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QME Theory Solves "*The Largest Discrepancy between Theory and Experiment in all of Science*"

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ABSTRACT:

Quantum Field Theory (QFT) based on the reduced Planck constant (ħ) predicts a very large quantum vacuum density value compared to the observable and measured values. On the Planck scale this predicted quantum vacuum density result is larger by 120 orders of magnitude (10^{120}) compared to the measured value. This large delta between QFT's prediction versus the measured value has been labelled by physicists Ronald Adler, Brendan Casey, and Ovid Jacob as "*The largest discrepancy between theory and experiment in all of science*" (American Journal of Physics, 1995). It has also been labelled as "*the worst prediction in the history of physics*", by M.P. Hobson, G.P. Efstatiou, and A. N. Lasenby (Cambridge University Press, 2006).

By applying the Quantum Exclusion Principle (QEP) of Quantum Mass-Energy (QME) theory, we resolve this discrepancy between the QFT prediction and the expected measured value for space vacuum density. As part of this research, a new QME universal quantum gravitation constant ($ƚ_{QME}$) is derived and applied, which is the binary equivalent to the existing reduced Planck constant (ħ) in electromagnetism. The newly derived QME reduced quantum gravitation constant ($ƚ_{QME}$) has a value of $ƚ_{QME}$ = 5.970 x 10^{86} kg-m^2/s (J.s). This universal quantum gravitation constant ($ƚ_{QME}$) is shown to resolve the universe vacuum density discrepancy between QFT and the measured expected value with percent error reduction from 120 orders of magnitude to less than 1.0% of the true measured value.

Keywords*: Quantum Mass-Energy (QME) theory, Quantum Field Theory (QFT), Quantum Exclusion Principle (QEP), QME Quantum Gravitation constant ($ƚ_{QME}$), Gravity Generating Cores (GGC), Passive Mass-Energy (PME), Hubble constant (H_0).*

1.0 BACKGROUND:

A well-known major problem persisting in physics for many decades has been the very large erroneous quantum vacuum density value prediction by the Quantum Field Theory (QFT) [1]. If the universe is described by the QFT at the Planck scale then the predicted quantum vacuum result comes out larger by 120 orders of magnitude compared to the measured and observed values. This larger than the size of the universe discrepancy has been called by physicists as "the largest discrepancy between theory and experiment in all of science" [2] and also "the worst prediction in the history of physics." [3] This disagreement between the observed values of vacuum energy density and the theoretical large value of zero-point energy calculated by QFT is also referred in cosmology as the vacuum catastrophe or the cosmological constant problem [4].

2.0 INTRODUCTION:

In this research paper, we first calculate the QFT vacuum density prediction based on the reduced Planck constant. We compare this QFT predicted vacuum density result with the latest vacuum density measured values and confirm the 120 orders of magnitude delta discrepancy between QFT's prediction versus the measured real value. To calculate the Quantum Mass-Energy (QME) theoretical vacuum density, we independently apply the QME theory laws to the universe model [5]. By applying the Quantum Exclusion Principle (QEP), we derive the equivalent QME quantum gravitation constant ($ƚ_{QME}$), which is analogous to the reduced Planck constant (ħ) in electromagnetism. As a function of celestial pressures, the derived QME quantum gravitation constant ($ƚ_{QME}$) is applicable in quantum gravity scales and universe large-scale structures. Similarly, as a function of celestial temperatures, Planck constant (ħ) is applicable in electromagnetism for quantum and universe large-scale structures. The vacuum density is computed by calculating the total Passive Mass-Energy (PME) present in the universe, then isolating the residual PME fraction present in space, followed by separating the residual fraction of visible baryon matter density remaining in the space vacuum. Finally, substituting and applying the QME quantum gravitation constant ($ƚ_{QME}$) to the QFT Planck equations fully resolves the 120 orders of magnitude vacuum density discrepancy between QFT's prediction and the measured value.

3.0 METHODOLOGY:

We apply the scientific research methodology as follows:

1. Calculate the predicted QFT vacuum density value based on the reduced Planck constant (ħ).
2. From multiple input sources calculate the theoretical vacuum density and reference the measured vacuum density values.
3. Compare the predicted QFT vacuum density value with the expected vacuum density value to confirm the existing 120 orders of magnitude discrepancy.
4. Apply the Quantum Exclusion Principle (QEP):
   ħ = Temperature driven EM; ƚ = Pressure induced Gravitation
5. Run the QME laws on the universe model to obtain the total PME input (as a function of mass) to derive the QME quantum gravitation constants ($ƚ_{QME}$).
6. Derive QME quantum gravitation constant ($ƚ_{QME}$) from Planck mass equation. Obtain the PME and the visible matter fractions in space by applying two adjustment factors.
7. Calculate, validate, match, and compare the QME ($ƚ_{QME}$) based vacuum density value against the measured vacuum density value to resolve the QFT discrepancy.

