Analysis of 5 galaxies with flat rotation curves

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Flat galaxy rotation curves are unexpected observations. Differences between expectations and observations allow us to learn. Most cosmologists today attribute the difference between observed flat and calculated declining Newtonian velocity curves to dark matter despite decades of failed efforts to identify it.

This paper examines data for five galaxies. Physics for flat galaxy velocity curves is proposed that preserves Newtonian gravitation and explains the flat velocity profiles. The proposal shows that a known quantum effect that physicists call spin actually scales to the galactic scale. The calculation procedure is straightforward and matches data. Data for planets in our solar system is discussed. Dark matter is not required in this approach.

Background

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 is an unstable universe and gravitational laws are not 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. Furthermore, the proton has initial kinetic energy 10.15 MeV and orbits central gravitational field energy 2.801 MeV with radius 7.045e-14 meters. These specific values allow the gravitational constant to be calculated. As kinetic energy decreases and potential energy increases each cell expands. Kinetic energy inside each of exp(180) cells is related to pressure acting outward on the surface. This expands the universe. 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].

Cellular Cosmology

Cells are defined by equating a large surface area with many small surface areas. This allows cellular cosmology to obey 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). The mass substitution is M=m*exp(180) and the surface area substitution is R=r*exp(90) for G large space= G cellular space.

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

The extremely small value 1/exp(90) 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.

The source of space and time

The neutron mass model is the source of space, time and the gravitational field energy -2.801 MeV. The radius of a quantum circle with this field energy is:

Identify the radius and time for the gravitational orbit described above			
Fundamental radius=1.93e-13/(2.801*2.801)^.5=7.045e-14 meters			
Fundamental time=7.045e-14*2*PI()/(3e8)=h/E=4.13e-21/2.801			
Fundamental time	**1.476E-21**	**seconds**	

Above, 1.92e-13 MeV-meters is hC, where h is Planck's reduced constant (6.58e-22 MeV-sec). The quantum radius 7.045e-14 meters and time 1.476e-21 seconds are fundamental to space and time. These never change. Coupled with these values kinetic energy (10.15 MeV/proton) from the Proton model is used in the calculations below that determine the gravitational constant.

Calculating the gravitational constant G

The column below determines the gravitational constant [6][7][11] based on the cell above containing one neutron with kinetic energy 10.15 MeV. 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 [10]. 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/(2pl)/(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.

Alternate and equivalent defining relationship for G

The defining relationship 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) that comes 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) as described in Appendix 3 and exp(180) protons [6][10].

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)

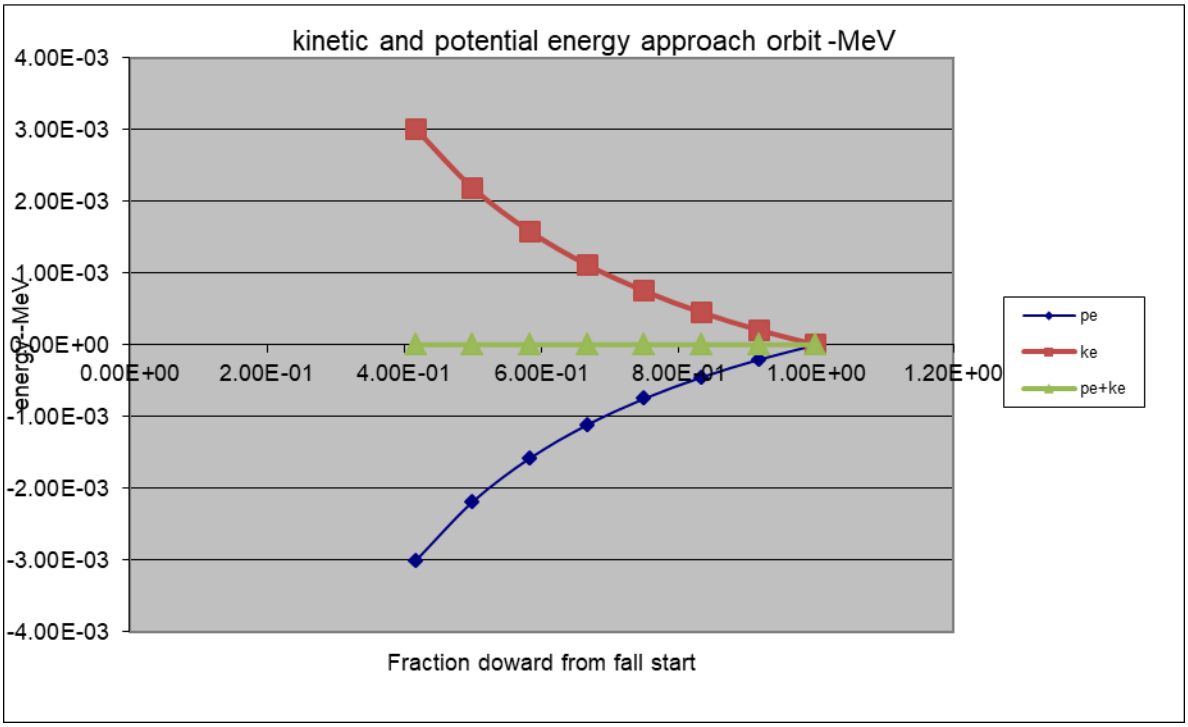
G=6.69e-11 Nt m^2/kg^2

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.

