R equation

The equation proposed to model expansion of the universe is the same equation that is used to calculate R, the critical radius that underlies calculations for the gravitational constant. The author will refer to this equation as the R equation, following the nomenclature and derivation presented in reference 1. The R equation is central to fundamental forces with different inputs, all derived from the model of the proton above. In each case gamma is a ratio less than one but for expansion, it takes on quite a different role.

Central Roles of the R equation

R=Constant/(Mass/gamma*Field Energy)^.5

Electronic Shells	R quantum shifts create light
Weak Force Shells	R quantum shifts model binding energy
Gravitation	R determines size of universe
	gamma becomes a time ratio
	time ratio is expansion time/alpha time

Mass and field energy are determined from the proton mass model

Proposed Model for Expansion of the Universe

For gravity and cosmology we take into account the large number of particles in the universe. Based on WMAP data, reference 1 suggested that the universe is made up of exp (180) neutrons (that decay to protons). For purposes of our discussion on cosmology it is preferable to consider a filled sphere since it what we observation. Rather than the surface of one large sphere, consider the equivalent cumulative volume of exp(180) small spheres each of radius 1.02e-14 meters. The volume of one large sphere is the same as the cumulative area of many small spheres by the following math.

Area=4/3*pi*1.02e-14^3*exp(180)=4/3*pi*R^3
R=r*exp(60)

Inflation

The radius R is calculated from the R equation (R=hC/(field energy*mass/g)^.5) with inputs from the proton mass model. For gravity the inputs are the mass (w/o kinetic energy) of the proton and electron (129.54 +0.511=130.05 mev), field energy (2.683 mev) and gamma. Using the R equation yields the gravitational base state of radius of 1.02e-14 meters.

				GRAVITY
				mass only
				proton
Particle Mass (mev)				130.052
M (kg)		Constants		2.318E-28
Field Energy (mev)				2.683
Kinetic Energy (mev)				10.151
Gamma (g)=m/(m+ke)				0.9276
Velocity Ratio		v/C=(1-(g)^2)^.5		0.3736
"R equation output"--meters		**R=(Hc/(2pi)/(E*m/g)^0.5**		**1.0174E-14**

This radius is related to the gravitational constant as follows:

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				GRAVITY
				mass only
				proton
Particle Mass (mev)				130.052
M (kg)		Constants		2.318E-28
Field Energy (mev)				2.683
Kinetic Energy (mev)				10.151
Gamma (g)=m/(m+ke)				0.9276
Velocity Ratio		v/C=(1-(g)^2)^.5		0.3736
"R equation output"--meters		**R=(Hc/(2pi)/(E*m/g)^0.5**		**1.0174E-14**
		F=m/g*c^2/r		1.809E-36
Force	newtons	Fg=E/R/exp(90)		3.462E-38
		F inertial=mv^2/R		
Calculation of gravitational constant from Inertial Force				
Inertial Force=m/g*(v/c*c)^2/r/EXP(90)				1.809E-36
Radius (Meters)				1.0174E-14
Mass (kg)			1.673E-27	1.675E-27
Gravitational Constant (g=F*R^2/M^2=nt m^2/kg^2)				6.6751E-11
		average P&N		6.6741E-11
		Published PDG		6.6743E-11

Inflation in the author's models is represented by duplication of one particle by a factor of exp(180). As duplication occurs, the lowest meaningful gravitational radius at the "edge" would be an initial radius of 1.02e-14 multiplied by exp(60)=1.16e12 meter. (exp(60) is exp(180)^.333 for three dimensions).

Expansion

The following derivation is similar to that of Friedmann (shown in reference 15) except the concept of a critical density is omitted. The reason to show this derivation is to justify the use of time to the power 2/3 as the basis for expansion.

Nomenclature
(all calculations are MKS)
v-velocity (m/sec)
M-mass (kg)
R-radius (meters or m)
G-gravitational constant (nt m^2/kg^2)
c-constant of integration
dt-delta time
t-time
H is Hubble's constant
R3 radius due to cosmolgical constant

	v=(2GM/R)^.5	
	R=v dt	
	R=(2GM/R)^.5 t+c	
	R^(3/2)=t (2GM)^.5 +c	
	R=t^(2/3)((2GM))^(1/3)+kRdt	
	(nt m/kg m m^2/sec^2)^.33 t^.66	
	(m^.33 m^.66/sec^.66)*sec^.66	
	R will be in meters	
	c=v t and v=R H	
	H=2.3e-18/sec	
	dR3=R*H*dt	
	dR3=R*H*dt	
	dR3=ct^2/3*H*dt	
	R3=ct^1.666*H/1.66	

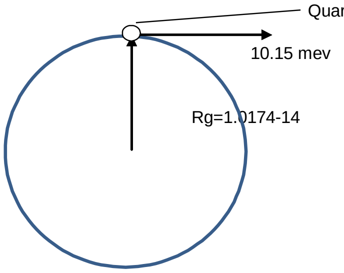
Note that the constant of integration is included in the derivation and it is evaluated with the Hubble constant H. This is the controversial cosmological constant that is now included in documents such as the WMAP analysis (reference 17). I have adopted the cosmological constant approach in this paper. The author will use time^(2/3) but prefers to consider each proton as a center of expanding space. The full expansion equations are shown below in the heading "making proton size space into universe size space".

There is a second component of expansion that depends of time. This component is a higher power of time and becomes important near the end of the expansion.

Proton size space

Reference 1 gave the source of the gravitational constant G at the size of the proton:

radius of electron orbit for the proton
Re/m=5.2911e-11+Rw=5.29177e-11



Quark "bundle" mass=129.6409 mev orbits the three strong field energies .
with kinetic energy=799.2507 mev
This orbit called Rstrong equals 2.09E-16
The proton has an orbital radius of Rw=1.43e-15 (cell az82) due to a mass of
129.5409+799.2507=928.7916 mev orbiting with kinetic energy 10.15
in a 20.3 mev potential energy
This kinetic energy stays at the value 10.15 except during fusion.
The quark "bundle" mass 129.5409 orbits in a gravitational field energy of 2.68 mev
with kinetic energy 10.15 mev giving a gravitational radius of 1e-14 meters
This kinetic energy of 10.15 has been reduced to about 1.7e-13 mev
due to expansion and the radius is currently about 0.5 meter

129.5409 129.5409
0.9273 gamma=129.54/(129.54+10.15)
0.3742 V/C=(1-(0.9273)^2)^0.5

G=fr^2/m^2					
r=((HC/(2pi)/(E*m/g)^0.5)=1.01e-14 meters					
f=1.8e-36, m=1.67e-27 kg					
G=1.8E-36*1e-14^2/1.67E-27^2=6.67e-11 newton m^2/kg^2					
G=rv^2/M/exp(90)					
	r=1e-14 meters. v=.37*C meters/sec M=1.67e-27 kg				

Note the factor exp(90) that will be explained later.

Making proton size space into universe size space

The universe will be considered as expanding cells surrounding protons. According to reference 1 there are exp(180) protons and in three dimensions each radius will be multiplied by exp(60) to estimate the full radius. The reason to consider the universe as many expanding cells is that the proton contains an orbit (described in reference 1) and kinetic energy important to gravity. The other reason to do this is that it places protons in the universe in a uniform manner. The universe is known to be very uniform overall but of course the protons can move around in space.

Radius of each cell R1=r*time^(2/3) +cHt^(5/3)
The cosmological constant term (cHt^(5/3)) will be called R3 and the addition R1+R3 represents the size of the universe as a function of time.
Lower case r in the equation above becomes universe size space expands with time (R1+R3) and the result is multiplied by exp(60).

