

# EPR, dual slit and “back from the future” observations

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## Abstract

Observations regarding unexpected connections in quantum mechanically entangled systems are revealing a new understanding of our position in the universe. Experiments known by the initials EPR (Einstein, Podolsky and Rosen) show a statistical correlation between separated particle properties. If two particles are produced with opposite spins and move in different directions, it is observed that changes induced in one particle cause immediate changes in its partner. The classic “dual slit experiment” demonstrates that quantum photons can either produce a spot pattern or an interference pattern depending on whether an observer can “measure” which of two slits the photon travels through. More recently, a Discovery Magazine article by Zeeva Merali (Aug 26, 2010) indicates that an entangled particle responds to future changes in its partner (called “back from the future” observations by Jack Sarfatti of Cornell University). The author discusses the implications of taking this data at face value. Three FQXi contest essays [5][6][9] lead up to what I believe to be the explanation for EPR results and back from the future observations.

## Background

Perhaps we need to rethink our basic assumptions regarding reality [6]. There is developing literature regarding information being a real building block of nature. Could the reality we observe be information based? This document explores the relationship between our mind and a possible preexisting information component. The formal definition of information is attributed to Claude Shannon [15]. Information (N) = negative natural logarithm of probability (P) or  $N = -\ln P$ .

The author documented a relationship between information and energy [1]. The relationship is simply that probability P is related to an energy ratio  $P = e^{0/E}$  and information (N) =  $-\ln P$ . Logarithmic numbers labelled N are shown to anchor fundamental energy values and underlie the mass of the neutron, proton and electron [1]. A summary is enclosed in the appendix but the following “information code” was a result of correlating fundamental energy data [1]. The information below appears to have existed at the big bang and is important to cosmology [3]. There are four sets of N values that total 90. After an interaction involving the logarithm 2 within each set, the value 90 represents the mass of the neutron which contains components that underlie the forces of nature [7].

Fundamental	
N values	
↓	
15.432	set1
12.432	
13.432	set2
12.432	
13.432	set3
12.432	
0.075	set4
10.333	
90	

If the particles of nature are information, what else could be information? What is coming into the mind? My work on the basis of perception examines [5] how our senses work and what our mind does with sensory input.

## Absorption

Absorption of light is fundamental for an electron and our brain is built from molecules containing electrons. The equation of interest for light perception is a wave function ( $\Psi$ ) for a system that has an internal freedom that varies back and forth between two frequency ( $f$ ) values.

$$\Psi = \mu E_0 / h (1 - \exp i (f - f_0) T / (f - f_0))$$

The solution to this quantum mechanical equation is found in the Feynman Lectures on Physics, Volume III page 9-13 [11]. I divide the basic equation for probability  $P$  by  $P_{f_0}$  to form a ratio normalized to make the response equal to one at the peak frequency. This equation will be called the absorption equation since it can relate an incoming frequency  $f$  to a peak frequency labeled  $f_0$ .

$$P_f / P_{f_0} = \sin^2((f - f_0) T / 2) / ((f - f_0) T / 2)^2$$

Where  $f$ =frequency,  $T$ =time,  $D$ =distance and  $WL$ =wavelength.

The absorption equation can also be written in terms of distance ( $D$ ), instead of time ( $T$ ).  $CT=D$  in the work that follows, where  $C$  is the speed of light and  $f$  is frequency. This is feasible since  $f \cdot T = f \cdot D / C = D / \lambda$  are both dimensionless. The same equation in terms of  $D$  follows with  $(f - f_0) T / 2 = (1/\lambda - 1/\lambda_0) D / 2 = (1/\lambda - 1/\lambda_0) D / C$

$$P_f / P_{f_0} = (\sin((1/\lambda - 1/\lambda_0) D / C))^2 / ((1/\lambda - 1/\lambda_0) D / C)^2$$

