

1 4D Hyper-Spherical Space~Time, Holographic Fractal-Memory Cosmos.

Abstract: Consider the paradigm of a 4D Hyper-Spherical, Holographic Fractal, “Space~Time-Memory” Cosmos. This model maps the geometry of 3-Dimensional Space + layers of 1-Dimensional Time to each of the most fundamental physical properties compiled by CODATA & NIST. Namely Magnetic Permeability, μ_0 , Electric Permittivity, ϵ_0 & Vacuum Impedance, Z_0 , along with quantum-scale Planck units (length, time, mass, Charge. The proposed model maps these quantities with 4D Sacred Geometry. Essentially, sphere-packing of Plank Spherical Oscillators (PSU’s, aka **Planck voxels**).

The proposed 4D Hyper-Spherical Model pulls together many insights, mathematics and key equations which unlock many mysteries of the universe. Let’s construct this cosmological model and then ask the model to answer these questions: What is charge? What is an electron? What is a proton? Why doesn’t the Higgs Field theory include gravity or understand the quantization of mass? How does gravity work? What is the true nature of time? Is Universal expansion really accelerating -or- are our perceptions warped by local deceleration of time? These answers can be found by determining which NIST CODATA Physical quantities are truly constant throughout time vs. which are covariant with the passage of time?

1.1 Brief Background

The author’s personal cosmological quest has, for years, focused on studying physics equations involving the properties of Planck Units & “particles” – all along hoping to solve for big-G and other properties as a system of 4D Space~Time & Mass~Charge physics equations. The realization that the properties of matter are dominated by the ever-present Ubiquium¹ – the Space~Time medium. This journey has led to mapping Sacred Geometry to the Cosmic Onion Space~Time geometry.

My life’s dream has been to become part of a team of mathematicians, theoreticians, scientists, engineers, inventors, pioneering frontiers of scientific *knowledge* & understanding. The dream has materialized in two stages, so far, first working with the R&D Teams at Torus Tech under **Nassim Hamein** and now, working with the Mathematicians Think-tank, under **Robert Edward Grant**. The intelligence level of these team members are truly mind boggling with their insightful knowledge spanning everything from number theory, cryptography, **geometry**, mathematics, fundamental physics, *quantum physics* to life sciences, archeology, new technologies, and even lofty thinkers exploring *Cosmic Consciousness*.

These teams have created opportunities to collaborate with many heart-centered humanitarian minded brainiac’s. My hope, herein, is to contribute a few key pieces to this Grand Cosmic Puzzle – a complete, mathematically precise, description of the nature of physical reality and of Space~Time itself.

1.2 Breaking free of limitations of old Scientific Paradigms

*“Space is not empty. It is full, a plenum as opposed to a vacuum,
and is the ground for the existence of everything, including ourselves.
The universe is not separate from this **cosmic sea of energy**.” — David Bohm*

¹ Ubiquium: 4D medium which permeates all of Space~Time. (Term coined by Scott Brown.)

1.2.1 Nothing vs. Ether vs. Space~Time Medium

Originally, Newton postulated an “aether” that was believed to be a static 3D medium through which material objects moved. Thus, most scientists thought that the Michaelson-Morley Interferometer experiment would detect a significant “ether drag” with respect to Earth’s motion through space.

But we do NOT exist within a static 3D volume, rather, Space persists from time-quantum to time-quantum across 4D Space~Time, within an energetic 4D Superfluid medium -- no viscosity & no aether drag. Instead, this medium has properties of Impedance, Magnetic Permeability and Electric Permittivity. With each Planck-time all of Space expands out to the next Onion layer. It took 13.762 billion years for the duration of our second to grow to the 1.85×10^{43} Planck times per second that is today. This is the reciprocal of Planck time.

1.1733693920e-51 qkg 1.0e-11 relative uncertainty	$m_{\ell} t_{\ell} = \frac{\hbar}{c^2}$	(1a)
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The true understanding of “Particle-Wave Duality” can be found by realizing the relationship between “wavicles” -- being the underlying "cause" -- versus the "effect" of quantum increments of mass-time -- leaving a trail of particles in its path through Space~Time. Wavicles can be conceptualized as double twisted spring-shaped wave constructs -- which interact with the Sacred Geometric quantum-scale energetic structure of Space~Time. The 1st twist is like the minor radius of a torus – it is the charge radius for the wavicle. This *very* frequent quantized manifestations of elementary charge occur at 11.706 times slower than the Planck Frequency ($1/\sqrt{\alpha}$). These charge manifestations represent the kinetic energy (quantum momentum) of so called “particles”. The 2nd twist is like the major radius of a torus and accounts for the surprisingly infrequent manifestations of mass -- on the order of 2.4×10^{22} times slower for electrons (spread across the magnitude of the Bohr radius) and about 1.3×10^{19} times slower for protons & neutrons (essentially the Yukawa confinement). (See equations in section 1.4.2.)

1.2.2 A Holistic Approach to Unifying Space~Time with ALL Quantum-level Quantities

Cosmological **models** are scientific paradigms that *SHOULD* closely parallel the nature of reality. Each part of the model ought to be in a one-to-one correspondence with aspects of reality. Let me introduce you to a paradigm which does just that. By mapping each of the Fundamental properties of Planck units & that grasps the totality of Space~Time with quantum-scale resolution.

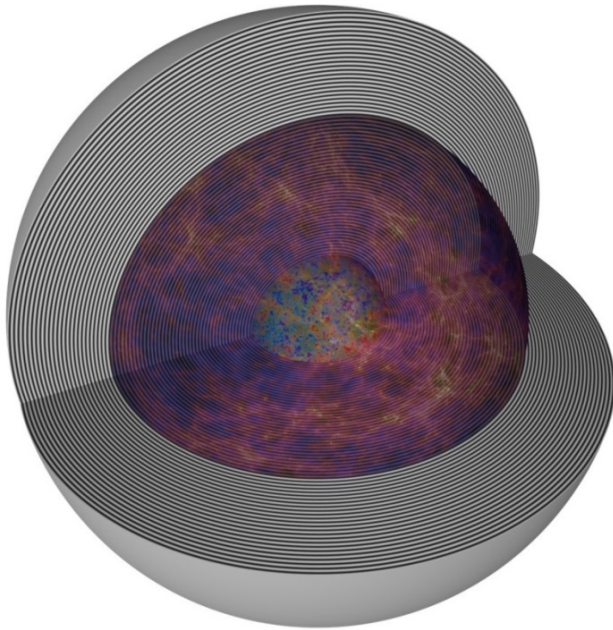
1.2.3 Physics Equations need a Geometric Context to have meaning.