R1 creates space with the following equation:					
	R1=(Hc/(2pi)/(E*m/G^(4/3))^0.5)	E=2.683 mev	2.683	m=130.052 mev	
	Big G is defined as a time ratio =time/alpha. Alpha is the time when expansion begins.				

Note that it preserves time^(2/3) as shown above but it is integrated into the R equation with power 0.5.

Beginning of table

expansion table			0.008164595		
	Note that the integration ends at 13.7 billion years (4.32e17 seconds).				
				4.47E+04	
alpha (initial time in sec)			0.000958026		
	1.02e-14/(.374*3e8)/2*exp(45)		0.001051068	41.9644	42.487
time--seconds				0.00095806	0.001615678
basis of time			5.70802E-22	5.70802E-22	5.70802E-22
G time ratio	→		0	1.000034718	1.68646516
time ratio	1		1	1.68E+18	2.83E+18
Fgravity (nt)	2.03E-36	m V^2/R	2.06E-36	1.99E-36	1.00E-36
Cell radius	**9.02E-15**	**R=R1+R3**	**9.02E-15**	**9.19E-15**	**1.30E-14**
R3 (from cosmological constant)			0.00E+00	8.04E-36	1.92E-35
R universe		cellR*exp(60)	1.03008E+12	1.04972E+12	1.48725E+12
		1.18E+00	9.32E-01	9.31E-01	9.30E-01
	0.3742	R	9.02E-15	9.1919E-15	1.3023E-14
g	5.91E-11	Fgrav*R^2/1.67e-27/	5.99E-11	6.00E-11	6.06E-11
ke orbit	10.15127	mev	10.15127013	9.96E+00	7.03E+00
pe from center				2.26432E-13	3.20808E-13
velocity	299792458	m/sec	112194890.5	111252044.5	94950202.74
	0.5234	5.22754E+25	4.23E+01	4.23E+01	4.28E+01
		8.59868E+25	1.10541E+12	1.12774E+12	1.59863E+12
	129.54087	mass mev	129.5408691	129.5408691	129.5408691
	0.9273	gamma (g)	0.9273	0.9286	0.9485
	0.3742	V/C	0.3742	0.3711	0.3167
			112194890.5	111252044.5	94950202.74
		R/r=(V/v)^2*g/g0	1.00E+00	1.02E+00	1.43E+00
		R=r(V/v)^2*g/g0	1.01E-14	1.03E-14	1.44E-14
rV^2/M		G from geodesic	6.23E-11	6.24E-11	6.37E-11

The end of the same table is shown below:

expansion table			0.008164595		0.5226		
	Note that the integration ends at 13.7 billion years (4.32e17 se				5.50E+13		5.70802E-22
					NOW		90
							6.96608E+17
							7.27128E+20
alpha (initial time in sec)			0.000958026				0.000958026
	1.02e-14/(.374*3e8)/2*exp(45)		0.001051068	88.9984	89.521	89.522	90
time--seconds				2.55858E+17	4.31481E+17	4.31913E+17	6.96608E+17
basis of time			5.70802E-22	5.70802E-22	5.70802E-22	5.70802E-22	5.70802E-22
G time ratio			0	2.67068E+20	4.50385E+20	4.50836E+20	7.27128E+20
time ratio	1		1	4.48E+38	7.56E+38	7.57E+38	1.22E+39
Fgravity (nt)	2.03E-36	m V^2/R	2.06E-36	7.88E-64	3.07E-64	3.07E-64	1.18E-64
Cell radius	**9.02E-15**	**R=R1+R3**	**9.02E-15**	**4.70E-01**	**7.53E-01**	**7.54E-01**	**1.22E+00**
R3 (from cosmological constant)			0.00E+00	8.91E-02	2.13E-01	2.13E-01	4.73E-01
R universe		cellR*exp(60)	1.03008E+12	5.3707E+25	8.59868E+25	8.60685E+25	1.38893E+26
		1.18E+00	9.32E-01	1.18E+00	1.18E+00	1.18E+00	1.18E+00
	0.3742	R	9.02E-15	3.8119E-01	5.4007E-01	5.4043E-01	7.4325E-01
g	5.91E-11	Fgrav*R^2/1.67e-27'	5.99E-11	6.22E-11	6.22E-11	6.22E-11	6.22E-11
ke orbit	10.15127	mev	10.15127013	1.95E-13	1.22E-13	1.21E-13	7.53E-14
pe from center				11.58492005	18.54786862	18.56548796	29.96008861
velocity	299792458	m/sec	112194890.5	16.44	12.99	12.98	10.22
	0.5234	5.22754E+25	4.23E+01	8.90E+01	8.95E+01	8.95E+01	9.00E+01
		8.59868E+25	1.10541E+12	3.68969E+25	5.22754E+25	5.23103E+25	7.1942E+25
	129.54087	mass mev	129.5408691	129.5408691	129.5408691	129.5408691	129.5408691
	0.9273	gamma (g)	0.9273	1.0000	1.0000	1.0000	1.0000
	0.3742	V/C	0.3742				
			112194890.5	16.44	12.99	12.98	10.22
		R/r=(V/v)^2*g/g0	1.00E+00	5.02E+13	8.04E+13	8.05E+13	1.30E+14
		R=r(V/v)^2*g/g0	1.01E-14	5.08E-01	8.13E-01	8.14E-01	1.31E+00
rV^2/M		G from geodesic	6.23E-11	6.72E-11	6.72E-11	6.72E-11	6.72E-11

This expansion history will be compared with other models in the section entitled "Comparison of Expansion Models" below. Appendix 1 shows a derivation for critical mass that is the basis of most cosmological expansion models. In the author's view, there are several limitations to the approach and a concern developed that we are looking for missing mass and dark energy that doesn't exist. According to the critical density approach, dark energy is most (about 70%) of the missing energy and conventional baryons only make up 4.4% of the critical mass which many believe is 9.5e-27 kg/m^3 . But what if the critical mass concept is incorrect? In fact, re-analysis of the WMAP data indicates that baryons are about one half of the actual density as measured by "equality" of mass density and radiation density discussed later. The author believes there is dark matter but it is the other half of the actual density. Furthermore the author believes that the concept of time needs further development and that space is a direct result of time expansion and the R equation leading to the gravitational constant calculated above. For these reasons, an alternative to the critical density approach was developed and is presented below.

WMAP

The Wilkinson Microwave Anisotropy Probe (WMAP) was launched into orbit in 2001 and produced data for many years. Its purpose was to map the radiation coming from the entire sky called the cosmic

microwave background (CMB). The temperature of this radiation is on average 2.725 degrees K but there are hot and cold areas (on the order of 70 micro degrees K) that are of interest. Theory emanating from Princeton (Peebles) and other important papers (Bahall) suggested that the hot and cold spots are the results of acoustic waves that have well defined origins and progress at know speeds. Their origin is a condition called equality of mass and radiation density. As the universe expands and matter density starts to dominate, waves travel in the matter at a speed of C/3^.5=1.73e8 meters/sec. They travel outward from their origin and a temperature spot develops related to compression within the wave. As expansion continues another transition occurs. Electrons initially have too much energy to fall into orbits around protons (a state known as plasma where electrons are ionized and absorb light). As expansion decreased the temperature, plasma cleared and the universe became transparent. Radiation from temperature variations on the surface of last scattering traveled through space and was measured by sensors on WMAP. Temperature decreased in direct proportion to the expansion ratio (Rfinal/R), so knowing the temperature at which ionization falls to approximately 0.5 is was extremely important. This transition is known as the decoupling point.
Results from WMAP (reference 14 series) support incremental expansion equations that have become know as the concordance model. The equations for expansion are presented below. There are three parts to the equations, starting with an incremental calculation that updates the radius as a function of the distance increased over a certain velocity and time. The velocity is the second part of the equation and contains parameters such as 0.27 mass/total and total “critical” mass density of 9.5e-27. The third part of the equation (the part starting with 3.36e-1 below) is an accelerating velocity addition to accommodate a universe containing an unknown dark energy that appears to be accelerating expansion. The radius “now” (7.2e25 meters) agrees with a measured Hubble constant of 71 m/sec/mega parsec.