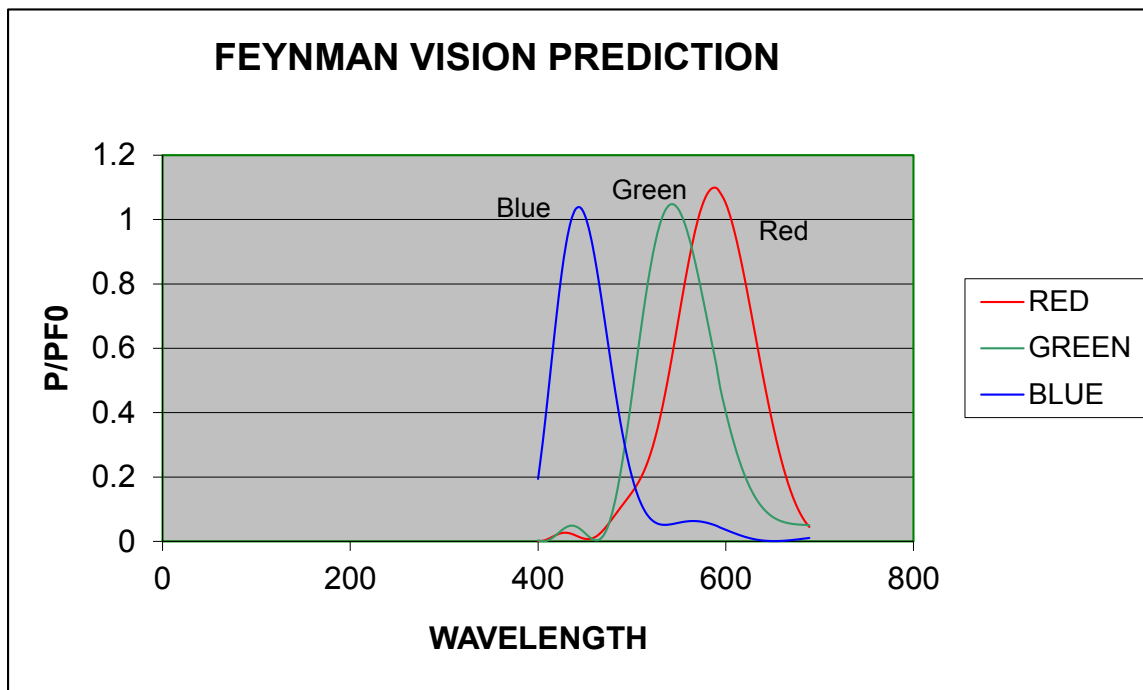
Where:  $D_0 = 1 / (1/d\lambda - 1/\lambda_0)$  gives the width of the response curve.

Where:  $\lambda_0$  = Peak wavelength standard i.e. 594 nanometers

Where:  $d\lambda$  = delta wavelength = response wavelength shift i.e. 55 nanometers

Example  $D_0 = 1e-9 / (1/55 - 1/594) = 5.2e-6$  meters

As different wavelengths ( $\lambda$ ) come into the eye, the difference between the entering wavelength and peak wavelength  $\lambda_0$ , gives a  $1/d$  variable  $(1/\lambda - 1/\lambda_0)$  before the peak occurs. This is multiplied by a constant ( $D$ ), which gives a dimensionless number. As frequency increases, the quantity  $(1/\lambda - 1/\lambda_0)$  becomes zero for an instant and probability builds to one. Just below and above after  $\lambda_0$ , the absorption equation gives the response of the eye to that color.  $D = 1 / (1/d\lambda - 1/\lambda_0)$  gives the width of the response curve. The eye's response to light has been carefully measured and the result corresponds to this equation for absorption of light when  $d\lambda$ ,  $\lambda_0$  and  $D$  are properly included. The graph below plots the Feynman equation  $P_f/P_{f0}$  for the three color peaks 595, 538 and 442 nanometers. The associated width series was 61, 51 and 42 respectively for red, green and blue responses. Using the  $(1/\lambda - 1/\lambda_0) * D^2$  equation above with the following inputs gives us a fundamental model.  $P_f/P_{f0}$  peaks at one through the  $\sin^2$  function.



Color vision is related to the electromagnetic field energy and the information code uses  $N = 3 * 0.0986$  to represent the electromagnetic field  $E = 2.02e-5 * \exp(3 * 0.0986) = 27.2e-6$  MeV. The value  $N = 0.0986 = \ln(3/e) = \ln(3) - 1$  separates colors in the table below.

Series			9.733E-06		Dwavelength	Wavelength		
	multiples of	2.025e-5*EXP(N)			hC/E0	hC/DE		
	0.0986							
Electron	0*0.0986	E0		DE=E1-E0				
Electron	1*0.0986	E1						
Series	Energy (Mev)		D Energy	width (nm)	peak (nm)	D0 (m)		
	-0.19722	1.66E-05	-2	(mev)	4.1e-21*3e8/2.02e-5*1e9	1e-9/(1/(652-61.2)-1/652)		
	-0.09861	1.83E-05	-1		4.1e-21*3e8/1.9e-6*1e9			
Natural	0.00000	2.02E-05	0	1.90E-06	61.23	652.05	6.29E-06	
Natural	0.09861	2.23E-05	1	2.10E-06	55.48	590.82	5.70E-06	
Natural	0.19722	2.47E-05	2	2.32E-06	50.27	535.34	5.17E-06	
Natural	0.29584	2.72E-05	3	2.56E-06	45.55	485.07	4.68E-06	
Natural	0.39445	3.00E-05	4	2.82E-06	41.27	439.52	4.24E-06	
Electron	-0.10454	1.82E-05			nm	nm		
Electron	-0.00593	2.01E-05		1.8901E-06	61.60	655.93	6.33E-06	
Electron	0.09268	2.22E-05		2.06E-06	55.81	594.33	5.73E-06 Red	
Electron	0.19129	2.45E-05		2.302E-06	50.57	538.52	5.20E-06 Green	
Electron	0.28991	2.71E-05		2.5408E-06	45.82	487.95	4.71E-06 Scotopic	
Electron	0.38852	2.99E-05		2.8041E-06	41.52	442.13	4.27E-06 Blue	
	-0.00593	2.01E-05		1.9589E-07				
N	Binding Ener	Quantum no	Quantum no	Delta Energy				
		2	3					
0.29583687	1.3609E-05	3.40E-06	1.5121E-06	1.8901E-06				