Three steps ahead to come to an understanding of how this universe works:

- (1) Describe a Space~Time model which defines the context for physical existence.
- (2) Map each of the properties of Magnetic Permeability, Electric Permittivity, and the Impedance of Free Space to aspects of this Space~Time geometry.
- (3) Dig into two of Nassim’s equations which unlocked an understanding of the holographic principle.

1.3 Implementing Space~Time of our Cosmos

1.3.1 Cosmic Onion = Space~Time Holographic 4D Hypersphere



What we call our “physical universe” exists within this 4D Spherical Space~Time geometry -- the holographic reality in which we all dwell. The geometries of 4D wave-functions, *described herein*, span the circumference of the entire universe expanding incrementally by the Planck Length at a frequency equal to the reciprocal of the Planck time while the all-pervasive Ubiquium² grants an increment of its mass-time.

Higher Perspective is the Key to Understanding.

The Cosmic Onion Model enables us to envision our ever-expanding Universe “as an outside observer”. It employs a 4D hypersphere with Onion Layers of Planck Time representing the whole Cosmos: past, present and future. This 4D volume is full of this elastic fluidic medium under negative pressure -- *stretched*. This 4D spherical standing wave is a super-fluid, thus no viscosity and no

aether drag. With names like “Dominant Field”, “Source Field”, “Higgs Field” or “Dielectric Field”, knowingly or not, all these systems of thought are trying to describe these rotational oscillating quantum layers of time – a 4D Hyperspherical standing wave.

Starting from the center, Cosmic Time is an integer count of layers outward. The ever-expanding spherical layers (3D surfaces layered by 4D Hyperspherical standing waves). Collectively, these layers record a hologram of the spatial dimensions at each moment of time. Near the center is the Cosmic Microwave Background -- which is how our universe looked just as it became **transparent**.

1.3.2 Cosmic Planetarium Show

Envision the entire universe as being a projection from inside-out – like the projector in the middle of a planetarium. Rather than projecting the local stars & planets as viewed from Earth, this cosmic planetarium’s dome (representing all of 3D Space) is the holographic screen on which the filamentary distribution of galaxies is projected. However, this dome continually grows during the entire planetarium show as a function of the passage of Time. Thus, the expansion of space is *one-and-the-same* as the forward flow of Time. I cannot over emphasize this notion. In other words, if the universe could stop expanding -- time “itself” would stop.

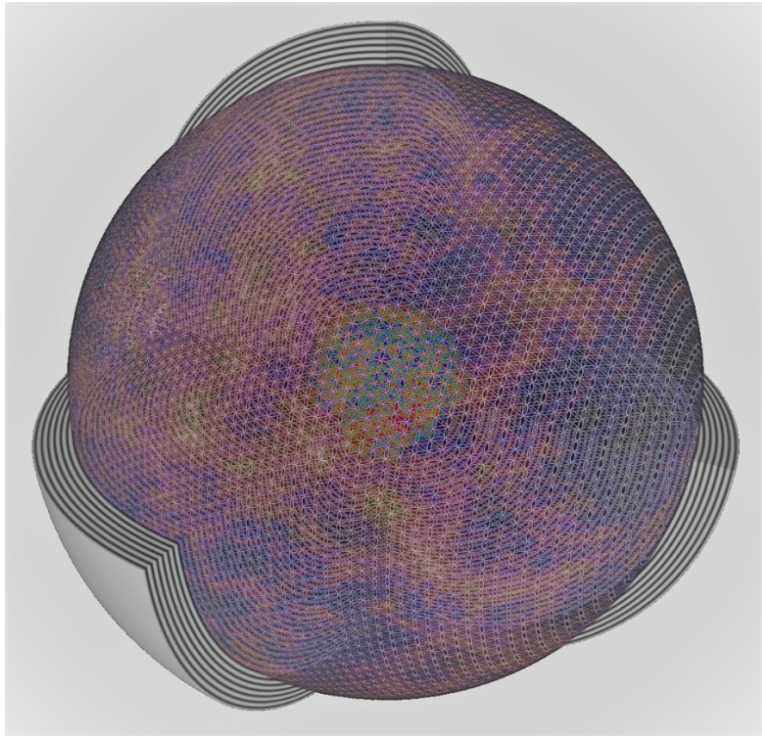
1.3.3 The Now Manifold & Space~Time Memory

Moment-by-moment the universe manifests as a 3D wavefront surface expanding as a 4D spherical standing wave. All that we experience -- all-of-space as it exists right now -- I call the Now Manifold. Massive objects inhibit Space~Time expansion thereby creating a temporal dent in and around the object – often referred to as a “gravity well”. Think of each Onion-layer as being thin holographic film. **As the Now-Manifold expands so called “particles” are caused by double twisted wavefunctions. Electron-wavicles, proton-wavicles and neutron-wavicles. The high periodically manifest charge and occasionally manifest mass. As they do they**

² Ubiquium the ubiquitous, omnipresent Space~Time medium.

create a trail of tiny distortions in this Space~Time structure – thus a memory of the event is retained in within and between the quantum thin layers described herein.

1.4 Holographic/Geometric Approach – Sacred Geometry at Quantum Scale



Imagine this Sacred Geometry pattern as spanning two adjacent Onion-Layers as they oscillate 180-degrees out-of-phase. By applying Nassim's Holographic/ Geometric approach it seemed reasonable to me that – *along with the unfoldment of time* -- comes the manifestation of space, charge and mass.

(1) ALL the mass that a “particle” manifests – manifests on the surface of its orbital radius. The perimeter of the orbital radius has a curvature associated with it – namely the charge radius of the wavefunction that is the root-cause of the “particle”.

(2) EVERY second that passes, each particle in the universe re-manifests its rest mass.

(3) For protons and neutrons their surfaces touch the extreme limits of Space~Time

curvature. This means that their charge radii are literally event horizons of tiny black holes! And, with the passage of time each second adds another layer to the orbital radius. The logical inferences are unavoidable. That means every particle is growing in mass and contains within its event horizon– the entire history of mass manifestations! Thus, each particle has two types of mass: (1) **Rest mass** is the mass manifested during the current second's worth of time. (2) **Holographic mass** is the mass manifested during all prior seconds.