eir expansion **Concordance expansion equations** **Result** simple.xls fa102

time n-sec time n+1-sec

3.03E+17 3.95E+17

5.12E+25 previous increment

(5.12E+25+0.568*(3.95e17-3.03e17)*3e8) 6.68E+25 meters

5.68E-01

5.68E-01 (8/3*PI()*6.67e-11*0.27*9.5E-27*2.5E+31^3/5.12E+25/3e8^2)^0.5/3e8+0.336

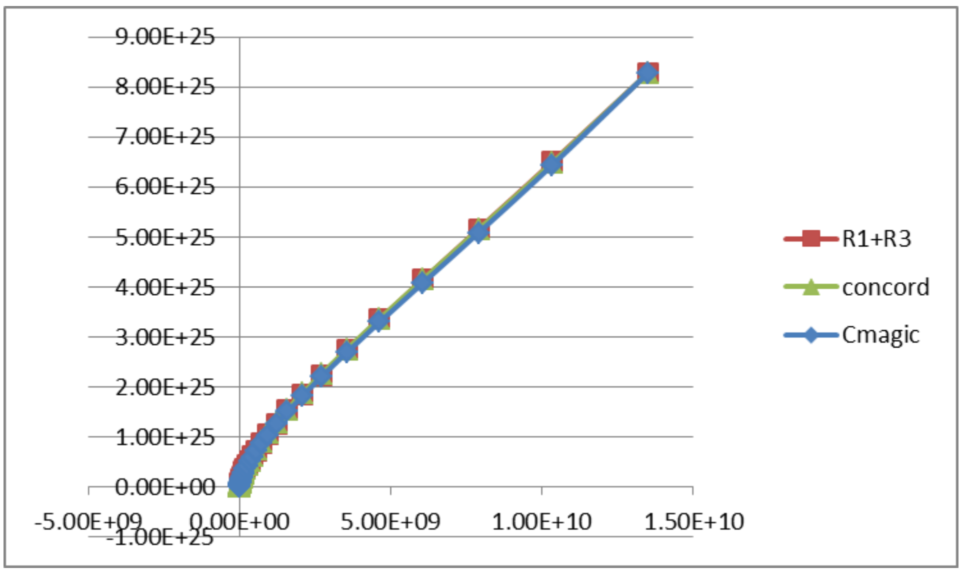
3.36E-01

3.36E-01 (1.16E-35*5.12E+25^2/3)^0.5/3e8

A plot of the expansion radius for the current proposal (referred to as R1+R3) as a function of time is compared below to the model resulting from WMAP data (referred to as the concordance model in the reference 14) and the CMAGIC model resulting from supernova data. Reference 15 contains the Best Cosmological Parameters in Table 3 (Concordance parameters) and reference 17 Figure 8 describes the CMAGIC “Best Fit” parameters with rho critical=9.5e-27 kg/M^3. Surprisingly the Best Fit cosmological expansion model (called CMAGIC in this paper) concludes that the universe is accelerating even more rapidly than the WMAP model. Many have concluded that the source of the acceleration appears to be a cosmological constant that becomes increasingly important as expansion reaches the later stages. Since supernova data is based on luminosity of its “standard candle”, the interpretation is mainly based on the final slope of the expansion.

Parameter	Friedmann	WMAP (Concordance)	CMAGIC
Omega total	1	1	
Omega mass	1	0.27	1.233
Omega lambda	0	0.73	2.15
Omega baryon	1	0.044	
Hubble's constant		2.30E-18	2.30E-18
Cosmological constant w	0		-1
pho critical kg/m^3	3.88E-27		

The time scales at the bottom of the graph are the same for all expansion histories. Note the "acceleration" toward the end of the CMAGIC history that has generated discussion regarding a cosmological constant. The R1+R3 model and the concordance model have almost identical expansion histories.



Hubble's constant

The ratio V/R (Hubble's constant, H) is one way to determine the degree of expansion at the present time. WMAP results (reference 14) list the most probable value of H as 2.3e-18 1/sec. This value is derived by taking the slope of the last step in the expansion model.

Hubble Summary			
V/R (1/sec)	2.302E-18	71.030 km/mpc/sec	barbee
V/R (1/sec)	1.62022E-18	50 km/mpc/sec	Pebbles
V/R (1/sec)	2.30071E-18	71 km/mpc/sec	WMAP data

Late stage expansion energy limitation

The concordance model accommodates dark energy by adding a late stage expansion velocity. Another model, referred to as the "CMAGIC" model (reference 17) adds steeper late stage expansion based on observations of supernova. Both of these models are partially supported by the "cosmological constant" historical discussions involving Einstein, Friedmann, Mach and others (reference 15). According to the proton model in the first section of this paper, particles have kinetic energy (20.3 mev).

From the R equation for gravity, an E/R force of 3.46e-38 nt =2.683 mev/(1.02e-14m*exp(90)*1.603e-13 nt/mev-m) resists expansion between cells. Appendix 2 describes kinetic energy and potential energy inside each cell.

The expanded state gravity between cells depends on 20.3 mev of kinetic energy being converted to expansion velocity. During expansion, gravitational potential energy increases by dE=Force*dr for each increment of expansion (where dr and dE are incremental changes). Conservation of energy is described in the following equation:

Kinetic energy+ potential energy=20.3 mev, where potential energy =integral (F dr).

		Force	3.462E-38	Newtons
R=Energy/Force		Energy	20.30	mev
R (meters)=20.3/3.472e-38*1.6e-13			9.395E+25	meters

Expansion ends at 9.39e25 meters when Ke is depleted (integral F(dR)).

Comparison of Expansion Models

In three dimensions the spheres that fill the volume repeat exp(60) times out to the edge of the overall radius for both the light and dark matter expansion. Each small sphere contains one particle on its surface and has a small expansion velocity (currently on the order of 2e-18 m/sec) determined by the base and expanded states presented above for gravity. Expansion models create space rather than move particles within space and represent space on a surface rather than space between particles. Since all particles expand, the additive velocity is quite dramatic at the "edge" of the radius that contains the particles. As a point of reference, studies regarding the distribution of mass throughout observable space document remarkable overall uniformity. A principle called the "cosmological principle" states that the initial condition was uniform.   Theories exist regarding uniformity (inflation theories) that attempt to explain the initial uniformity (reference 15). The addition of dark matter to the model adds uncertainty to the matter distribution. Each light matter model suggests that "space is expanding and carrying light along with it", especially during an inflation phase and early expansion. The author's proposal is based on the inflation phase being identical to duplication of the particles to equal exp(180). All four models involve velocities larger than the speed of light. Energy conservation and the source of the cosmic background radiation will be addressed in later sections.

The table below compares overall characteristics of the four models.