The wavelengths the eye sees as red, green and blue are separated by  $N=0.0986$ . The rods in our eyes have a response curve between the blue and green peaks, known as the scotopic response and it is included above. Work within the last few years has shown that rhodopsin has isomers that absorb light in at least two colors related to amino acid variations. Overall, the dye (or dyes) absorbs throughout the approximate range 400 to 700 nanometers. The width of eye's sensitivity to a particular color is specified in another way by  $N=0.0986$ . It specifies the shift in wavelength from the standard energy ( $1.89e-6$  MeV) to the other wavelengths by the series  $1,2,3,4 \times 0.0986$ . The explanation for light being multi-frequency sensitivities to different wavelengths based on  $N=0.0986$  is surprising and new. An energy of 1.89 electron volts is the delta energy standard, but why can the frequency series be represented by information?

Whatever the absorption mechanics are, signals are known to go into the brain where a great deal of processing takes place. How our mind interprets these signals as color vision is interesting.

## Information associated with perception of light

How does the eye/brain assemble and decode information? Can nature use electronic bonds to link probabilities and specify relationships? In the spirit of information theory we need to decipher what  $N$  is for colors. This is similar to reference 1 where neutron/proton components were associated with a specific set of  $N$  values.

The Rosetta stone aided in decoding Egyptian hieroglyphics because the same message was written in two languages. The following table is similar to the Rosetta stone because it links two things 1) what our brain perceives and 2) the probabilities that allow the absorption equation to specify wavelength. We can

calculate the peak wavelength from the absorption equation, but why should the peak wavelength shift according to a number representing information? We can read probabilities and colors from the table labeled “Rosetta Stone for DNA”. The answer is that  $N=0.0986$  represents a probability ( $1/\exp(.0986)=.906$ ) and this probability “codes” for red. The association between probabilities and colors is summarized below. The wavelength is the base wavelength  $652*0.906=590$  nanometers for red.

Rosetta Stone For DNA									
0.0986123					Perceived meaning				
20.247155 (E0/E)			wavelength						
4.136E-21			$E0/E \cdot ch/dE$		Meaning	Blue	Scotopic	Green	Red
	base								
n	$P=1/\exp(n \cdot 0.0986)$				Code	0.674	0.744	0.821	0.906
1	0.906	652.05121	590.827		R				
2	0.821	652.05121	535.351		G				
3	0.744	652.05121	485.085		S				
4	0.674	652.05121	439.538		B				
						Blue	Scotopic	Green	Red
						Overall response is white light			

The above table tells us that perception of blue is a probability.  $P = e0/E=0.674$  and the other colors are also probabilities. Our mind interprets the probability with the equation: Information (N) = - ln P, in the case of blue,  $N= 4*0.0986$ . Our other senses are also electronic and may also be based on absorbing different frequencies in a structure that use the Feynman equation to produce probabilities and information.

### Information Structures

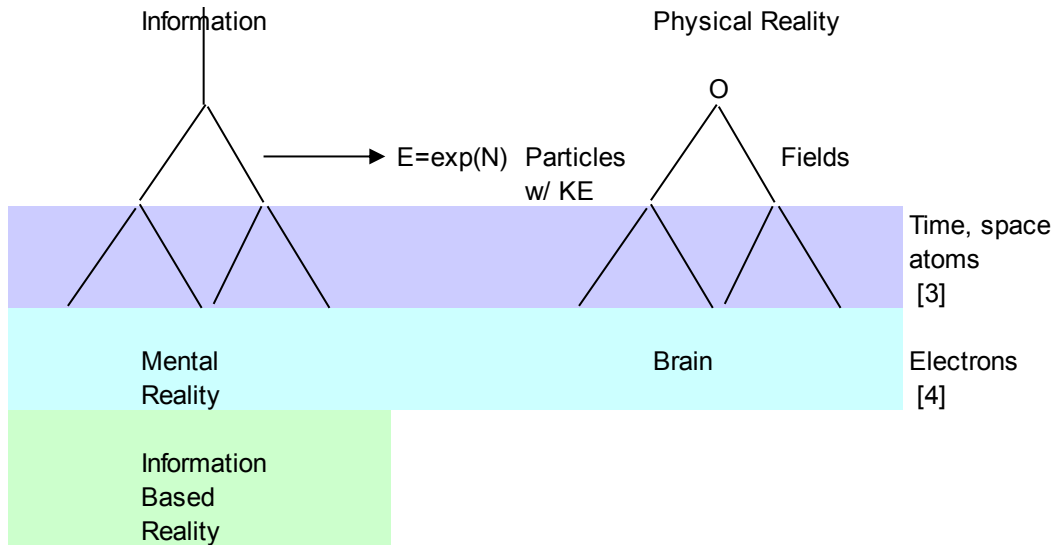
Since language is information, an analogy can be drawn between information structures found in nature and language. Language is based on symbols that we learn to form into concepts and eventually complex meanings. One important aspect of information is it can be taken as parts or as a whole. Small defined units can be added together (integrated) into larger and larger structures. The analogy below proposes a relationship between language, information and observed physical reality. The concepts DNA words and DNA sentences represent molecules held in place by electrons. Their meaning is coded but are read and expressed as specific functions that support life.