(4) Although the duration of a Planck-Tick is constant, the value **WE** associate with the Planck-Time is gauged against our “time metric”, that is to say the standard that we use to count the passage of time – for all us Earthlings the standard that science uses is “a second”. As the universe ages the duration of a second slowly *grows*. We perceive the speed of light as constant, this Model states that all distances and all objects grow proportional with our time-metric – the second. (The Earth expands with time, but its surface spreads slightly slower than its expanding interior – *explanation comes later*.) With the appropriate adjustments for Special & General relativity, every meter stick & pendulum gets longer and -- without the number of atoms increasing -- each individual electron, proton, neutron increases in mass at exactly this same “co-variant” rate that “our second” is growing. As we get into the dimensional analysis of fundamental physical constants and their roles in our physics equations will make these co-variant assertions obvious. Section 2 derives the meaning of “magnetic permeability” of space and its role in explaining all the properties of the so called “Vacuum”.

1.4.1 Time vs. Clocks which “count” ticks as a means of measuring time

Within each physics equation, whenever we examine the dimensional units of physical quantities, pay attention to the distinction between the “duration of a second” vs. “a frequency”. Becoming aware of the distinction between the passage of time (traversing Onion-layers of time) vs. counting swings of a pendulum

or the vibrations of a quartz crystal or the precise oscillations of Cesium 133, – these clock rates are all subject to adjustments for 3 types of Relativity. These will be explained with quantum clarity when we get that far.

1.4.2 One Essential Requirement of True Cosmological Understanding

Defining the fundamental characteristics of particles from first principles, and without free parameters, is of great importance as not only will it provide information about the structure of subatomic particles but also the source of mass and the nature of spacetime itself.³

1.4.3 Planck-scale Units vs. SI Units and the magnitude of their quantiles

The table below documents the fundamental quantities

15 calc 'l_P t_P l_P%t_P c m_P m_P%t_P m_P*omg_P hBar%^2 q_P %:(2*h%Zo)'

Quantity	Value	relUnc	L_T_M_C_K	dt	SIunits	
l_P	1.61625409490756e_35	0	1 0 0 0 0	0_1	m	Planck Length
t_P	5.39124334778149e_44	0	0 1 0 0 0	0_1	s	Planck time
l_P%t_P	2.99792458000000e8	0	1_1 0 0 0	0	m/s	Plank(length/time)=c
c	2.99792458000000e8	0	1_1 0 0 0	0	m/s	c = Speed of Light
m_P	2.17643559439662e_8	6.1e_11	0 0 1 0 0	1	kg	Planck Mass
m_P%t_P	4.03698266614551e35	6.1e_11	0_1 1 0 0	0	kg/s	Planck Mass/Planck time
m_P*omg_P	4.03698266614551e35	7.7e_11	0_1 1 0 0	0	kg/s	m_P * PlanckFrequency
m_P*t_P	1.17336939201656e_51	6.1e_11	0 1 1 0 0	0	s kg	Quantum mass-time increment
hBar%c^2	1.17336939201656e_51	6.1e_11	0 1 1 0 0	0	s kg	Quantum mass-time increment
q_P	1.87554603829021e_18	5e_11	0 0 0 1 0	1	C	Planck Charge
%:(2*h%Zo)	1.87554603829021e_18	3.1e_11	0 0 0 1 0	1	C	Planck Charge exact equation

The magnitude of Planck Time & Planck Length are clearly a “quantum-scale” quantities. What struck me as strange is Planck Charge does not have a “fundamental” (single) SI unit – rather it is expressed as Amp-seconds = (Coulombs/second) * second. Here the definition of Amperes **bundles** in a “per second.”

Applying this technique to the kilogram – we define a quantum-kilogram as:

$$qKg = 1.173369392 \times 10^{-51} [kg \cdot sec] = (m_P * t_P)$$

This resolves the units’ issue that some might complain about in section 1.5.2 “On the Electrodynamics of Moving Bodies”. The product of mass with time, *especially when the time duration is such a tiny increment*, clearly describes an integration. This quantum increment of mass is inside the following integral formula:

The Planck Mass: $2.175686189 \times 10^{-8} \text{ kg} = \int_0^{1 \text{ second}} [1.173369392 \times 10^{-51} [kg] dt_\ell [sec]]$	(1b)
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Ever since Newton gave us $F=ma$, our science has gauged masses with the duration of a second. That means that the unit we call a “kilogram” has implied within it a “/per second”. This tiny 10^{-51} quantity **is** the source of the Planck Density -AND- whenever any Wavicle manifests mass – **this** is the increment that all particles manifest mass. Each particle type has a specific angular frequency that it manifests mass at. Arthur Compton gave us formulae for wavelengths and angular frequencies for electrons, protons, and any other particle, x, defined by:

Wavicle wavelength: $\lambda_x = \frac{h}{m_x c}$	Wavicle radians/sec frequency: $\omega_x = \frac{m_x c^2}{h}$	(2,3)
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Dividing the Energy of the particle by h-bar gives us its angular frequency (radians/second). Solving (2) & (3) for mass gives us these relations:

³ Haremein, Nassim: “The Electron and the Holographic Mass Solution”

$$m_x = \frac{h}{c} \lambda_x = \frac{\hbar}{c^2} \omega_x \quad (4)$$

Parallel

16 calc 'm_p2018 m_p m_e2018 m_e m_p2018m_e2018 m_p% m_e MpMe_2018'

Quantity	Value	digit ₁₆	relUnc	L_T_M_C_K	dt	SIunits	Calculated: 2020-09-12
m_p2018	1.672621923690000e_27	2.5e_10	0 0 1 0 0 1	1	kg	CODATA 2018	
m_p	1.672621925515432e_27	3.9e_11	0 0 1 0 0 1	1	kg	mass of proton	
m_e2018	9.109383701500001e_31	2.4e_10	0 0 1 0 0 1	1	kg	CODATA 2018	
m_e	9.109383711491229e_31	1.7e_11	0 0 1 0 0 1	1	kg	calculated electron mass	
m_p2018m_e2018	1.836152673440002e3	3.5e_10	0 0 0 0 0 0			calc from CODATA2018	
m_p/m_e	1.836152673430000e3	4.3e_11	0 0 0 0 0 0			calc using lowest relUnc	
MpMe_2018	1.836152673430000e3	4.9e_11	0 0 0 0 0 0			CODATA2018 proton/electron mass ratio.	