Comparison of Expansion Models

Criteria	**Proposal**	**Friedmann**	**Concordance**	**Cmagic**
Energy for expansion	Identified as 20.3 mev (quantum?)	several hundred mev source unidentified	several hundred mev source unidentified	several hundred mev source unidentified
dark energy	no	no	yes-source growing	yes--source growing rapidly
Dark matter	yes 1.67e-27 kg/particle 50% dark	no	yes 0.27 of total .044 baryons .73 dark	yes mostly dark
Inflation	Yes identified as particle duplication	yes several proposals	yes several proposals	yes
Final State of Universe	"flat" about 2e26 meters	"flat"	Expansion could continue	Accelerating expansion "cold" end
Temperature at beginning	cold-->1e9 heat due to neutrons decaying	>1e9 degrees	>1e9 degrees	>1e9 degrees
CMB temperature C	2.73*(z-1) radiation source quantified	2.73*(z-1)	2.73*(z-1)	2.73*(z-1)^1
Conservation of energy	yes	no	no	no
V/C in early Universe	Superluminal for light (Space is being created) 0.5 C or lower for dark	Superluminal	Superluminal	Superluminal
Helium formation	Proposal in simple.xls (fractions of seconds after beginning)	Sakharov	Sakharov?	Sakharov ?
Mass Accumulation	accoustically initiated for light matter dark matter allows estimation of number of clusters, galaxys and stars	accoustically initiated		
WMAP interpretation	accoustic variation at decoupling power spectrum variations Accumulation of dark matter in cluster augments gravitation redshift			

Mass accumulation

Important transitions related to mass accumulation are related to temperature and radiation. These transitions occur in all cosmologies when the temperature is similar (reference 15). Mass accumulation starts when gravity attraction overcomes radiation separation forces. This condition is called equality. WMAP observation (reference 14) of temperature anisotropy is believed to come from observable temperatures (the surface of last scattering) after radiation is allowed to pass, rather than be absorbed by plasma. This condition is known as decoupling. The period between equality and decoupling has been the subject of intense interest. Anisotropy in the radiation is related to mass accumulation and theorists have attempted to develop mechanisms for mass accumulation in the early hot universe. There is a critical period when mass accumulation needs to begin to agree with observations regarding early development of galaxies and stars (this occurs at about 200 million years into expansion according to some sources).

Cosmologists use the expansion ratio to back calculate the cosmic background radiation temperature. The measured value (WMAP) at the present time is t=2.725 K. The temperature at an early state of expansion is normally T=2.725*(R/r), where R/r is the radius of the universe now divided by the radius at an earlier time (z-1 is also used to describe the expansion ratio but for large z, the 1 can be ignored). This equation makes t/T=r/R the equation for scaling temperature from one radius to another. Radiation temperature is related to energy by the equation E=kaT^4, where k is Boltzmann's constant. Decoupling is predicted by an equation known by the acronym SAHA. At decoupling WMAP measured the temperature anisotropy of a sphere when the light matter plasma cleared and it was possible for radiation to escape (the surface of last scattering). This cosmic microwave radiation has been fully analyzed by WMAP papers (in the reference 14 series) and cosmological parameters have been estimated from the results. The interpretation of the cool spots is that early gravitational accumulation has red shifted the radiation, somewhat offset by density compression that would also change the temperature slightly. The size of the spots and the magnitude of the temperature perturbations are of extreme interest.
Decoupling is predicted by the SAHA equation and temperature 2970 deg K. Knowing that the temperature ratio is 2970/2.725=1090, the expansion ratio for the spot at decoupling must also be 1090. As indicated above, an acoustic wave of velocity 1.73e8 m/sec starts at equality and travels until decoupling, a period of 2.15e13 seconds. Calculations show that the spot had a radius of 4e21 meters. Knowing that the spot expands by 1090 times allows the current spot size to be calculated. The highest temperature peak was observed by WMAP against the full sky and the angle the spot subtended was 0.598 degrees or 0.0105 radians. (there are pi radians per 180 degrees) From this, it is straightforward to calculate the radius of the universe at the present time. Radius universe now=3.843e24/(.0105*2*pi)=7.4e25 meters.

Note that the author's re-analysis deviates slightly from the WMAP derived values because the author did not trust the rather confusing situation concerning critical density. (If one uses actual densities rather than fractions of 9.5e-27 kg/m^3, both approaches are the same….equality occurs at about one half the density of exp(180) protons of mass 1.675e-27.)

The proposal evaluation will consider interpretations of the WMAP data and show possible relationships leading to the number of clusters, galaxies and stars.

WMAP data analysis using the proposed expansion model

Equality=1, Decoupling=.5 and h=2.302e-18 are the matches required.								0.772	
				129.541		t=alpha*G		6.30E+13	"Universe"
				Expanded	R1			R3	R1+R3
		G	G^(4/3)	radius per	Time^2/3	Time (sec)	Time (years	Time^(5/3)	
				particle (m)	meters			meters	meters
on	1	1	1	**1.0192E-14**	1.1640E+12	9.580E-04	3.038E-11	1.04E-09	1.1640E+12
46 years)	28	1.44626E+12	1.636E+16	**1.3035E-06**	1.4886E+20	1.386E+09	4.394E+01	1.93E+11	1.4886E+20
1.028E+00	35.93	4.01977E+15	6.391E+20	**2.5768E-04**	2.9427E+22	3.851E+12	1.221E+05	1.06E+17	2.9427E+22
5.0422E-01	37.5	1.93216E+16	5.185E+21	**7.3391E-04**	8.3813E+22	1.851E+13	5.870E+05	1.45E+18	8.3814E+22
2.3016E-18	h	4.279E+20	3.225E+27	**5.7880E-01**	6.6099E+25	4.09968E+17	1.300E+10	2.53E+25	9.1408E+25
2.301E-18	h wmap	4.283E+20	3.228E+27	**5.7909E-01**	6.6133E+25	4.10283E+17	1.301E+10	2.53E+25	9.1474E+25
balance	46.977	2.52262E+20	1.594E+27	**4.0692E-01**	4.6471E+25	2.417E+17	7.663E+09	1.05E+25	5.6960E+25
	48.03563472	7.271E+20	6.539E+27	**8.2417E-01**	9.4121E+25	6.966E+17	2.209E+10	6.12E+25	1.5536E+26

Anisotropy in the cosmic microwave background

Expansion history (as a ratio) is directly related to temperature history as a ratio, but since the current temperature is known (2.725 K) the decoupling condition (3000K) directly measures the size of the universe once the decoupling radius is known. This is because the expansion ratio is the temperature ratio (3008/2.725=1128.3). (It is assumed and logical that the radiation measured expanded without distortion from decoupling until now).

"Universe"		1.675E-27				
R1+R3	Temperatu	Mass	Radiation	Saha		
		density	density			
meters	T=Rnow/R*2.725					
1.1640E+12		3.776E+14				
1.4886E+20	1.673E+06	1.8054E-10	3.67E-08			
2.9427E+22	8464.5	2.3370E-17	2.40E-17	2.6464E-15	3106.2308	3108.48543
8.3814E+22	2971.9	1.0115E-18	3.65E-19	5.0422E-01	1090.6018	1090.60181
9.1408E+25	2.7	7.7977E-28	2.58E-31		9.47439E-27	0.0823
9.1474E+25	2.7	7.7807E-28	2.57E-31		2.3686E-27	0.3292
5.6960E+25	4.4	3.2226E-27	1.71E-30		**stops expanding**	
1.5536E+26	1.6	1.5883E-28	3.09E-32			

Spot size (anisotropy in the CMB) is a measurement of decoupling radius, once the spot mechanism is known. Literature indicates that accumulation was nil before equality of radiation and matter. Also according to the literature, an acoustic wave developed at equality, was amplified and traveled at a velocity of 3e8/3^.5=1.73e8 meters/second. The acoustic mass that accumulated caused light released from the higher density spot to be red shifted. The red shift measured by WMAP was on the order of 75 micro-degrees for the dominate part of the wave. The size of the spots measured by WMAP was 0.601 degrees (0.011 radians). This measurement, in combination with a good measurement of Hubble's constant and the current background temperature, is used to infer other parameters. The table above shows progression of the acoustic wave in meters. At decoupling the spot radius is 3.3e21 meters (6.63e21 meters diameter listed below. This diameter can be used to infer the size of the universe at decoupling and the size of the universe now.