Analogy between language, information structure and physical reality

Language	Information Structure	Physical Reality
Concept of symbols	Information operations	Laws of Nature Time, Space
Alphabet	N for particles Proton mass model [3]	Particles Atoms
Words Sentences	DNA Words DNA Sentences	Electrons, Molecules Senses, Brain
Paragraphs	Genome	Body
Life Experiences History	Mental Reality  Information Based Reality	

Our vantage point is from within a mind that is part of an information structure. Perhaps the reality we observe is mental activity related to a giant information source. One definition of intelligence is seeing differences and we appear to have mental freedom to use information and expand reality. This is enhanced by language and memory that increases our ability to see differences and think about complex issues. Our evolving mental reality suggests that our mind participates in an overall information based reality. When we create new thoughts from old ones, we are advancing our reality.

Is it possible that information operates on a different level than our brains and bodies? It appears that information based laws predated our physical reality. The diagram below shows a relationship between two sides of reality but suggests that they are separate. The physical reality we observe (right side of diagram) began as information (left side of diagram). Information we access and information we develop evolves into the mind. The left side of the diagram is a giant information source partially internalized and made more complex by our mental activity. As a whole, the left side can be called Information Based Reality. The impressions it creates are associated with physical reality.



## Integration

When information is integrated it represents the product of its components. A computer program works because instructions written in a standard language can be processed by a machine into an output. Lego® blocks make things because they fit together. Integration of the body information structures makes a complete human not just the components. This is similar to language telling a story; i.e. we focus on the story not the components. We see alphabetic symbols but automatically read them as words. There are repetitive patterns throughout nature that suggest many levels of information structure and integration. Higher level DNA structures integrate sense components into the body. Our senses evolve with our body and extend basic information to mental structure. As the brain evolves, freedom for each individual to be different emerges because the information is not “hardwired”. The brain can process information and does not have to exactly follow a set of instructions. Complex living beings are made possible by integration.

## Evolution of information structures

It appears that our sensory system contains many information networks. Color vision is just information since  $N = -\ln P$  (probabilities found in the Rosetta stone above) and we perceive them with the Feynman absorption equation and process them in an electronic network. One of the surprising aspects of perception is how easily our senses integrate incoming probabilities and construct a colored reality. The important thing about the  $P_f/P_{f0}$  equation is that it specifies states in information form which can be integrated with other information.

Why is life possible? Information is able to combine into information structures similar to the way an alphabet forms words, words form sentences, etc. DNA sentences form the body and survival promulgates DNA. In similar fashion, as our brain develops useful concepts that survive, our reality evolves.

But we need to think deeply about the reality we observe. There is no doubt it is real but perhaps not “out there” like it seems. We have been alerted to this possibility by the Eastern Philosophies and especially those that practice meditation. It is possible for some to occasionally experience feelings of wholeness when they “let go of” outward reality.

### **Information based reality**

Our senses are rather limited. They receive only electromagnetic energy ratios (probabilities  $e0/E$ ). Outside our direct observations of the immediate environment, we receive very little except other reports from fellow observers (past and present through writing and speech).

The other information we get about the world around us is where light comes from relative to our position. Quantum mechanics utilizes complex numbers and a “particle” is the point where the math allows the complex numbers to be a real number. This is its source of quantum mechanics, particle/wave duality and the Heisenberg uncertainty principle. The Copenhagen interpretation makes quantum mechanics an information science “...the only information we can have about a particle position is probabilistic”.

### **Information comes into our mind but we see reality**

With photons constructed of information, light represented by probabilities and position described by probabilities, it is fair to say that information is what comes into our minds. We know the output of our mind. It is the reality that we see around us and it is reasonable to conclude that our mind participates in creating reality. For mental reality, consciousness is divided into many experiences but its structure is information based and can be integrated at a high level.

Although you create a reality, the underlying information that you interact with has a source and a history. We also have a memory that appears to be a map in the brain that can be activated. The electrons in the nerve cells may have information states and energizing these electrons temporarily gives us the impression of memory.