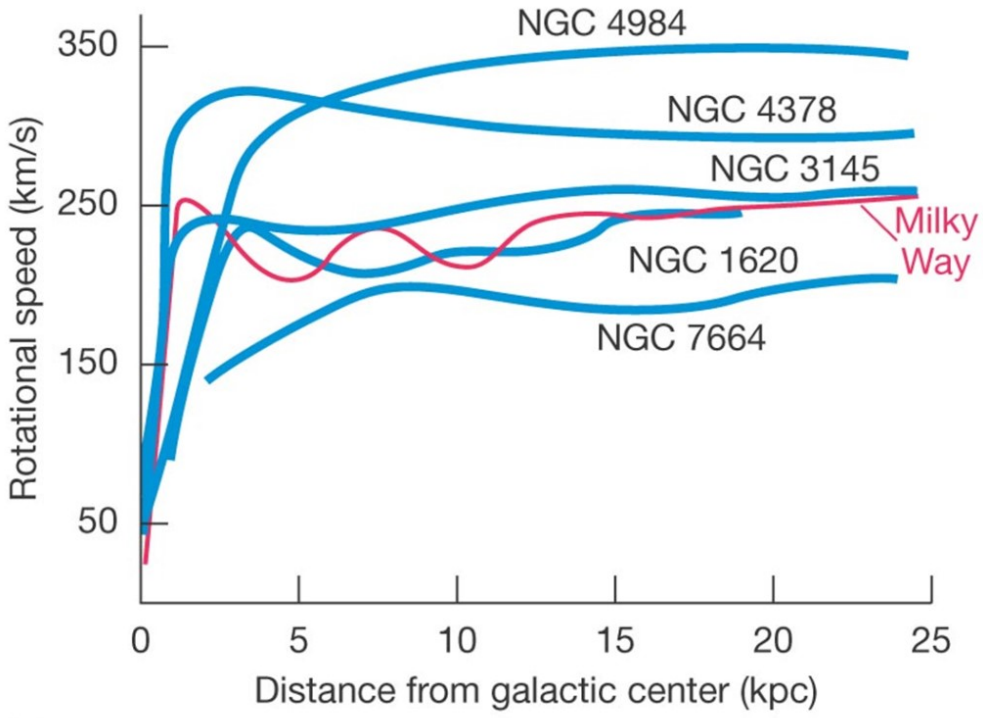
Flat Velocity Curves for Galaxies

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.



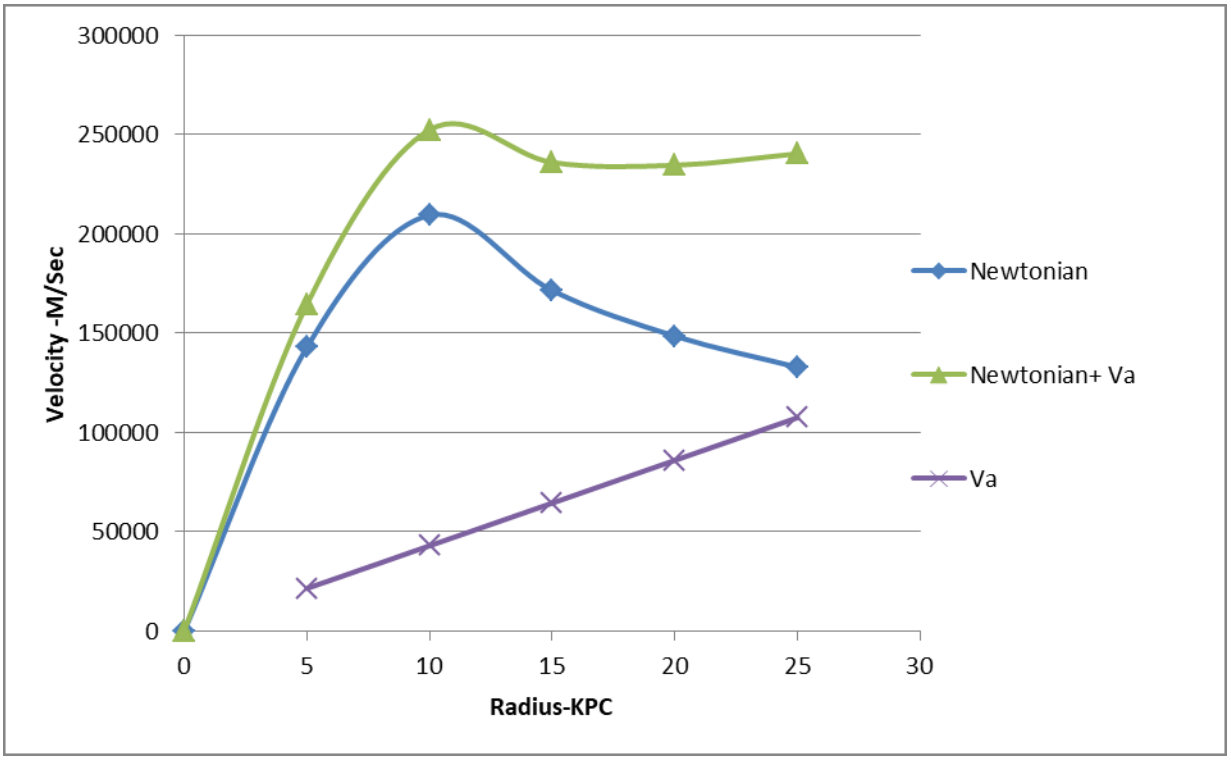
All of the followinng galaxy profiles (search Wiki for velocity curves) are nearly flat:



(b)

Calculating Flat Velocity Curves

The 240 km/sec velocity curve above is simulated below with an angular velocity value we call Omega. Omega is the reason the velocity curve is flat and will be explained.



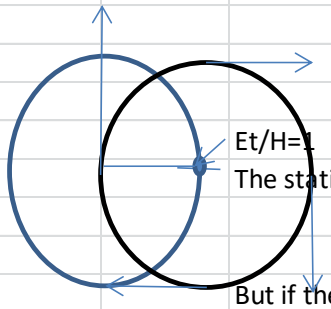
The example below is for a galaxy with mass 2e41 Kg. Measurements of observed radius and observed luminosity are available (Wiki but astronomers have published data). The luminosity falls off rapidly with observed radius indicating that there is not much mass toward the outside (luminosity is proportional 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 a way of simulating a flat velocity curve without assuming dark matter. The line labelled Vn is the normal Newtonian velocity that falls off with radius. Below that line, a line labelled Va= Omega*R. This velocity increases with radius. The final line in the table above is the sum of Vn and Va. The value Omega is explained below. The sum of declining Vn and increasing Va produce a flat galaxy rotation curve matching measurements. After explaining the procedure for calculating Omega, data from five galaxy velocity curves will be compared to calculations.

Omega is a quantum property related to spin

Cells have quantum properties related to collapse of the wave equation (Appendix 1). The property is called spin at the quantum level. The diagram below is for the gravitational field 2.801 MeV and as pointed out earlier, is the source of space and time. The circle on the right is spin around the central proton mass.



Et/H=1

The stationary collapse point Et/H=1 is the particle

But if the particle is stationary, where is the spin?

t = 2pi*r/V =2*pi*7.045e-14/3e8=1.48e-21 sec is the time

Angular velocity 1/t is the spin

For Gravity E=2.801

Planck's constant 4.14e-21=Et 4.14E-21 mev-sec

t=4.14e-21/2.8= 1.48e-21 sec

E*t/H=1 for the quantum mechanical collapse point (see Appendix 1). The value H is Planck's constant. The particle according to conventional quantum mechanics has the property spin.

Equivalent cells that 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 r= 7.045e-14 meters allows further development of cellular cosmology gravitational relationships (small m below=1.67e-27 Kg).

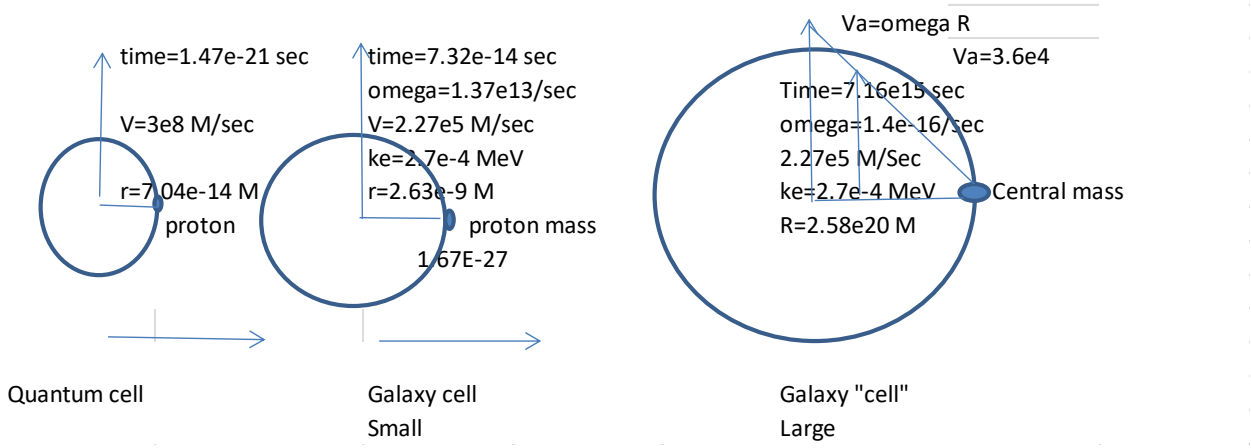
G remains constant during expansion			
ke0=10.15 MeV/neutron			
r0*V^2/m=r*v^2/m			
(mv/mV)^2= (r/r0)			
ke/ke0= (r/r0)			
r=r0*10.15/ke			

Using relationships from cellular cosmology, the orbital radius of a central mass can be calculated.