Taking values from the above table:						
Equality		3.851E+12	seconds			
Decoupling		1.851E+13	seconds			
Radius at decoupling		8.381E+22	meters			
Wave travel time (delta		1.466E+13	seconds			
Radius of spot R=V*delta		2.537E+21	meters	This radius roughly corresponds to the radius of		
Radius of spot*Rnow/Rs		2.767E+24	meters		The calculated spot expan	
angle of spot radians		0.00964	spot now/(pi*Radius)		0.55212436	
Radius of Universe Now		9.141E+25	meters	pi in this relationship converts distance along a		
Now (at matching H0)		2.302E-18	13000000000	Age of universe in billions of years.		
measured hubble (H0)						

The above values can be compared with WMAP reported results below:

	1.06E+69	WMAP Reported and derived values				
	5.794E+17	3196	z equality			
	1.405E+09	1090	z decoupling			
	2.426E-09	302.4	acoustic scale			
	0.2609228	14.116	da angular size dia gigapc			
	1.4684E+00	1.384E+23	radius at decoupling meters=14.116*3.08e19/pi			
1.821E+13		146.6	sound horizon mpc (3.08e19 meters/megaparsec)			
13855.608	118	4.515E+21	sound horizon (spot size) meters=146.6*3.08e19			
1.018E+26		4.922E+24	Wmap spot size now=1090*4.5e21			
		0.0104	spot size in radians=4.5e21/(1.38e23*pi())			
1.017E+26		0.012504289	analysis from simple 1			
		7.542E+25	Universe radius now=4.9e24/.0104/(2*pi())			
		2.301E-18	Hubble's constant =71/3.08e19			
		13.75	Age of Universe Billion years			
		4.34773E+23	4.5378E+21			
		4.73902E+26	4.9462E+24			
		7.54239E+25				

The author believes that the current proposal is consistent with the WMAP analysis. Both analyses use a density equivalent to the proton mass/2 for equality. This suggests that half of the exp(180) particles in the universe are dark and the other half are normal proton/neutrons. The "dark" particles could be the same mass as a neutron that does not decay and has zero "cross-section" for absorption.

Mass accumulation

It is clear from WMAP that amplification of light matter acoustic waves is the primary mechanism. However, once density develops conventional gravitational accumulation continues. The approach below should be considered estimates since it is very difficult to calculate processes that are probabilistic.

Partitioning the volume into clusters

Accumulation of mass obeys conventional kinematics and Newton's law as bodies fall into each others gravitational fields. The final state appears to consist of clusters, galaxies, stars and planets interacting gravitationally in a way that a new semi-stable state is achieved. That state is ideally nested "orbits" in which forces are balanced. Overall movement in the resulting orbital state is neither overall expansion nor contraction. The numbers of spots in the WMAP analysis were probably the seeds of clusters. If the spots represents spheres of early accumulation, the number of spots is (Runiv/Rspot)^.333 and equal to 16624. WMAP results suggest that the dense (cool) spots observed are associated with clusters in the era of decoupling. The size of the spot (0.011 radians) gives a value of (1/(pi*.011)^3=1.6e4 clusters.

How many clusters are there according to observation? Measurement of temperature perturbations was carried out by WMAP (reference 14). The signal is on the order of a few micro-degrees. From the standpoint of this work, one important observation is that on average the angular size diameter of spots are about 0.6 degrees. If we associate the spots with clusters, the number and mass of the clusters can be estimated. This work gives the total mass of 2.47e51 kg. Filling the 5.4e25 meter radius with 0.6 degree spots gives 2.5e4 clusters of 9e46 kg/cluster. The calculated ratio substantially agrees with this WMAP data interpretation.

This would place the mass of clusters in the right range. (e46 kg).

Number of Stars

At decoupling wave speed drops dramatically as the plasma clears. The Jeans length falls to 1.2e17 meters. The cluster size (the dark cold spot size of 4.9e21 meters) is divided into disturbances on the order of the slow jeans length. This ratio (5.7e13) times the dark portion ratio (1.53e4) gives the stars/cluster (5.72e13) since the stellar masses develop where the dark portion lies.

						Mass (kg)					
Universe mass						2.495E+51	1.67e-27 kg*exp(180)				
Taking values from table		R1+R2	9.425E+22								
Number of clusters/universe			22161		((6.3e22)/2.6e21)^3	1.126E+47	mass of average "light matter" cluster				
		spot	3.355E+21								
		spot*2	6.7108E+21	meters							
Number of galaxys/cluster			3.0E+06		((5.1e21)/3.7e19)^3	3.79E+40	galaxy mass	6.237E+40	avg mass of galaxy from count data		
	Jeans lo spee	1.334E+18	4.668E+19	meters		4.00E+10	numb galaxys	data http://universe-review.ca/F05-galaxy.htm			
	Jeans hi spee	5.00E+22							mass--kg	dn/d log m	
			4.668E+19	meters					2E+29	5.0000E-02	
stars/galaxy			1.18E+11		((3.7e19)/6.3e15)^3	3.221E+29	star mass	~~compare data~~	3.17E+29	0.2	References
	Jeans fractior	1.334E+18	9.527E+15			7.746E+21			5.024E+29	0.29	maximum probabilit
	http://en.wikipedia.org/wiki/Jeans_instability				stars/universe=clusters/universe*galaxys/cluster*stars/galax				7.962E+29	0.25	

The mass distribution of stars (reference 15) is well estimated by their life cycle data and once again the approach above gives about the right average.

mass--kg	dn/d log m
2E+29	0.05
3.1698E+29	0.2
5.0238E+29	0.29
7.9621E+29	0.25
1.2619E+30	0.13
2E+30	0.065
3.1698E+30	0.006
5.0238E+30	0.001

The author evaluated what the developing cluster above might look like from a temperature standpoint. After decoupling dense pre-clusters red shift escaping radiation. This red shift is measured by WMAP as cool spots on the order of 70 micro-degrees Kelvin. These estimates are for the cluster mass and spot size determined in the tables above.

spot size			3.355E+21	meters				
cluster mass			1.126E+47	kg				
1+1/(1-(2*0.00000000006675*spot/(cluster mass*300000000^2)))^0.5-1						1.03E+00	1.05E+00	
(2.925-2.925/(1+(1.02-1)/2000))*1000000						37.81	78.70	micro degrees K
						WMAP Data:	Maximum peak 70 micro degrees K	
						References	Bennett	

As indicated by photography, galaxies and stars are still in the process of development. Mass accumulation at the star level is from material that has been recycled and concentrated from earlier generations. Spiral galaxies are apparently good concentrators and star development is not only cyclical but very incomplete at the present time as evidenced again by photography. Star counts and surveys of matter indicate that only a small fraction is visible. As individual atoms fall toward the central body, most of the material will form orbits. Over time in relatively small accumulations enough kinetic energy is lost to allow “solid” stars to form and “light up” with nuclear fusion.