## **A Giant Information Source**

Most of us agree that we should not confuse mathematical models with reality but what should we believe about information? Sir James Jeans said, that “the universe begins to look more like a great thought than a great machine”. It seems to me that nature is information based and we are part of it. Based on reference 1 it appears that there was information before the big bang. It is not unreasonable to believe that the “big bang” created a giant source of information. It is reasonable to believe that we are receiving only information from this source. Specifically we receive information giving the angle to “particles” from our perspective and we perceive these angles with probabilities (information) related to light. It is also reasonable to believe that the giant information source has a history. Some might associate the giant information source with



a “great mind” but this is a leap of faith. The information source may at the same time be divided into many but also united as one. Our minds tell us that many duplicate protons form one universe and we are made of protons. We have no choice but to participate in some small way.

## **Explanation of EPR, the dual slit experiment and “back from the future” influences**

According to Jack Sarfatti of Cornell University, an article by Zeeva Merali, Aug 6, 2010 appeared in discovery magazine with evidence that the future can affect the present for quantum entangled particles. His slides for an upcoming London conference quote the thoughts of Jeans, that reality is one great thought. He also quotes Hawking as saying that we perceive a three dimensional universe based on a two dimensional hologram.

The author believes that information is pre-eminent. The January 2015 essay [9] describes an underlying pre-big bang information structure. I began to understand that our consciousness is an interaction between a giant Information source and our mind. Our mind doesn't create a dreamlike reality because it is anchored in underlying information that is available to other minds. We can use EPR like observations to differentiate what exists in the information source vs what we create in our mind.

## **EPR, the double slit experiment and back from the future tell us what preexists in the giant information source**

The essence of EPR is that separated up spin and down spin particle are correlated. You flip the spin of one particle and the other will flip appearing to communicate.

Explanation: The information source is built from “zero energy” and “zero properties” [1][7] and two entangled particles preserve zero. They are separated by information only. You create a space like reality by accessing the information source. This gives you the impression they are physically separated and can't communicate.

The double slit experiment has a similar explanation. This phenomenon occurs because reality is an interaction between preexisting information and the observer's thoughts. With the information the observer has been given two perceptions are possible. If the individual photon's path can be observed (measured), it will act as an individual photon, not an interference pattern. The perception is completed by acting on unambiguous information from the source.

The essence of back to the future observation is similar to EPR, except the particles are separated in time.

Explanation: The information source separates zero into two related energy ratios (probabilities) and the entangled particles preserve zero. To contain energy the particles must have a time base but it does not exist in the information source. The impression that they contain energy and that time has passed is your constructed reality based on multiple accesses of the information source.

## Everything is information but what preexists and what do we create?

Information in the source:

The number series of reference 1, the code that underlies what we perceive as the neutron (based on the logarithm 90.), the number of neutrons ( $\exp(180)$ ), the individual position information in the giant information source (the big bang), the history of what we perceive as expansion (perhaps “snapshots” of expansion at various stages), information related to light emission, quantum mechanical complex numbers and quantum mechanical probabilities for position.

Information we create:

The information source and our mind interact to create conscious impressions synonymous with physical reality. When we interact with position information, the center of our reality is unique to our mind (we view reality from the angles around us). The impression of particle distances is based on mental processing. Information enters your eyes and your mind sees colored objects around you. Consciousness is created by integrating many sensory inputs with memory. We create the perception of time when we receive information indicating that the position of particles change.

## Summary

EPR, the double slit experiment and back from the future observations tell us that we must refine what most believe about physical reality. These observations can be explained by believing that the mind's perception creates reality as it interacts with an information source. There is no way to know the universe except through our mind and it was shown that the only thing the mind receives is information. Colored light is information, quantum mechanical positions are probabilistic and neutrons/protons and the other particles are made of information from a logarithmic code. Surprisingly distance and time are largely creations of our mind according to EPR like experiments.

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## Appendix

### Interaction between the information source and the mind

On the surface, physics tells us that mass is solid and distributed throughout space but the text argues that there is a giant information source available and that time and space are created *from the perspective of each mind*. Time and space appear to be based on the following information about cosmological cells [8].

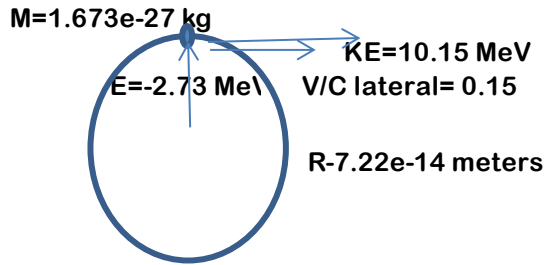
Mathematics is fundamental to physics because it uses information to model the universe around us [9]. The energy interaction whereby the logarithm 2 is added and subtracted from quads of information code is the “creative act” that produces energy ratios and probabilities, ready for the mind to interpret as protons and other particles. We do not know the origin of the information code, nor do we know why nature uses this information exchange to separate zero into the components around us. The initial conditions: energy=0, probability=1 and exchange=2 plus the exclusion principle and duplication of the information by  $\exp(180)$  are fundamental to creating a giant information source. The math of complex numbers allows us to believe in particle/wave duality. Using the mind to interpret this information, we can partially understand what the universe was created out of and why there are so many particles separated in space.