Orbital R for galaxy= GM/V^2 where M is the central mass			
substitute G=r0 v^2/m*(1/exp(90))			
R= r v^2/m*(1/exp(90))*M/V^2			
v^2/V^2=1 (cell v and large V equal)			
m/M=m/(m*number of cells in galaxy)			
R= r*(1/exp(90))*M/m			
multiply top and bottom by exp(180)			
R=r*exp(90)*M/(m*exp(180))			
m*exp(180)=Muniverse			
R=r*exp(90)*(Mgalaxy/Muniverse)			
r=r0*10.15/ke=7.04e-14*10.15/ke			
R=7.04e-14*10.15/ke*exp(90)*(Mgalaxy/Muniverse)			
R=r0*10.15/ke*(Mgalaxy/1.67e-27)*(1/exp(90))			
R=7.04e-14*10.15/2.74e-4*(2e41/1.67e-27)*(1/exp(90))			

The new relationship 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 quantum scale r=r0*10.15/ke is the cell radius as the universe expands. Maintaining G equivalence between the large scale and cellular scale requires multiplying small scale values by (Mgalaxy/1.67e-27)*(1/exp(90)). A cell is the proton and its gravitational space but it can be quite large. 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.

The cell enlarges (circle below in the middle) from the diagram above as expansion occurs but retains the quantum property of particle spin that we call angular velocity (Omega) at the sub quantum level. The cell further enlarges as shown in the rightmost diagram. The cell 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 it also retains the angular velocity property of the particles in the mass. With omega =1.39e-16, the flat velocity profile matches measurements.



The velocity arrows rotate around mass on the circumference of a circle.

Calculation procedure for Omega

The calculation on the left below defines gravitational space for the cells of the galaxy. As expansion occurs, the kinetic energy is converted from kinetic energy to potential energy. The cell enlarges but becomes somewhat smaller as the mass falls into a developing galaxy and potential energy is converted back into kinetic energy. The definition of cells requires equal velocities between the galaxy cells and the galaxy velocity itself. The circle on the right is the gravitational equivalent at a higher mass scale.

	Quantum cell		Galaxy cell Small		Galaxy "cell" Large	
Mass (Kg)	1.67E-27		1.67E-27		2.00E+41	
Ke=0.5*mV^2/1.6e-13 (MeV)	10.15		2.70E-04			
r=7.04e-14*10.15/ke (m)	7.05E-14		2.65E-09			
V (m/sec)	4.41E+07		2.27E+05		2.27E+05	
Rgalaxy (m)					2.58E+20	
Omega cell=1/(2*pi()*r)/V (1/sec)	9.97E+19		1.36E+13			
Mass scale=M/1.67e-27/exp(90)					9.81E+28	
Omega galaxy=omega cell/Mass scale					1.39E-16	

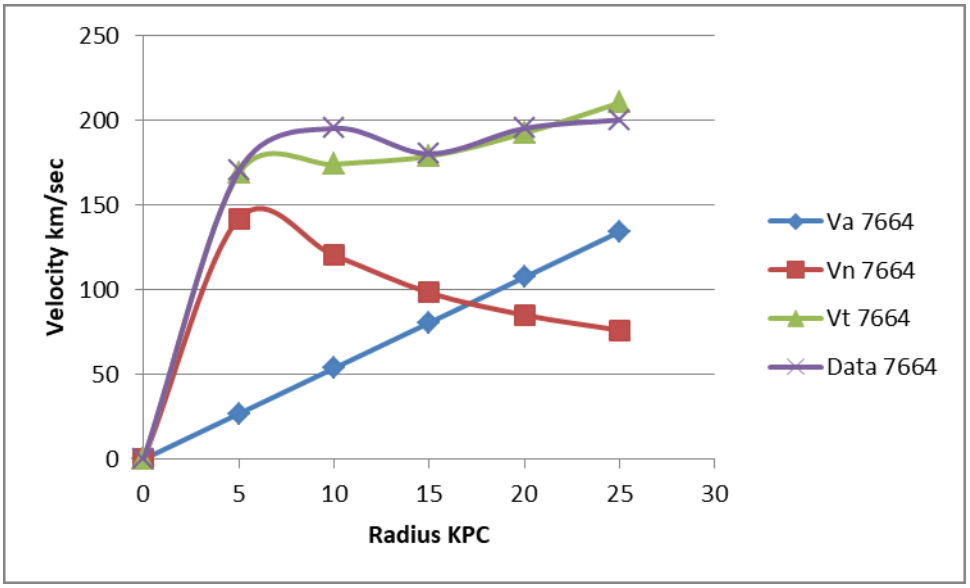
The table above shows the important value Omega highlighted in red. The cell's Omega is scaled to large radius (angular velocity decreases dramatically). In the calculation table above Omega galaxy 1.36e13*(Mgalaxy/1.67e-27)*(1/exp(90))= 1.39e-16 (the value in red above). The diagram on the right is for the central mass of the galaxy. Angular velocity Omega is around the central mass. Angular velocity looks like a distant merry-go-round but within its reference fram protons move at Vn determined by Newtonian gravity. 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