Detailed energy balance for expansion

The detailed energy balance/particle at different times in the expansion is shown below. Note that the overall energy balance is zero for each time during expansion, even though expansion kinetic energy has been converted to potential energy and kinetic energy inside the atom has been converted to external kinetic energy (temperature) due to fusion. Note also that the original neutron decays to a proton without any external release of energy. The reason is that neutrinos are produced that do not appreciably interact with matter. Note further that the original proton mass table shows that the electron quad produces 27.2e-6 mev of kinetic energy that just balances the -27.2e-6 field. As the electron falls into the field, 13.6e-6 mev will be released as light/heat. Likewise as mass accumulation occurs, some gravitational potential energy will be reconverted to kinetic energy. It is observed that a particle falling into the gravitational potential eventually creates lateral kinetic energy that allows an orbit to be established. In this process, the fall positions the orbiting body at one half of its original height if its energy is conserved. It is clear that expansion kinetic energy is not reversed. Entries in the table could be changed slightly to reflect exactly where the kinetic energy is but the total of gravitational and kinetic gravitational will not change as a result of gravitational accumulation.

ENERGY BALANCE PER PARTICLE AS EXPANSION OCCURS

simple cell bk9		Fusion	Fusion		Gravitational	Gravitational	Electron ke			
begin	Atoms/Strong	ke	Heat	e/m	Kinetic Energy	Potential E	Heat	neutrinos		
	131.4566								131.4566	mass
0.000	797.9575	10.15127013	0		**20.303**	**0.00**		2.02E-05	828.4113	ke
-2.683	-957.1848								-959.8679	pot
									-1.4263E-08	total
after decay to P & fusion to helium				e/m	1.07E+03					
(released as K	129.5409						0.5110		130.0519	mass
	798.5799	8.521270135	1.63	2.720E-05	**10.15**	**10.15**	0.1114	0.6709	829.8160	ke
-2.6831	-957.1848								-959.8679	pot
					Grav Kinetic E	Grav Pot E	CMB	neutrinos	-2.9969E-06	total
Now	8.28E+25									
	129.5409						0.5110		130.0519	mass
	798.5799	8.351270135	1.8	2.720E-05	**0.00**	**20.30**	0.1114	0.6709	829.8160	ke
-2.6831	-957.1848								-959.8679	pot
									-2.9969E-06	total
Near end	9.41E+25									
	129.5409						0.5110		130.0519	mass
	798.5799	8.351270135	1.8	2.720E-05	**0.00**	**20.30**	0.1114	0.6709	829.8160	ke
-2.6831	-957.1848								-959.8679	pot
									-2.0394E-05	total

Formation of Helium

There appears to be wide acceptance that formation of deuterium/helium occurs in the first few minutes. The initial work is largely credited to Andrei Sakharov. Current literature cites measurements indicating that 25% of primordial matter consists of Helium 4. This element occurs as deuterium is produced and fuses to helium. Plasma exists until the temperature drops enough to allow electrons to form orbits around protons. Radiation pressure prevents gravitational accumulation until radiation is attenuated by expansion. Eventually gravitational forces become dominant and accumulation of mass into clusters, galaxies and clusters begins. The concentration process later allows stars to “light up” with fusion when they become dense and hot. This is known in the literature as re-ionization. Stars burn up their hydrogen and follow a well documented aging cycle that depends on the kinetics of progressive fusion reactions. Literature cites measurements regarding the abundance of the heavy elements that are produced by these reactions.

A detailed analysis of this period of expansion is contained in reference 16 and the information contained below summarizes an alternative. It is likely that the accepted work is complete but the author can’t find the initial energy to support such a high temperature at “time zero”. The high initial temperature in the standard model also suggests a period of “free quarks” and unknown physics that is discomforting.

Initial radius

In the quantum model, "inflation" may be the process of duplication of one neutron by exp (180) times (reference 1). It is proposed that "time zero" is when a gravitational radius of 1.02e-14 meters from the R table is duplicated and fills a sphere of radius 1.02e-14*exp(60)=1.16e12 meters.

Initial temperature of the compressed state

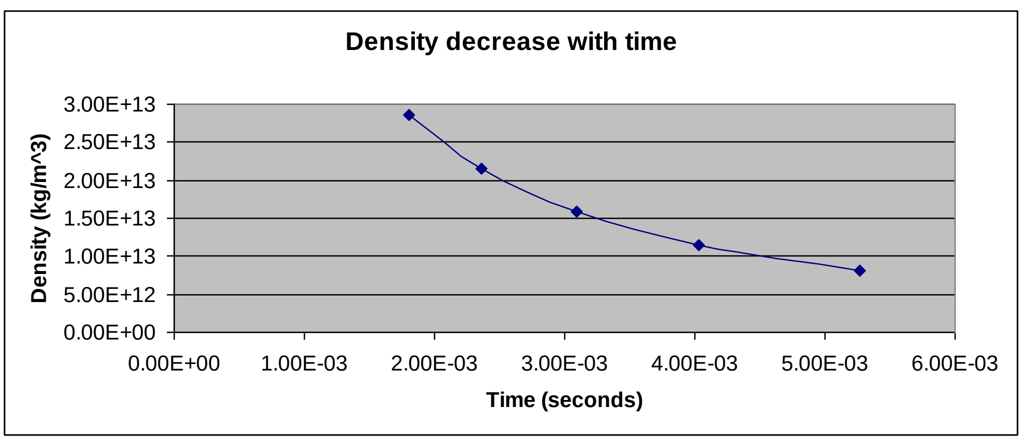
At time zero, no fusion has occurred and the neutron mass table shows a small release related to the neutrino quad and nothing else. There appears to be no other significant energy release that might raise the initial temperature since neutrinos escape without adding energy to their surroundings. Neutrons start decaying at this point and as electrons are formed they each carry an initial kinetic energy of 0.1114 mev.

The proton (mass=938.27 mev) receives energy from the electron (m=.511 mev) and energy is shared between the electron and proton. The kinetic energy they experience can be translated to a temperature with the following equation:

E0*r/r		simple ai308
27.2e-6*(5.29e-11/1.2e-14)		
0.120	mev	
T=.11/1.38e-13/938.3)		
8.50E+08	degrees K	

The neutron decay process has a mean decay time of 855 seconds (0.5 at 855 on the plot below).

The initial density is defined by 1.67e-27 kg divided by the volume associated with the gravitational radius of 1.2e-14 meters (2.3e14 kg/m^3). Expansion changes the volume according to the expansion model as shown in the following plot:



Early work by Andrei Sakharov suggested that high initial temperatures would fuse elements from primordial nucleons and "freeze" their abundances at the observed levels during expansion and cooling. Current literature cites measurements indicating that 25% of primordial matter consists of Helium. Fusion of neutrons, protons and electrons occurs as the temperature achieves a kinetic energy of 0.1114 mev (about 5e8K). The difference between the neutron and proton mass in mev is 1.293 and the fraction reacted would be about 0.23 based on a very simplified Boltzmann type equilibrium.