**The comments below are from the perspective of the mind. Please remember that the great information source is just that...information.**

The fundamentals of quantum gravity [2] are based on the field energy -2.73 MeV ( Endnote 1). The quantum radius is  $7.22e-14$  meters.

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

The neutron falls to this radius with 10.15 MeV of kinetic energy. General relativity extends to the quantum level and the following diagram is the information our mind uses to define space and time.



Information about the position of cells is all our individual minds perceive. The information consists of angles. Once evolution builds a reality system from cells, we also receive information related to light. Specifically, we receive probabilities related to colors. We also create time from our perspective. The important thing about the present is it centers perception at each point but only connections of electrons in life systems receive this perception. The present is all that exists and it only exists for a perception system built by an observer.

Natural logarithms, complex numbers and a few conservation laws are all we need to understand most of physics. The topics covered include current questions regarding unification, quantum gravity and cosmology [3] but many of the details are in references. Mass plus kinetic energy is balanced to zero by field energies and that the number of particles in the universe is explained by probability 1 as an initial condition.

## Information

Information is defined by the following equation:

Information =  $-k \ln P$ , where  $P$  is a probability [1].

We used the equation,  $E=e_0 \cdot \exp N$  to model the neutron, but we can take the log of the equation and have  $N = -\ln(e_0/E)$ . Comparing this to the definition of information we see that  $N$  is information and  $e_0/E$  can be a probability. We also recognize that probability  $P=1/\exp(N)$ .

Information  $P=e_0/E=e_0 \cdot t/(H)$

The following “information code” was a result of correlating fundamental energy data [1]. I do not know why this code is used by nature but it anchors energy values. The numbers are natural logarithms. There are four sets and total 90.

Fundamental	
N values	
↓	
15.432	set1
12.432	
13.432	set2
12.432	
13.432	set3
12.432	
0.075	set4
10.333	
90	

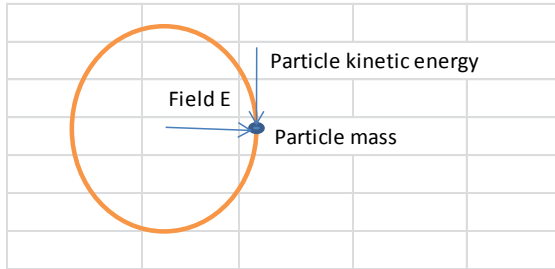
Set 2 is used in the example below. The code doesn't represent energy until after the following arithmetic exchange on each set. Set 2 starts with the natural logarithms 13.43 and 12.43. The number 2 is added to 13.43 to become 15.43 and 2 is subtracted from 12.43 to become 10.43. This will be called an energy interaction and the four values of N involved in the exchange will be called a quad.

Before adding and subtracting 2				After adding and subtracting 2			
		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

Information N is conserved ( $13.43+12.43=15.43+10.43$ ). Each of the four positions has a specific meaning. N1 is always a mass, N2 is kinetic energy, N3 is a strong field and N4 is a component of the gravitational field. Energy is evaluated by the equation  $E=e_0 \cdot \exp(N)$  where  $e_0=2.025e-5$  MeV.  $E_0$  was determined from N for the electron ( $10.136=10.333-2 \cdot \ln(3/e)$ ) and its known energy 0.511 MeV.

Result of Energy Interaction					
		ke (difference ke)		E3 field1	
E1 mass	E3+E4-E1-E2		E2 ke	E4 field2	
MeV	MeV		MeV	MeV	MeV
13.797	83.761		5.076	-101.947	
				-0.687	
E1+difference ke+E2			102.634	E3+E4	-102.634
Energy is conserved since 102.634=102.634					

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



The particle mass 13.8 MeV is one of the quarks in a neutron. The table below adds three quark energies together from quads 1 through 3. When these quads are treated the same way and added together they simulate the neutron mass 939.57 MeV within measurement error [1][11]. Their masses total 130.163 MeV and their kinetic energies total 799.25 MeV.