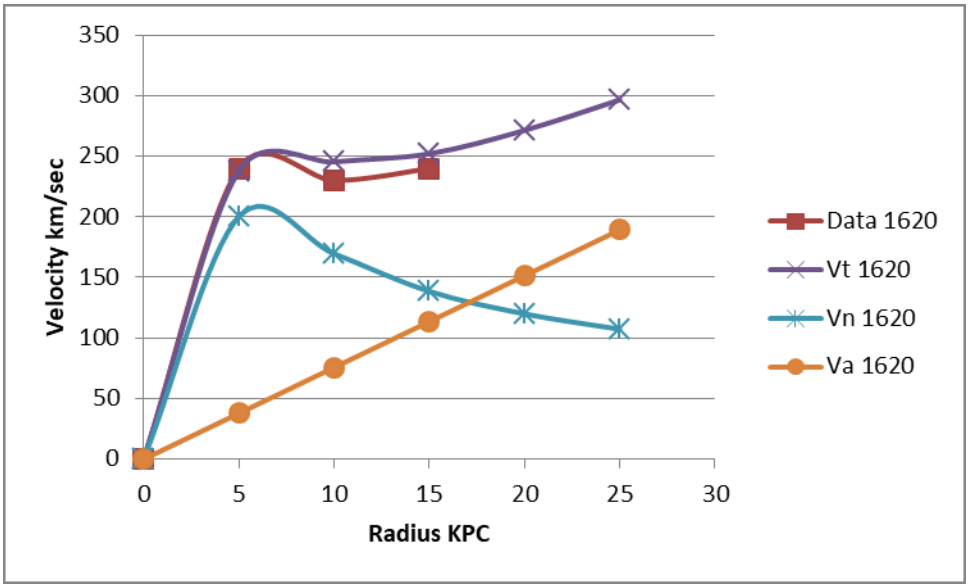
= Va (line labelled Va above). Added its newtonian velocity (Vn) at various points across the galaxy to the velocity we see (Va) determines the galaxy velocity profile.