Fraction decay approximately = exp(-.1114/1.293)/4=0.23

Cosmic background radiation source

Cosmologists estimate the temperature history by using the measured cosmic background radiation temperature of 2.725K and the expansion ratio, z. The relationship is (T=2.725*(z-1)). The following equation gives the same temperature history:

(0.841*(Z+1)^2*EXP(180)/(4*PI()*Radius^2)/0.004718)^0.25

example			
radius	1.59E+19		
z (expansion ra	6.60E+06		
Temp K	1.794E+07		
4.718E-03	stephan boltzmann constant		
	time (seconds)		
binding energy release from primordial heliur	7.07 * helium/t		1.63
energy released based on elemental abundance measured			0.23
			1.80E+00

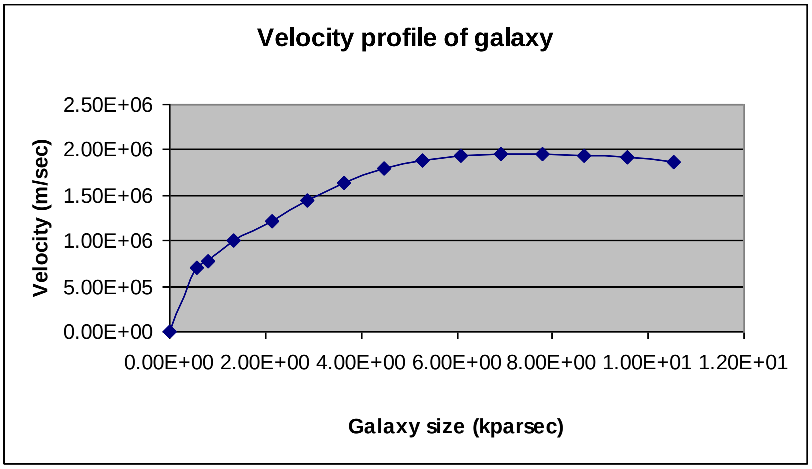
The energy value 0.841 mev gives the temperature history during expansion, but where does the value originate?

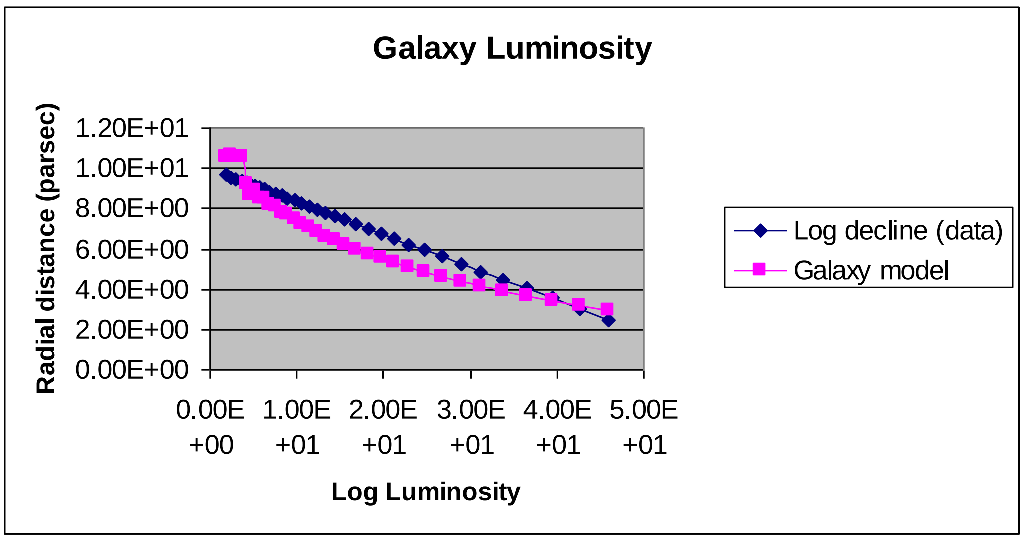
Approximate energy release from helium fusion =0.23*7.0 mev/nucleon=1.62 mev

Careful measurements have been made of the elemental abundance at the present time. The fusion energy that created the elemental abundance was 1.8 mev but helium fusion energy (1.62 mev above) accounts for most of the total energy. Based on the above table, about half of the energy release is now the cosmic background radiation and the remainder of the energy may be stored in the kinetic energy of orbital motions plus other miscellaneous places (it takes only a velocity of 0.04C to store 0.84 mev/particle but the temperature related internal energy of stars stores only about .004 mev/particle).

Galaxy velocity and luminosity profiles

An early clue that dark matter indeed exists lies in the observation of the velocity and luminosity across the diameter of observable galaxies. If a significant amount of dark matter forms a "halo" around observable light matter, the flat velocity profiles and the decreasing light density (mev/m^2) emanating from the edge of the galaxy can be rationalized. Galaxy mass accumulation studies were carried out for a 50% light/50% dark ratio. The galaxy estimated above has significant amounts of dark matter in their outer regions. It seems reasonable that the dark and light particles have no preferred position initially among the exp(180) identical particles but that dark matter particles tend to accumulate outside gravitationally bound objects because they move readily through other particles and have no way of losing kinetic energy. This flattens the velocity profiles as shown in the graph below. Again, these are estimates only.





Summary

Information that describes nature in a concise way appears to reside inside the neutron and proton mass model. The R equation "displays" this information on several scales that underlie nature's four forces and its cosmology. The big bang could be an expression of this information. An expansion model was offered that predicts conditions consistent with observations to date, but obviously more work can be done. Enough energy to support current observations regarding the size and age of the universe is also associated with the model. Overall, the proposals in this document indicate that nature may be somewhat understandable. In particular, the proposal has the following to offer in the field of cosmology:

- Baryon mass is closer to one half of the mass of the universe, not 0.044 of critical density as current thought.
- No dark energy is required to expand the universe.
- A possible mechanism for inflation is offered.
- A proposal for dark matter is offered.
- WMAP results appear to be consistent with the proposal.
- The proposed R1+R3 model is consistent with conservation of energy and offers a plausible explanation for the energy of expansion.
- Estimates for the number of clusters, galaxies and stars are given from the WMAP and R1+R3 model.
- The expansion equations are straightforward and consistent with the author's overall theme.

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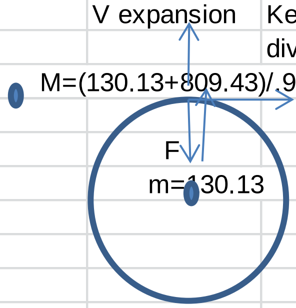
Appendix Why critical density from H^2=8/3 pi G rhoc is incorrect

Derivation of Critical Density				
ke			pe	
1/2mv^2			FR	F=GmM/R^2
1/2mv^2			GmM/R^2*R* (R/R)	
			GmM*R^2/R^3	
1/2v^2			GmMR^2/R^3)/m	
			GMR^2/R^3)	
			GMR^2/R^3)* (4/3)/(4/3)* (pi/pi)	
			4/3*pi*GR^2*(M/(4/3*pi R^3))	
1/2 v^2			4/3 pi G rho* R^2	
v^2			8/3 pi G rho* R^2	
		define rhoc as density when KE=PE		
		rhoc=rho*(Rc^3/R^3)		
v/R=H			(8/3 pi G rhoc)^.5	

The first line of the derivation for the 8/3 pi G rhoc equation is ke=pe. Since expansion is well characterized by WMAP (and agrees with the author's calculated expansion), one can simply calculate ke and pe as a function of time and determine if ke is in fact turned into pe. With the number of particles known, a calculation can be carried out for the expansion inside each cell containing two particles. That calculation is shown below based on the following diagram:

		Pe=F dR	
	V expansion	Ke=0.5MV^2/2	
		divide by 2 only M has V	
M=(130.13+809.43)/.927=939.56/0.927			



	F	M to lift	g
Ff=E/R/exp(90	2	939.56	0.927
Fg=GM/g*M/R	1	939.56	0.927
Fi=M/g*V^2/R	1	939.56	0.927

Comparison of calculated kinetic energy of expansion with potential energy using cellular approach (the table only shows the first two time increments but the final PE is for 13.7 billion years):