Particle, x	abbreviation	mass (kg)	lambda, λ (m)	omega ω (rad/s)
electron	m_e2018	9.109383702e-31	2.426310239e-12	7.763440706e20
muon	m_m	1.883531627e-28	1.17344411e-14	1.605233305e23
proton	m_p	1.672621924e-27	1.321409855e-15	1.425486241e24
neutron	m_n	1.674927498e-27	1.319590906e-15	1.427451159e24
PSU	m_P	2.175686189e-8	1.01587219e-34	1.854221018e43

1.4.4 All this talk about “not invariant” constants: Double-speak or Deeper Understanding!

Consider this quote from www.quantumofgravity.com:

Gaussian Curvature and Length Scale

This is what brings us to Gauss’ wish regarding the existence of an absolute unit of measurement. Any *curved*, maximally symmetric spacetime is described by a single number \mathbb{R} which can be either positive or negative (but not zero). Such a spacetime is *not* invariant under the scale transformations of the former mentioned above and observers in this spacetime will be able to determine the value of \mathbb{R} by making measurements on large enough scales. This number \mathbb{R} , would then play the role of an absolute unit of measurement, since one can associate a distance:

$$r = \frac{1}{\sqrt{\mathbb{R}}}$$

by taking the inverse of the square root of the curvature. What does all this have to do with the Planck scale? Well, theories of quantum gravity such as String Theory and Loop Quantum Gravity (LQG) generically predict that spacetime is not infinitely smooth and that if we zoom in to small enough scales we will find that the smoothness gives way to a discrete, foamy structure, in much the same way that zooming in on the surface of water would eventually cause the smooth appearance of water to break down as we approached a scale where the size of water molecules becomes significant. In other words, there is some absolute *minimum* length scale, usually written as l_P – where the subscript P stands for “Planck”, and called the “[Planck scale](#)”. From the discussion above we can conclude that if there is such a minimum length scale then it *must* correspond to a macroscopic geometric curvature of the order:

$$\mathbb{R}_{Cosmic} \sim \frac{1}{\ell_P^2}$$

This is a very interesting result because it implies that there is a connection between physics at the smallest possible scales (the Planck scale) and physics at cosmological scales.

As we explore the equations in this document, keep in mind this idea of a connection between this Cosmic Curvature equation and the size and age of the universe. I’m anticipating another discovery.

1.5 Schwarzschild's exact solution to Einstein's Field Equations & Nassim's Holographic Approach

Karl Schwarzschild's 1916 solution to Einstein's Field Equations determined the critical radius, r_s , where the escape velocity equals c , the speed of light. (Harramein, 2013)

$r_s = \frac{2Gm}{c^2}$	(5a)
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A Proton's charge radius, r_p , has been one of the most challenging physical properties to measure. In Nassim's equation below⁴ note that a_0 is the Bohr radius, α , the fine structure constant, & m_p/m_e is the proton-to-electron mass ratio:

<p>2020: 8.41235640428985e-16 m 3.4e-10 2021: 8.41235640424147e-16 m 4.0e-11 <i>relative uncertainty^</i></p>	$r_p = \frac{4a_0\alpha}{\frac{m_p}{m_e}}$	(5b)
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Given the most accurate input values calculated by my physics equation-matrix software, this formula computes the most accurate value yet published. The relative uncertainty is about 0.04 of one part in a Billion. Nassim's holographic approach defines the fundamental geometric relationships which reduce to dimensionless ratios.

$\eta_p = \frac{Area_{sphere}}{Area_{EquatorialDisk}} = \frac{4\pi r_p^2}{\pi r_\ell^2}$	$R_p = \frac{Volume_{sphere}}{Volume_{PlanckSphere}} = \frac{\frac{4}{3}\pi r_p^3}{\frac{4}{3}\pi r_\ell^3}$	(5,6)
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Nassim Harramein's equations⁵ show that the mass of a particle is equal to the Planck Mass times a "space curvature factor" (4 for the proton) times the ratio of surface-area volume (1 Planck thinness) to volume expressed in terms of Planck Spherical Volumes.

<p>CODATA 2018 vs. my Calcs. 1.67262192369000e-27 kg 2.5e-10 1.67262192551543e-27 kg 4.8e-11 <i>relative uncertainty^</i></p>	$m_p = 2 \frac{\eta_p}{R_p} m_\ell$ <p>Proton Surface / Proton Volume in flat Planck Areas / in Planck Spherical Units</p>	(7)
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Note: m_p is the proton mass, r_ℓ Planck radius = half the Planck length:

Thanks to Nassim's Holographic/Geometric approach this made it obvious that – *along with the unfoldment of time* -- comes the manifestation of space, charge and mass.

- (1) ALL the mass that a "particle" manifests – manifests along the surface of its orbital radius. For an electron that's the Bohr radius, for a proton/neutron it's essentially the Yukawa confinement.
- (2) Each "Wavicle" type -- EVERY second -- manifests the rest mass associated with its particle type.
- (3) For protons and neutrons their surfaces touch the extreme limits of Space~Time curvature. This means their surfaces are literally event horizons of tiny black holes! Each second adds another layer to those surfaces. The logical inferences are unavoidable -- every particle is growing in mass and

⁴ 2019: Baker, A.V: Compilation of Interesting Physics Relationships (private document)

⁵ Harramein, N.: Quantum Gravity and the Holographic Mass, Physical Review & Research Int'l, 27-Apr-2013

contains the entire history of the mass manifestations is left in the wake of each particles path through Space~Time. Thus, each particle has two types of mass: (1) **Rest mass** is the mass manifested during the current second's worth of time. (2) **Holographic mass** is the mass manifested during all prior seconds. By completely grasping this idea of the "wake of particles Holographic mass" we will come to understand both Dark Matter and quantum gravity.