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

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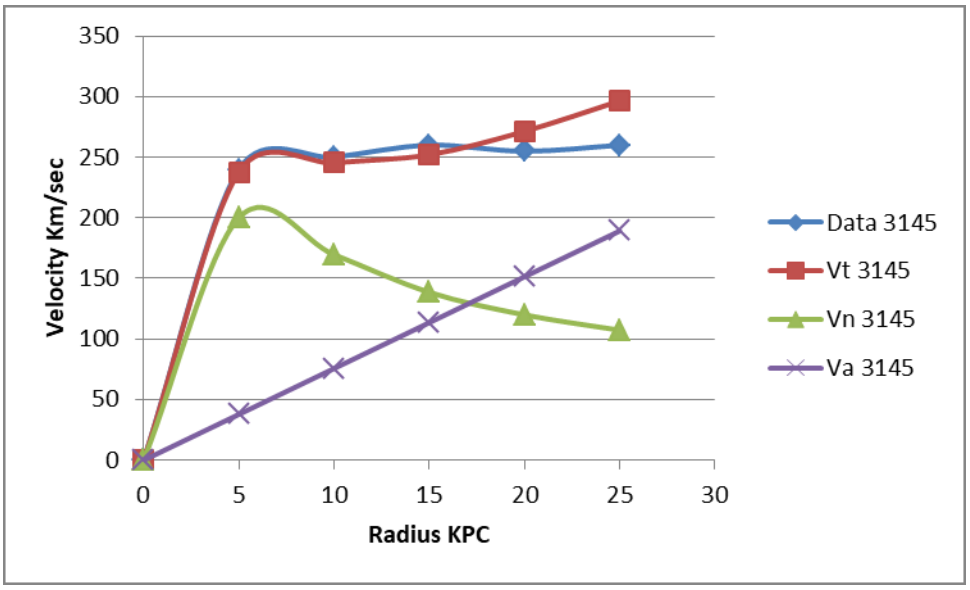
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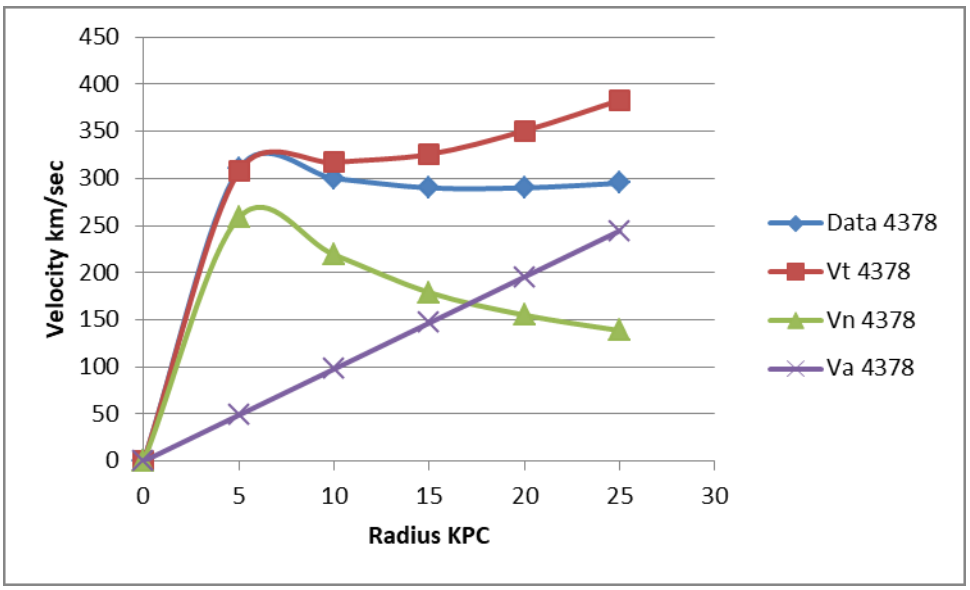
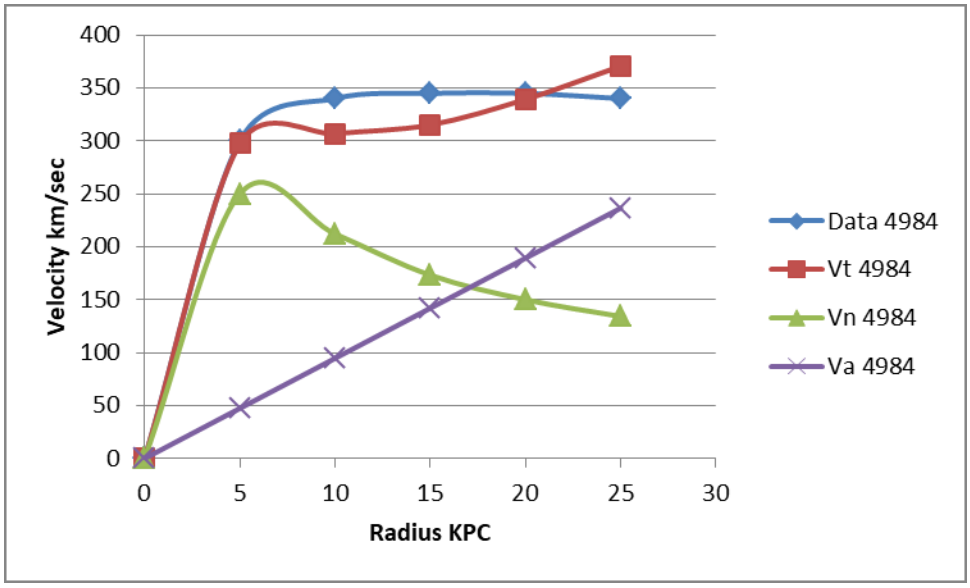




What about our solar system?

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.

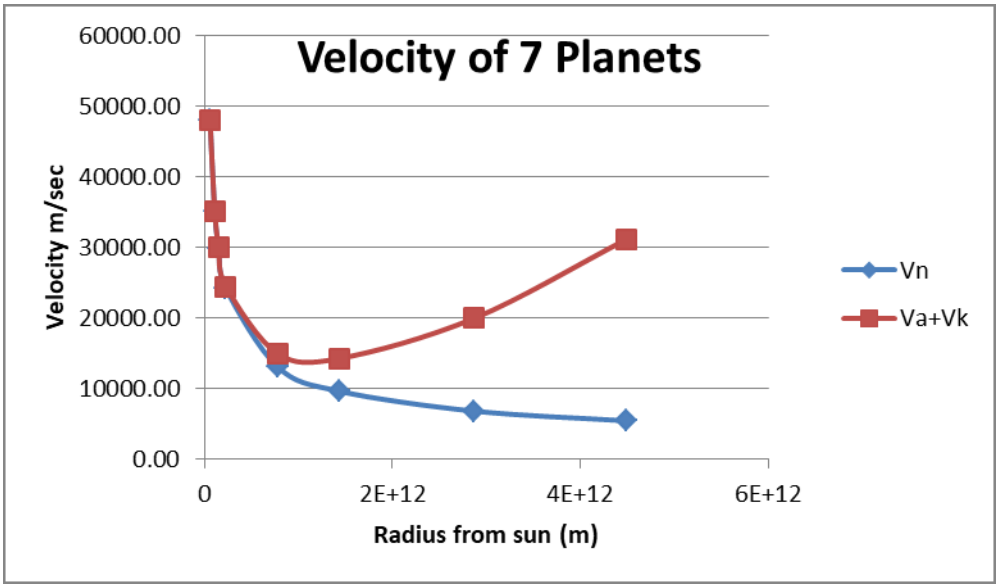
There are two cases:

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 have most of their mass about 5 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. The data and calculations are presented below.