	Mass and Kinetic Energy		Field energy		
	Mass	ke	Strong	Gravitational	
	MeV	MeV	field energy	Energy	
	MeV	MeV	MeV	MeV	
<b>Quark S</b>	<b>101.947</b>	<b>631.729</b>	<b>-753.291</b>	<b>-0.687</b>	
<b>Quark U</b>	<b>13.797</b>	<b>83.761</b>	<b>-101.947</b>	<b>-0.687</b>	
<b>Quark D</b>	<b>13.797</b>	<b>83.761</b>	<b>-101.947</b>	<b>-0.687</b>	
	<b>129.541</b>	<b>799.251</b>	<b>-957.185</b>	<b>-2.061</b>	
	<b>129.541</b>	<b>799.251</b>	<b>0.671</b>	<b>0.622</b>	
		<b>10.151</b>			
<b>Neutron</b>		<b>939.565</b>	<b>Mev</b>		

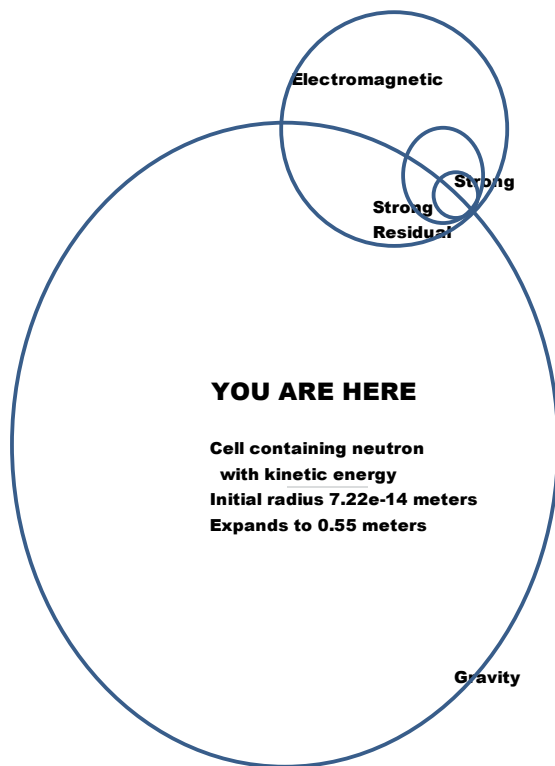
The two energies 0.671 MeV and 0.622 MeV come from quad 4 of the information code (The electron quad). The logarithm 12.432 gives  $E=e^0 \cdot \exp(N)=2.025e^{-5} \cdot \exp(12.432)=5.076$  MeV. Multiples of this energy appears several times in the tables above and below (10.15 MeV and 20.30 MeV).

### Neutron Model

The “Neutron Model” below lists the total mass, kinetic energy and fields associated with the neutron. Quad 4 of the code also gives us the 4<sup>th</sup> component of the gravitational field energy (-0.671 MeV) which totals -2.73 MeV.

Mass and Kinetic Energy			Field energy	
Mass	KE	Strong	Strong	Gravitational
Quarks		Residual	field energy	Energy
MeV	MeV	Field	MeV	MeV
<b>Strong</b>	<b>130.16</b>	<b>799.25</b>	<b>-957.18</b>	<b>-2.73</b>
<b>Strong Residual KE</b>		<b>10.15</b>		
<b>Neutron</b>		<b>939.57 (-20.30)</b>		<b>-959.92</b>
<b>neutrinos</b>		0.05		
<b>Gravitational ke</b>		<b>10.15</b>		
<b>Gravitational pe</b>		<b>10.15</b>		
<b>Total</b>		<b>959.92</b>		

With one further transition in quad 4, the neutron becomes the proton [1]. The orbits are “nested”. The outer most orbit represents quantum gravity [4] and is the source of space and time.



The values in the neutron model above unify the four forces of nature [11]. The three quarks are imbedded in strong field energy -957.185 MeV. The total field energy for the neutron is -959.92 MeV. This is lower than the neutron mass 939.565 MeV and the “missing energy” is a potential energy field -20.3 MeV within a neutrino of 0.05 MeV. A quark “bundle” in their strong field energy falls into the 20.3 MeV field energy and gains 10.15 MeV from its fall. This orbit is

labelled the strong residual field above and changes in this field are responsible for the binding energy curve [8][9]. The neutron subsequently falls to a radius  $7.22e-14$  meters in the gravitational field  $-2.73$  MeV. It originally had kinetic energy  $20.3$  MeV but when the gravitational orbit was established, the kinetic energy was  $10.15$  MeV and the potential energy was  $10.15$  MeV. As the neutron transitions to a proton, electron and anti-neutrino, the electromagnetic field  $-27.2e-6$  MeV is established. The table energy plus the associated gravitational kinetic energy balances the total energy ( $959.92$  MeV- $959.92$  MeV=  $0$ ).