(4) Although the duration of a 1-time quantum, 1-length quantum, 1-charge quantum & 1 mass-time quantum is constant, the value **WE** associate with the Planck-time is gauged against our *emergent* "time metric". The standard that scientific Earthlings use is the "second". **As the universe ages the duration of a second slowly grows**. This means that all distances and all objects grow proportional with our time-metric (the second). With the appropriate adjustments for Special & General relativity, every meter stick & pendulum will get longer while the number of atoms stays constant. Because the root-cause wavefunctions for electrons, protons, & neutrons have more time to manifest mass. This covariance happens at the same rate that the Planck-frequency grows – Planck tick-tocks per second.

Understanding these aspects of this Cosmic Onion Model will help to explain the true nature of Space~Time. Our Cosmos is the quantum-scale fractal manifestations of interacting wave-functions which create quarks, charge, mass and the "forces" of nature.

1.5.1 Eric Dollard's Contributions to this Endeavor

Special thanks to Eric Dollard for emphasizing the distinctions between: Space vs. Counter-Space, Time vs. Frequency, & Electric vs. Magnetic Induction. And, surprisingly, for electrical engineers, the "Relative" unimportance of $E=Mc^2$!

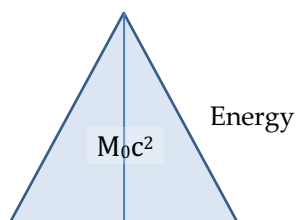
Yet, we all thank Einstein for Special and General Relativity and his heartfelt inspirations and inspiring words:

*The important thing is not to stop questioning.
Curiosity has its own reason for existing.
One cannot help but be in awe when he contemplates the mysteries of eternity,
of the marvelous structure of reality.
It is enough if one tries merely to comprehend a little of this mystery every day.
Never lose a holy curiosity.*

1.5.2 "On the Electrodynamics of moving Bodies"

Over-emphasis of $E = Mc^2$ has distracted from the more generalized mass + momentum form⁶:

	$E^2 = (Mc^2)^2 + (pc)^2$	(8a)
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This made scientists "focus" too much onto the mass side of this formula and not enough emphasis on the momentum (pc) of **Wavicles**. Wavicles are the root cause of "particles" -- *not the other way around*. They are double twisted vortex wave-functions where

⁶ Thanks to William Brown who, during our cosmological conversations, reminded me of this equation. So much of Eric's assertions suddenly made perfect sense in the context of this awareness of the "momentum of charge."

(pc) momentum the charge radius is the minor axis of a torus and the Orbital radius is the major radius (which defines the wavicle’s mass confinement).

From (8a) can we get new insights into what momentum is? Dividing by c^2 :

	$p^2 = (E^2 - (M_0 c^2)^2)/c^2$	(8b)
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That leaves us just one step in defining momentum in terms of energy. Then we can equate that to the classic definition of momentum, product of mass and velocity.

	$p = mv = \frac{\sqrt{E^2 - (M_0 c^2)^2}}{c}$	(8c)
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These wave functions create holographic images on the backdrop of the 3D surfaces of the Cosmic Onion layers as the Now Manifold passes through them. Physical reality is the manifestations of these 3D holographic images. The physics equations reveal that “so called particles” are really manifestations of these double-twisted spring-shaped waves. They exist as a wave of pure momentum 99.9999999999999999+% of the time. Only during a brief moment, one Planck time, do wavicles manifest an increment of Mass~Time = ($m_P \cdot t_P$). If the math behind Higgs field can connect to this, then Higgs stands a chance of enduring the test of time.

1.17336939201656e-51 qkg 6.0e-12 relative uncertainty	$m_\ell t_\ell = \frac{\hbar}{c^2}$	(9)
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\hbar Bar, with units of angular momentum, when divided by c^2 converts this to its energy-equivalent mass. Thus 1.173369×10^{-51} kg-seconds IS the source of mass for all “particles”. Turns out our idea of mass ties the duration of a second to be proportional to the numeric value we associate with our unit of mass the “kilogram”. In other words, ever since Newton defined Force = Mass \times acceleration, our definition of mass of an object is gauged by the duration of a second. (Read that again.)

1.9560827616511e9 Joules 7.3e-12 relative uncertainty	$E_\ell = m_\ell c^2 = \frac{\hbar}{t_\ell}$	(10)
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Sorry Higgs, although CERN’s boson is not what they were hoping for, it *IS* something even more profoundly significant than anyone imagined. For it reveals what happens as protons, near the speed of light, turn almost all their $E=Mc^2$ energy into Charge Momentum Energy! The surprise is that this might NOT be the normal fundamental charge – *I’m exploring the possibility that it shifts from elementary charge towards Planck Charge*. Higgs boson within 3.7% of proton mass expressed as eV/c^2 divided by the Fine Structure constant.

125.09 GeV 2.7% relative uncertainty	$m_{Higgs} \approx \frac{m_p (c^2/e)}{\alpha}$	(11)
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1.6 Time vs. Clocks which “count” ticks as a means of measuring time

Within each physics equation, whenever you examine the dimensional units of physical quantities, pay attention to the distinction between the “duration of a second” vs “a frequency”. Becoming aware of the distinction between the passage of time (traversing Onion-layers of time) vs. counting swings of a pendulum or the vibrations of a quartz crystal or the precise oscillations of Cesium 133 – these clock rates

are all subject to adjustments for the 3 types of Relativity. These will be explained with quantum clarity when we get that far.

Today all our scientific perceptions are viewed from the perspective of what we consider to be the duration of one-second. Consider $\mathbf{F} = \mathbf{ma}$, where acceleration is in units of kilogram meters per-second-per-second. Generalize this as:

$$[\text{mass}] * ([\text{distance}] / [\text{time}] / [\text{time}]) = [\text{mass}] * [\text{speed of light}] / [\text{PlanckTime}].$$

What this equations is trying to tell us – for those who know how to pay attention – that every kilogram of mass slows the flow rate of time by this tiny amount per second.

Later, once we fill in our equation matrix, we will see which physical quantities are fundamental causes vs. which ones are constant because they are ratios between co-variant fundamental properties.

2 Explaining things that many physicists take for granted

This document describes the specific geometries of 4D Space~Time wave functions and correlates these wave constructs with well-known physics properties and the equations which precisely relate them. Thus, explaining the meaning of each of the 11 most fundamental properties of the so called “Vacuum”.