Planetary Fact Sheet - Metric

	MERCURY	VENUS	EARTH	MARS	JUPITER	SATURN	URANUS	NEPTUNE	PLUTO	MOON
Mass (1024kg)	0.33	4.87	5.97	0.642	1898	568	86.8	102	0.0146	0.073
Diameter (km)	4879	12,104	12,756	6792	142,984	120,536	51,118	49,528	2370	3475
Density (kg/m3)	5427	5243	5514	3933	1326	687	1271	1638	2095	3340
Gravity (m/s2)	3.7	8.9	9.8	3.7	23.1	9	8.7	11	0.7	1.6
Escape Velocity (km/s)	4.3	10.4	11.2	5	59.5	35.5	21.3	23.5	1.3	2.4
Rotation Period (hours)	1407.6	-5832.5	23.9	24.6	9.9	10.7	-17.2	16.1	-153.3	655.7
Length of Day (hours)	4222.6	2802	24	24.7	9.9	10.7	17.2	16.1	153.3	708.7
Distance from Sun (106 km)	57.9	108.2	149.6	227.9	778.6	1433.5	2872.5	4495.1	5906.4	0.384*
Perihelion (106 km)	46	107.5	147.1	206.6	740.5	1352.6	2741.3	4444.5	4436.8	0.363*
Aphelion (106 km)	69.8	108.9	152.1	249.2	816.6	1514.5	3003.6	4545.7	7375.9	0.406*
Orbital Period (days)	88	224.7	365.2	687	4331	10,747	30,589	59,800	90,560	27.3
Orbital Velocity (km/s)	47.4	35	29.8	24.1	13.1	9.7	6.8	5.4	4.7	1
Orbital Inclination (degrees)	7	3.4	0	1.9	1.3	2.5	0.8	1.8	17.2	5.1
Orbital Eccentricity	0.205	0.007	0.017	0.094	0.049	0.057	0.046	0.011	0.244	0.055
Obliquity to Orbit (degrees)	0.034	177.4	23.4	25.2	3.1	26.7	97.8	28.3	122.5	6.7
Mean Temperature (C)	167	464	15	-65	-110	-140	-195	-200	-225	-20
Surface Pressure (bars)	0	92	1	0.01	Unknown *	Unknown *	Unknown *	Unknown*	0.00001	0
Number of Moons	0	0	1	2	79	62	27	14	5	0
Ring System?	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Global Magnetic Field?	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Unknown	No

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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

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 around the center more than observed. The proposal above explains flat velocity curves without inferring dark matter.

Problem 2; What is the Cosmic Web?

Observations of light bending show streaks between stringy galaxy clusters. This is also attributed to dark matter. In cellular cosmology, a proton is on the surface of each cell. As mass accumulates cells change their size according to the kinetic energy regained from falling from the expansion determined radius. Potential energy + kinetic energy=10.15 MeV.

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

The gas between the stars is treated with thermodynamics. The protons/atoms are still associated with a cell but the relationship P=rho R T where rho=m/volume means that the volume of the gas “cells” no

longer follow the relationship r=r0*10.15/ke. The cell radius in the space between large objects can be as large as 0.3 meters in the fully expanded gas down to 1e-6 meters. For cells in solid objects like planets are about 5e-11 meters in size since the electrons repel each other and limit further contraction. Yet further contraction occurs in black holes. Galaxies and the gas within are gravitationally bound and can't enlarge with time. Space continues to expand elsewhere. One can simulate this situation by placing a piece of cloth on a surface and gathering (pinching together) the cloth in spots. Ridges are formed between the pinch points indicating the distribution of mass.

Problem resolution; What is the cosmic web?

The general theory of relativity gives the deformation of space by mass but according to work above, mass has angular velocity associated with it that may bend space and affect light transmission. Curved space deflects light. This might be imaged as the cosmic web.

Conclusions

Space-time is defined by the gravitation field energy 2.8 MeV

There is a Schrodinger based energy=0, probability=1 construct (Appendix 1) associated with orbits. At the quantum level a sine wave varying with time is represented by a circle with one imaginary axis and one distance axis. The Schrodinger equation is based on quantum theory and leads to a model of the Neutron. The information we need about gravity is provided by the Neutron model, cellular cosmology and the number of initial neutrons determined by probability considerations (1=exp(180)/(exp(90)*exp(90)). Cellular cosmology provides a bridge between small and large scales (M=m*exp(180) and R=r*exp(90)).

The Neutron model gravitational field energy 2.8 MeV is a quantum value and its circle defines space and time. Time is measured around the fundamental cell circumference (cycle time= 2*pi*7.045e-14/C=1.2e-21 seconds). Time counts forward by repeating this cycle. 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 according to r0= hC/2.73=7.045e-14 meters. This is a function of (time/time')^(2/3).