		M	129.54087	129.54087	129.5408687	129.5408687	129.5408687	129.5408687
		M (kg)	2.3093E-28	2.3093E-28	2.3093E-28	2.3093E-28	2.3093E-28	2.3093E-28
		Field	2.6831448	2.6831448	2.683144792	2.683144792	2.683144792	2.683144792
		Ke	10.1513			10.151	9.961	7.031
		R	1.019E-14			9.020E-15	9.192E-15	1.302E-14
		Ff=E/R/exp(90)		2		7.8105E-38	7.6644E-38	5.4096E-38
		Fg=Gm(M/g)/R^2		1		2.478E-36	2.383E-36	1.162E-36
		Fi=M/g*V^2/R		1		2.0637E-36	1.9885E-36	1.0008E-36
		Time (sec)					0.000958	0.001616
					V	1.122E+08	1.113E+08	9.50E+07
2.74E-37	KE with m (mev)					7.185E-12	7.18E-12	5.83E-12
1.37E-37	ke half				FINAL PE (MEV)		2.74E-37	1.80E-37
1.036	Pef/ke (mev)	Pe=Pe+dPE=Pe+Ff dR		Ff=E/R	1.42E-37	0	8.31E-41	1.62E-39
0.979	Peg/ke(mev)	Pe=Pe+dPE=Pe+Fg dR		Fg=GmM/R	1.34E-37	0	2.61E-39	4.24E-38
0.862	Pei/ke (mev)	Pe=Pe+dPE=Pe+Fi dR		Fi=MVI/R	1.18E-37	0	2.18E-39	3.59E-38

The kinetic energy per particle is only 2.74e-37 mev but only half the particles have kinetic energy since half the particles occupy the center of the cell that does not expand. This makes the kinetic energy driving expansion 1.37e-37. The calculations for potential energy compare three alternate forces. The force labeled Ff is the field force where E is 2.68 mev but the particles attract each other and F=2E/R. Fg is the gravitational force GmM/R^2 and Fi is the inertial force Fi=MV^2/R where V is the lateral velocity V/C=.37 that decreases with increasing R. The correct answer to the question what resists expansion appears to be the field force. For this force, the ratio of kinetic energy to pe is 1.036. This shows that there is no missing mass. From these calculations, we can see the errors in the derivation for critical density. Since there is mass in the center of the cell, only half of the particles have kinetic energy. Also, again, because there is mass in the center of the cell, the resisting force is F=2*E/R. These two error mean that the WMAP derived value of 0.27=mass found/mass expected must be multiplied by 4.

However, cells are attracted to each other with the force 3.46e-38 newton and convert kinetic energy into potential energy as they separate from each other during expansion.

Field force=E/((R)*EXP(90))*1.602e-13		3.4560E-38	newtons

Calculation for potential energy used is PE=3.4e-38*(Rf-Ri)/1.3e-19 mev. This calculation yields pe=20 mev. This energy is set aside for expansion in the original energy balance.

Dark Energy

The values of v^2 (where v is the velocity of cell expansion) and the value 8/3piGrho can also be compared, where rho=1.67e-17/(4/3*pi*r^3). Note that this analysis shows that v^2 is too high and the ratio 0.1, indicates that there is excessive dark energy.

Now	
2.745E-36	v^2
0.108	(8/3piGrho)/v^2
2.964E-37	8/3piGrho*R^2

Using the correction factor 4x, the corrected ratio (8/3piGrho)/v^2 is 0.44. (The value 0.044 was reference by WMAP as the baryonic mass over total energy. However, the above calculation for kinetic energy and the potential energy developed by resisting field force indicates that the ratio is 1. Again, the critical density calculation appears to be incorrect (still working on the 0.44).

It is concluded that there is no "missing mass" in the universe. The kinetic energy matches potential energy almost exactly. In addition, there does not appear to be excessive "dark energy".

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Appendix 2

We learn from the study of meson and baryon decay (reference 5) that time is measured by revolution around an R equation radius at the speed determined by a kinetic energy. The time to revolve around the circumference associated with the R equation for gravity (1.02e-14 meters) at 0.373C is the basis for time for the expansion proposal above.

Identify the fundamental unit of time for expansion is the gravitational orbit described above/(time around radius)=1.017e-1						
	Fundamental time=1.017e-14*2*PI()/(0.373*3e8)					
	Fundamental time	5.70762E-22	seconds			

It is of interest to find the beginning and end of time (alpha and omega). Omega radius can be defined as the time at which 20.3 mev/particle of kinetic energy is depleted.

The end of the expansion phase occurs when its initial kinetic energy (20.3 mev) is depleted.									
	This time is identified as fundamental time*exp(90). Define this time as omega.								
	Omega time =5.7e-22*exp(90)				6.9656E+17	seconds	2.21E+10	years	
	At omega time, the 20.3 mev of kinetic energy set aside in Cosmology operation 1 has turned into potential energy by								
	a resisting force of 3.472e-38 newtons.						Force	3.462E-38	Newtons
	The radius of the universe at this point is				R=Energy/Force		Energy	20.30	mev
			Gravity		R (meters)=20.3/3.472e-38*1.6e-13			9.395E+25	meters
Back calculate for G at a radius of 9.369e25 meters using the equation						R=(hc/(2pi)/(E*m/G^(4/3))^0.5)*exp(60)			
	G=((2.683*130.054)/(1/(9.395e25/exp(60)/i152))^2)^(3/4)								
	6.873E+20	G					2.6831E+00	130.052	
	1.014E-03	alpha= omega/G		seconds					

The above value of alpha is slightly low according to the section below entitled "WMAP analysis using the proposed model" where alpha is .001187 seconds. The Omega time above was based on a bold assumption that all of the available 20.3 mev would be available and used completely. Alpha time is just the time for light to travel across R time exp(45).

basis for t0		
R	1.0192E-14	meters
V=C		
time=R/C*exp(45)	0.001187	seconds

Appendix 3

QM Probability

For other uses of the R equation g is a ratio less than one measuring the dilation of time with increased velocity. For expansion G is allowed to increase above 1 representing many cycles around the radius 1.02e-14 meters. When this radius is used for the calculation of the quantum mechanical "action", it gives the probability 1 as shown in the following calculation:

					Gravity	Gravity
					Proton	exp(90) range
V/C					0.1466	0.1466
original mass					130.052	130.052
"boson mass" back calculated to give action= 1 with v/c =					1.945E+01	1.589E-38
mass to give P=1 with c=1			g=1/exp(2)=		0.989	0.989
			m/g		131.4732752	131.4732752
			x		1.0146E-14	1.2382E+25
time at C			t		3.3842E-23	3.3842E-23
time at V/C			t above		2.3077E-22	2.3077E-22
use above time to give 1.			m/c^2x^2/t		6.5249E-22	6.5249E-22
QM probability (action)			mx^2/t/h		0.9913	0.9913

The author believes that expansion using this R equation represents the quantum mechanics of gravitation. The QM probability is approximately 1 in the right column when exp(180) is placed in the denominator.

Appendix 4

It is proposed that gravitational mass accumulation can be estimated by a simple equation called the touch down equation. The derivation below gives the average acceleration (a) of a single atom's mass (m) toward a central mass M as a function of the time (t) it takes to move the particle from its virgin or initially expanded position into an orbit (and later if enough energy is lost) to contact (touch down upon) the central body.

Touch down equation

F=GMm/R^2
a=GM/R^2

L=at^2/2=1/2*GM/R^2*(t)^2
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

The above equation is used in an incremental calculation. The acceleration equation is used to find the radius of a sphere of incoming material (R=at^2/2). This forms a volume that sweeps up virgin density. This volume multiplied by density gives the mass increment of the growing central body. This calculation also shows velocity of the particles moving inward to an "eventual" orbital position of about 0.5 its initial radius. In using the equation one should be aware that it predicts an eventual condition since there may not be enough time in any given calculation increment to reach steady state. The equation works because it shows the long range influence that starts to separate mass into different areas. Since radius is squared in Newton's law, once separation occurs the initial gravitational influence is dominant.