2.1 Equation Matrix linking Newton, Einstein & Planck

This table ought to be in Chapter 1 of every physics book High School on up:

Space~Time / Mass~Charge Equation Matrix: factoring out Newtons reveals an invisible symmetry

Inter-action	Surface/Time $\hbar\omega = \text{Energy}$ $N(m)$	=	Time Mass [kg]	$\times c^2$	<p>Einstein made “E=Mc²” famous. Max Planck showed that energy exchange happens in discrete increments, h at a frequency rate denoted by the Greek letter ν. c^2 also relates many other physical properties: K_Θ [iii] is the author’s discovery that “s/kg” says how much each kilogram of matter slows time & curves space, where “m/kg” is a radius of curvature per kilogram; which in turn slows space expansion around massive objects “m^3/s^2” obeying the inverse-square law.</p> <p>For Electromagnetism, a Charge differential along the time-dimension (north-to-south magnetic poles) slows time “s/C” in a magnetic field. For electric fields “m/C” says space is curved by electric charge differential is space.</p> <p>For Electromagnetic waves, $h\sqrt{1/\epsilon_0\mu_0}$ defines a photon as an incremental packet of angular momentum propagating at the speed of light.</p>
Matter /w Space~Time	$G [N(m/kg)^2]$ 6.67384×10^{-11} [m ³ /kg s ²]	=	$K_\Theta [N(s/kg)^2]$ 7.425648×10^{-28} [m/kg]	$\times c^2$	
EM /w Matter	$K_e [N(m/C)^2]$ 8.9875518×10^9 [kg m ³ /s ² /C ²]	=	$K_m [N(s/C)^2]$ 1×10^{-7} [kg m/C ²]	$\times c^2$	
Wave Propagation	$1/\epsilon_0$ $1/8.8541878 \times 10^{-12}$ [m/F]	=	μ_0 $1.256637061 \times 10^{-6}$ [N/A ²]	$\times c^2$	

In this table & whole document:

A=Amperes, C=Coulombs, c=speed-of-light, h=Planck’s constant, ϵ_0 =electric permittivity, $\nu=\omega$ =frequency, N=Newtons; kg=kilograms, m=meters, s=seconds, F=Farads, $N(s/C)^2$ is equivalent to N/A^2 , $i=\sqrt{-1}$; $\hbar=2\sqrt{\alpha\pi}$

Dimensional units are enclosed in [Brackets]. Note this hidden symmetry revealed when factoring out Newtons [N] which helps to conceptualize the meaning of these otherwise difficult to grasp dimensional concepts. Every cell in this table deserves its own symbol. K_Θ is my notation for this Constant not commonly recognized for its profound significance in physics -- but any physics formula containing G/c^2 reflects the same idea.

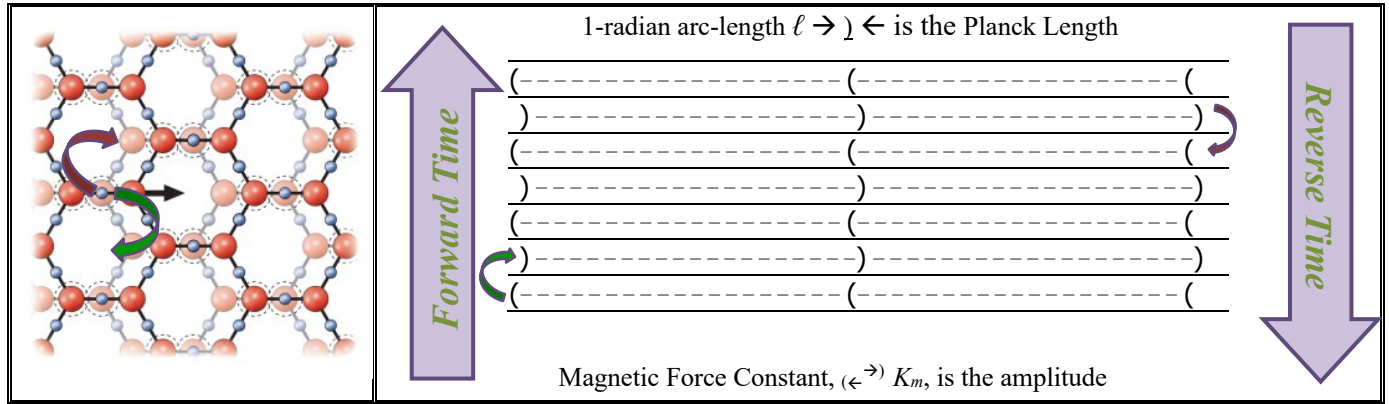
2.2 Onion-Layers of Planck Time vs. the Fine Structure of the “Dielectric Field”

Fundamental charge, aka elementary charge, see eC below, manifests at a frequency is the reciprocal of the Planck Time times square root of the Fine Structure constant.

$\text{Frequency of elementary charge} = \omega_{eC} = \frac{1}{t_P \sqrt{\alpha}} = 1.584505421e42$	(11)
--	------

Spatially, the arc-length of these quantum-scale oscillations is the Planck Length. Surprisingly, the oscillations between layers is **not** 2π radians (360-degrees), but rather, 1-radian (about 57.3-degrees). The ratio of Planck Length over Planck Time is c , the speed of light in Free Space. Two surprising realizations are: (1) the Planck Charge represents 1-radian worth of rotation goes into each Cosmic Onion layer. (2) elementary charge represents 11.7 radians of rotation of these layers. This is what creates the Dielectric Field.

Locally, these layers appear to be flat, but their curvature is the same as the circumference of the universe. For a 13.8Billion year old universe this translates to about 4.038×10^{60} Planck-times --



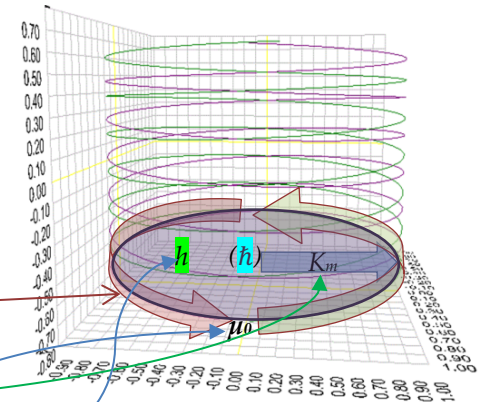
Just like how EZ Water layers are offset, so are these rotational oscillations of adjacent Onion-layers of Planck-time. Note that the solid lines at the nodal points remain stationary. The dashed lines represent the point of maximum amplitude. The amplitude of these oscillations is the magnetic force constant (K_m) $1e-7 \text{ N/A}^2$. I'll explain these units later, but for now think of this numeric quantity $1e-7$ as the scaling factor of SI units for the amplitude of these oscillations. The circumference of the outward rotation is $2\pi K_m$ and the inward is $(-2\pi K_m)$.