Special relativity value gamma (g)= (mass+ke)/mass. When performing orbital calculations, the orbital mass is mass/gamma (a result of special relativity). Gamma is related to Schwarzschild dt=1/gamma-1. Time is slowed slightly and in this regard space-time is a proper concept. The special relativity effect gamma 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).

Real orbits like those of orbiting stars follow curves because the protons and their gravitational space called cells are curved regardless of the number of protons. Cells have the unexpected property angular velocity.

Flat galaxy velocity curves are correct and match revised expectations

This document examines the possibility that galaxies have angular velocity related to particle spin at the fundamental level. A procedure is presented that allows calculations that match the measured velocity curves for five galaxies. This proposal takes the place of inferring dark matter within galaxies. It is proposed that the fundamentals apply to all orbits. Data for our solar system was used to further

understand how to apply the fundamentals. Our reference frame appears to have a small angular velocity. If it did not, we would measure higher velocities for the outer planets.

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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 [9]. 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.

Components of P=1

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.

Creation was a zero energy, probability one separation event

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 [9] 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 call it consciousness. Zero energy and probability 1 appear to be initial conditions [12]. 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 Proton model and cellular cosmology.**

Appendix 2 The Proton model

Neutron components

The author found N values for neutron components based on the way three quark masses and their kinetic energies add to the neutron mass. The related information components total N=90 for the neutron. They are listed in Table 1 below.

	Neutron particle and kinetic energy N			Neutron field energy N			
Quad 1	**15.43**	quark 1		**17.43**	strong field 1		
	12.43	kinetic energy		**10.43**	gravitational field component		
Quad 2	**13.43**	quark 2		**15.43**	strong field 2		
	12.43	kinetic energy		**10.43**	gravitational field component		
Quad 3	**13.43**	quark 3		**15.43**	strong field 3		
	12.43	kinetic energy		**10.43**	gravitational field component		
Quad 4	**10.41**			**-10.33**			
	-10.33			**10.41**	gravitational field component		
Quad 4'	**10.33**	pre-electron		**10.33**			
	0.00			**0.00**			
	90.00	Total		**90.00**	Total		
	Table 1			Table 2			

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.

Number of neutrons in nature

There have been several missions (COBE, WMAP [1][2][4], HSST, and PLANCK [8]) and earlier work [1][5] that yield a great deal of information about the universe. Measurements and models allow astronomers, astrophysicists and cosmologists to estimate the number of neutrons in the universe [1][5]. The measurements agree with exp(180) quoted above [11].

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 [9] 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 [13] indicated that 129.5 MeV transitions to 9.34 MeV + kinetic energy. The quark masses agree with Particle Data Group (PDG) [10] data, one with 4.36 and two with 2.49 MeV (multiples of 0.622 MeV from Quad 5).

						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							-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							
	10.41	0.67	10.41	0.67				0.671	t neut ke		-0.67
Quad 5	10.33	0.62	10.33	0.62		0.62				-0.62	
	0.00	0.00	0.00	0.00							
	90.00	sum	90.00	sum	129.54	799.87	939.5654133	**0.671**	20.30	-957.81	-2.73
							NEUTRON MASS		Total m+ke	Total fields	
									Total positi	Total negative	
									960.54	-960.54	
									MeV	MeV	

The neutron energy 939.5654 MeV is constant and agrees with the PDG [10] data within many significant digits.

The proton model is a manifestation of the laws of nature.

Previously I thought it was static. The core of the cosmology model [11] is repeated below but time and potential energy are added.

Potential energy + kinetic energy (MeV)	20.30	20.30	20.30	20.31
Potential energy (MeV)=.5FdR/1.6e-13	10.43	12.16	13.59	14.77
r0=7.22e-14*9.872/ke	7.22E-14	8.76E-14	1.06E-13	1.29E-13
ke=9.87*(time/time')^0.5	9.872	8.14E+00	6.71E+00	5.54E+00
g=938.27/(938.27+ke)	**9.8959E-01**	**9.9140E-01**	**9.9289E-01**	**9.9413E-01**
V=(1-(g)^2)^0.5*C	**4.3148E+07**	**3.9238E+07**	**3.5674E+07**	**3.2427E+07**
fgrav=(1.673E-27*V^2/(r0*EXP(90))	3.5702E-38	2.4305E-38	1.6543E-38	1.1259E-38
time (seconds)	5.29E-02	7.77E-02	1.14E-01	1.68E-01
G=fgrav*r^2/(m/g)^2	6.503E-11	6.533E-11	6.558E-11	6.578E-11

Time is around the gravitational orbit R=hC/2.8. Fundamental time=1.67e-21 seconds. As time counts forward, kinetic energy decreases by ke'=ke*(time/time')^(2/3).

This provides the startling insight: The information in green above is inside every proton [13]. The gravitational orbit has counted time cycles from the big bang and we experience this as increasing time. 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 2.73K. 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 [12]!