## Complex Numbers

Simple logarithmic arithmetic is not the only math required. Nature uses complex numbers and we interpret these as waves. Look again at the “orbit” formed by quad 2 of the information code:

<b>The time for one cycle of the wave is <math>2\pi R/C</math> since the wave moves at C (R is the radius of a circle).</b>			
<b><math>2\pi R/C=1/\text{frequency}</math></b>			
<b><math>2\pi R/C=H/E</math></b>		<b>where H=Heisenberg's Constant <math>4.136e-21</math> mev-sec.</b>	
<b>Using the same orbit from set 2:</b>			
<b>Field energy E</b>		<b>101.947 mev</b>	
<b><math>2\pi R/C</math></b>	<b>time</b>	<b>4.057E-23</b>	<b>seconds</b>
<b>H/E</b>	<b>time</b>	<b>4.057E-23</b>	<b>seconds</b>
<b>solve for R:</b>			
<b><math>R=H\cdot C/(2\pi)/E</math></b>		<b>1.936E-15 meters</b>	

This “quantum circle” can be characterized by complex numbers and a “particle” is the point where the math allows the complex numbers to be a real number. This is its source of quantum mechanics, particle/wave duality and the Heisenberg uncertainty principle. The Copenhagen interpretation makes quantum mechanics an information science “...the only information we can have about a particle position is probabilistic”.

Time is around the quantum circle and Heisenberg’s constant is the conversion between frequency and energy. The most probable radius can be found with the following equation:

$R=H\cdot C/(2\pi)/(E\cdot E')^{.5}$  with  $E'=101.947=13.797/0.1353$  MeV with  $H\cdot C/(2\pi)=1.93e-13$  MeV-m. The divisor  $0.1353=1/\exp(2)$ . When 2 is added to N1 to become N3 in the energy interaction, it has the effect of adding energy to N1 to become a mass with kinetic energy. Dividing by  $0.1353$  is identical to the concept of gamma in special relativity with  $\text{gamma}=\text{mass}/(\text{mass}+\text{kinetic energy})$ .

Probability was 1.0 at the beginning (proof? The big bang occurred). The logarithm  $N=90$  is maintained by the fundamental information code and its probability  $P=1/\exp(90)=8.2e-40$ . The neutron table mass+kinetic energy values are very improbable. The fields of the quads that make up the neutron are equally improbable.



<b>Mass &amp; Ke</b>		<b>Field</b>	
<b>N values</b>		<b>N values</b>	
↓		↓	
15.432	↘ set1	17.432	
12.432		10.432	
13.432	↘ set2	15.432	
12.432		10.432	
13.432	↘ set3	15.432	
12.432		12.432	
0.075	↘ set4	0.075	
10.333		10.333	
90		90	
<b>P=1/exp(90)</b>		<b>P=1/exp(90)</b>	
		<b>P=1/exp(180)</b>	

Nature appears to duplicate the neutron  $\exp(180)$  times to maintain initial probability 1.0. That is,  $1/\exp(90)*1/\exp(90)*\exp(180)=1.0$ . The duplicate neutrons fill space simultaneously but are excluded from overlapping one another (the Pauli Exclusion Principle). There is no need to believe that the big bang was a point. The time zero radius of the universe could have been  $\exp(60)*1.22e-14$  meters= $8.5e12$  meters ( $\exp(180)$  is  $\exp(60)$  in three dimensions). As duplication occurs, the gravitational field in the orbit shrinks by  $\exp(90)$  [again Endnote 1] and expansion occurs because the kinetic energy of the neutron (10.15 MeV) represents temperature and pressure [6][14]. The kinetic energy at the present time is, by the Boltzmann equation, 2.73K after He4 primordial nucleosynthesis is considered [13]. To understand gravity we have to properly interpret data obtained by astronomers and astrophysicists [2][4] and use the concept of cellular cosmology [3][8].

## Time

During expansion, kinetic energy (ke) is converted into gravitational potential energy ( $pe=F*r$ ) over *time*. Time enters physics through our perception of cosmology. The derivation below indicates that the “snapshots” of increasing position information (radius to the mind) of the universe and increasing time are related through expansion.

<b>Kinetic E</b>	<b>Potential Energy</b>	
<b>KE</b>	<b>F*r</b>	
<b>1/2M(v)^2</b>	<b>GMM/r</b>	
<b>1/2M(r/t)^2</b>	<b>GMM/r</b>	
<b>1/2Mr^3/t^2</b>	<b>GMM</b>	
<b>1/(2GM)*r^3</b>	<b>t^2</b>	
<b>(r/r0)^3 increases as (t/t0)^2</b>		

The above derivation contains only radius and time and is a requirement for kinetic energy conversion. If our mind believes that expansion occurred we believe that time advances. Each cell is quantum (identical), expansion occurs uniformly and “fundamental time” around the quantum radius  $1.22e-14$  equals  $1.5e-21$  seconds. Elapsed time (additive repeats of  $1.5e-21$  second) is the primary variable for the expansion equations. This cycle is established and

maintained by the quantum mechanics of the gravitational field inside each neutron (the model above). Since each neutron/proton is identical and none occupy a preferred position all protons advance in elapsed time simultaneously. Special relativity is preserved by a secondary slower measure for time additive over many cycles of fundamental time. (Twins standing together in time at the end of the twin paradox trip indicate to me there are two measures for time).