$$\mu_0 [kg \cdot m / C^2] = \underline{4\pi K_m} = 2\pi K_m - (-2\pi K_m) \quad (6)$$

The 2nd Electro-Magnetic (EM) property of the Dielectric Field is the Magnetic Permeability of Space (μ_0) which is created by the differential of the inward (reverse time, $-2\pi K_m$) versus outward (forward time, $+2\pi K_m$) rotationally oscillating, standing waves. Alternately, μ_0 units can be written as [Henry/meter]. Hypothesis:

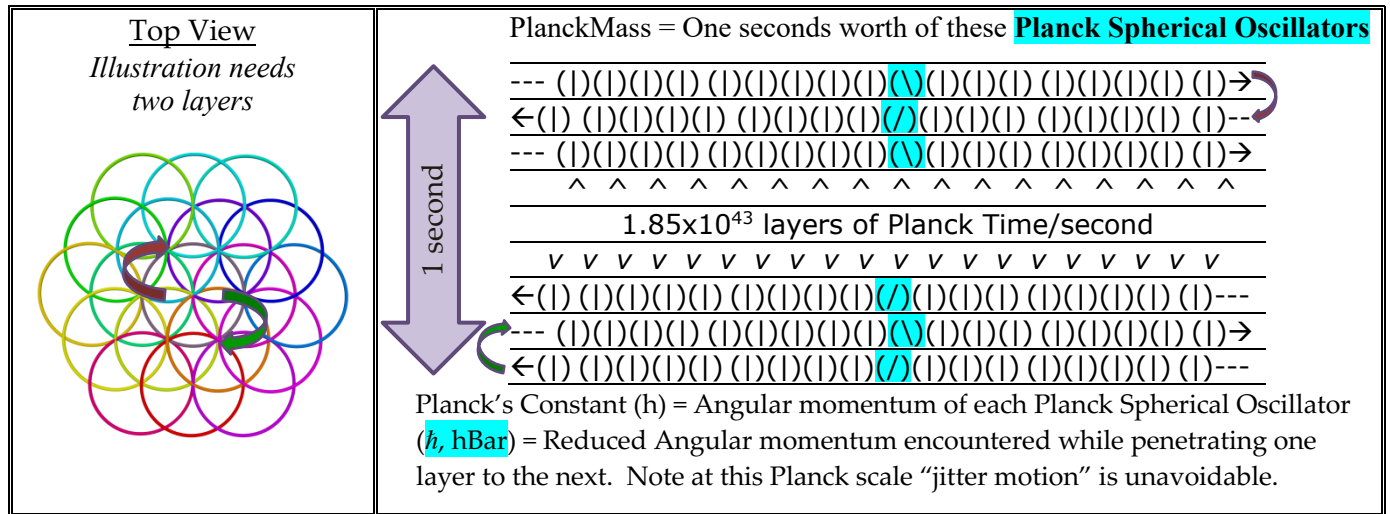
$$Z_0 [m^2 kg / s \cdot C^2] = \mu_0 [m \cdot kg / C^2] \times c [m/s] \quad (7)$$

The Impedance of Free Space is 376.7303135 Ohms.



\hbar , Planck's constant, is full rotation angular momentum. \hbar , reduced Planck properly reflects 1-PlanckMass per one quantum of rotation, 1-radian. Wavicles manifest $\text{Mass} = \omega_x \frac{\hbar}{c^2}$ where $\omega_x = \frac{m_x c^2}{\hbar}$

Next, lets compress the vertical scale in the diagram to represent one seconds worth of time:



Connecting the diagrams above to the table below: The Planck Time is the time to transition from one layer to the next. The Planck Length is the distance that light propagates in one Planck Time $\ell/t_\ell = c$, the speed of light. Planck Mass is one-second worth of these Planck Spherical Oscillators – that is the volume encompassed by the amplitude of the Onion layer oscillations. The Reduced Planck, \hbar , is the angular momentum encountered while penetrating one-seconds worth of Onion layers. Planck’s *non*-constant is the total angular momentum of one-second worth of Quantum Onion layers. K_θ is key – it says mass is proportional to length, while the speed of light is proportional to time, so mass is proportional the duration of a second.

Physical Property, <i>symbol</i>	Approximate Value	SI units
Planck Freq, ω_ℓ	1. 8548596965e-43	radians/sec
Planck Time, $t_\ell = 1/\omega_\ell$	5.391160e-44	s
Planck Length, ℓ	1. 616254e-35	m
Planck Mass, m_ℓ	2. 17643559e-8	kg
Planck's constant, h	6. 62607015e-34	kg m ² /s
Reduced Planck, \hbar	1. 05457182e-34	kg m ² /s
Planck Charge, q_ℓ	1. 875546038e-18	C = A s

Speed of Light, c	29972458	m/s
$K_{\theta} = G/c^2$	7.4259222242e-28	m/kg
Newton's, G	6.674086072e-11	kg m ³ /s ²
elementary charge, e	1.6021766208e-19	C
Mag. Force, K_m	1e-7	kg m/C ²
Mag. Permeability, μ_0	4 π Km	kg m/C ²
Coulomb Constant, K_e	8987551787.368	kg m ³ /s ² C ²
Space Impedance, Z_0	376.73031346	kg m ² /s C ²
Electric Permittivity, ϵ_0	8.85418781762e-12	s ² C ² /kg m ³
Fine Structure, α	0.0072973525664 1/137.035999138	

K_m is the magnetic-amplitude of the dielectric property of the Onion-layer standing waves. The magnetic permeability, as described on previous page, is the difference as these circularly oscillating standing waves pass through each other. K_e , Coulomb constant is simply $K_m \cdot c^2$ – its meaning is described in the next sub-section

■ ■ ■

This last page is a work-in-progress – *needs to tie together ideas and wrap-up take-aways & suggest conclusions.*

2.3 Fine Structure Constant – shows up in many places

Essential to all quantum mechanics is the need to grasp why the Fine Structure Constant and its value squared or it's square root connects many physics equations:

0.0072973525664 relative uncertainty=2.3e-10 = 1/137.035999138	$\alpha = \left(\frac{e}{q_\ell}\right)^2 = \frac{Z_0 e^2}{2h} = \frac{e^2}{2hc\epsilon_0} = \sqrt{\frac{r_e}{a_0}} = \sqrt{2R_\infty h c m_e}$	(12)
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More needs to be said here as we tie in the significance of Rydberg Constant,...

3 Magnetic Dipole Moment

	$\mu = \frac{q}{2m} L$	(13)
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μ is magnetic dipole moment, q is charge (usually +e, -e), m is mass of the particle, L is angular momentum.

electron:	$\mu_e = g \frac{-e}{2m_e} S$	(13)
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μ_e is the electrons magnetic dipole moment, -e is its negative elementary charge m_e is electron's mass, g is a fudge factor, S is its spin angular momentum.

4 Appendix A

Differences between mainstream science and this proposed Cosmological model

Old Paradigm Thinking	Proposed Paradigm Thinking
Matter is made from "solid?" particles which (somehow) have wave-like properties.	Matter is the manifestation of wavicles. Electron & proton wavicles, each, have a characteristic frequency that they manifest charge and another frequency that they manifest mass. By relating these two frequencies to the properties of Free Space – we can calculate all other properties of the so called "particles". <i>Neutrons seem to be a blend of positive & negative.</i>
Gravity causes apples to fall, planets to orbit and creates "gravity wells". The thinking is that gravity causes time to slow.	Wavicles incrementally manifest mass at its Compton frequency. Each time this happens -- time – for that particle – stops for 1 Planck-time – leaving a Planck sized dent in the Now Manifold. This dent spreads at the speed of light – merging with of other particles. The accumulative effect of many atoms concentrated in a region of space result in space around the object to slow Space~Time expansion – creating a dent in Space~Time Manifold. Gravity is the result of the temporal slope of this manifold encountering the Impedance of the Dielectric Field.
Time is linear and the duration of our "second" today is the same back to the beginning of time.	As a natural progression of time – space expands – and with it the duration of a second slowly grows. Today that growth rate is so slow it that time – to us – appears linear.
Work-in-Progress...	

5 Appendix B

Calculations referenced in this book.

<p>2020: 8.41235640428985e-16 m 3.4e-10</p> <p>2021: 8.41235640424147e-16 m 4.0e-11</p> <p>relative uncertainty^</p>	$r_p = \frac{4a_0\alpha}{\frac{m_p}{m_e}}$	(4)
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16 calc 'm_p2018 m_p m_e2018 m_e m_p2018% m_e2018 m_p% m_e MpMe_2018'

Quantity	Value digit ₁₆	relUnc	L_T_M_C_K	dt	SIunits
m_p2018	1.672621923690000e_27	2.5e_10	0 0 1 0 0	1	kg
m_p	1.672621925515432e_27	3.9e_11	0 0 1 0 0	1	kg
m_e2018	9.109383701500001e_31	2.4e_10	0 0 1 0 0	1	kg
m_e	9.109383711491229e_31	1.7e_11	0 0 1 0 0	1	kg
m_p2018% m_e2018	1.836152673440002e3	3.5e_10	0 0 0 0 0	0	
m_p% m_e	1.836152673430000e3	4.3e_11	0 0 0 0 0	0	
MpMe_2018	1.836152673430000e3	4.9e_11	0 0 0 0 0	0	

Calculated: 2020-09-12

CODATA 2018
mass of proton
CODATA 2018
calculated electron mass
calc from CODATA2018
calc using lowest relUnc
CODATA2018 proton/electron
mass ratio.

$\eta_p = \frac{Area_{sphere}}{Area_{EquatorialDisk}} = \frac{4\pi r_p^2}{\pi r_\ell^2}$	$R_p = \frac{Volume_{sphere}}{Volume_{PlanckSphere}} = \frac{\frac{4}{3}\pi r_p^3}{\frac{4}{3}\pi r_\ell^3}$	(5,6)
--	--	-------

'eta_p' defQty '4p1*(r_p^2) % pi*r_P^2'

Symbol	Value	relUnc	L_T_M_C_K	SIunits	Formula
eta_p	4.33447032844776e40	6.5e_11	0 0 0 0 0		4p1*(r_p^2) % pi*r_P^2

'R_pVol' defQty '4r3p1*(r_p^3) % 4r3p1*(r_P^3)'

Symbol	Value	relUnc	L_T_M_C_K	SIunits	Formula
R_pVol	1.12801289541659e60	9.8e_11	0 0 0 0 0		4r3p1*(r_p^3) % 4r3p1*(r_P^3)

Calculated: 2020-09-12

<p>Proton Surface / Proton Volume</p> <p>in flat Planck Areas / Planck Spheres</p>	$m_p = 2m_\ell \frac{\eta_p}{R_p}$	(7)
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16 calc '2*m_P * (eta_p % R_pVol) m_p'

Quantity	Value digit ₁₆	relUnc	L_T_M_C_K	dt	SIunits
2*m_P * (eta_p % R_pVol)	1.672621925515432e_27	9.6e_11	0 0 1 0 0	1	kg
m_p	1.672621925515432e_27	3.9e_11	0 0 1 0 0	1	kg

whats 'm_P'

m_P	kg	LTMCK: 0 0 1 0 0	sum=1	Planck mass
Values	digit ₁₆	relUnc	Formulae	
2.176434000000000e_8		9e_6	m_P2018	
2.176435594396617e_8		6.5e_12	q_P * %:(K_m % K_Theta)	
2.176435594396617e_8		5e_12	%:(hBar*c % G)	
2.176435594396617e_8		6e_12	hBar % c*l_P	
2.176435594396617e_8		7.3e_12	2*K_m*h % Zo*l_P	
2.176435594396617e_8		1.1e_11	(K_m*q_P^2)%l_P	

K_Theta	m/kg	LTMCK: 1 0 _1 0 0	sum=0	d(length)/d(mass)
Values	digit ₁₆	relUnc	Formulae	
7.426151727479190e_28		6e_12	(c^3)*(t_P^2)%hBar	
7.426151727479188e_28		8e_12	G % c^2	
7.426151727479187e_28		9e_12	l_P % m_P	