4.0 ANALYSES:

The expected vacuum density (ρ_Λ) on dimensional grounds can be approximated with the following three major constants namely: ħ (reduced Planck constant), G (universal gravitation constant), and c (speed of light) listed below:

Speed of light:	$c = 2.998 \times 10^8$ m/s
Universal Constant:	$G = 6.674 \times 10^{-11}$ m^3/kg – s^2
Reduced Planck constant (ħ):	$\hbar = 1.054 \times 10^{-34}$ J.s
Universe ρ_{Crit} measured (ESA):	$\rho_C = 8.62 \times 10^{-27}$ kg/m^3 [6],[7]
Universe density parameter Ω_Λ (ESA):	$\Omega_\Lambda = 0.6911$ [7]
QME Universe density parameter Ω_Λ:	$\Omega_\Lambda = 0.6888$ [8]

The extremely large QFT vacuum density prediction (larger than the universe size in orders of magnitude) using reduced Planck constant is:

- ρ_Λ (QFT – Planck method) $\equiv c^5/\hbar G^2 = 5.155 \times 10^{96}$ kg/m^3 (1)

QFT prediction result in (1), should match following measured results:

- $H_0 \geq 70.5$ in $\rho_C = (3H^2/8\pi G)$ yields: $\rho_\Lambda \approx 6.5$ to 7.2×10^{-27} kg/m^3 (2)
- Observations & measurements(H_0=67.5): $\rho_\Lambda \approx 6.0 \times 10^{-27}$ kg/m^3 (3)
- QME theory - ΛCDM method [5]: $\rho_\Lambda = 5.891 \times 10^{-27}$ kg/m^3 (4)
- Planck satellite – CMB [7]: $\rho_\Lambda = \Omega_\Lambda \times \rho_C = 0.6911 \times 8.62 \times 10^{-27}$
  $\rho_\Lambda = 5.957 \times 10^{-27}$ kg/m^3 (5)

Vacuum density values in (2), (3), (4), and (5) representing experiments, observations, measurements, QME theory (using ΛCDM method), and Planck satellite data using Cosmic Background Microwave (CMB) radiation, show consensus agreement around $\rho_\Lambda \approx 6.0 \times 10^{-27}$ kg/m^3. However, all vacuum density values from all different methodologies when compared with the QFT vacuum density result $\rho_{QFT} = 5.155 \times 10^{96}$ kg/m^3 in (1) show a gigantic delta discrepancy of $\geq 10^{120}$. The new vacuum density $\rho_\Lambda = 6.0 \times 10^{-27}$ kg/m^3 consensus value associated with latest H_0 = 67.5 ± 0.30 (km/s)/Mpc [14] based measurements is established as a reference expected value for later comparisons.

In this research paper, we will resolve this large QFT vacuum density discrepancy with the help of QME theory. The Planck model as a function of celestial temperatures works well for the electromagnetic side of quantum physics, however it fails miserably when it is applied to the celestial pressure induced gravitational world. Applying QEP from the QME theory allows the derivation of the Planck constant equivalent called the quantum gravitation constant ($ƚ_{QME}$). Substituting this reduced quantum gravitation constant ($ƚ_{QME}$) in the QFT equation provides the correct vacuum density result that exactly matches the experiments, observations, measurements, and the Planck satellite vacuum density results within < 1.0% of true expected value.

4.1 Quantum Exclusion Principle:

The Quantum Exclusion Principle (QEP) states that iron atoms have dual quantum properties that allows them to either generate gravitational or magnetic flux fields. However, the same iron atoms (e.g. inside planetary cores) cannot simultaneously produce both gravitation and magnetic flux fields. Iron atoms under '*celestial pressure compression*' inside inner cores generate gravitational flux. Conversely, iron atoms within outer cores under '*celestial temperatures expansion*' produce magnetic flux fields via Dynamos and the Coriolis process.

QME theory's QEP principle states that the celestial temperatures-based Planck constant used in the quantum electromagnetism systems is not compatible with the celestial pressures-based gravitational systems. This implies Planck constant is fully valid for electromagnetic systems but invalid for the celestial pressure induced gravitational systems. Consequently, per the QEP, Planck constant cannot be applied correctly to the celestial pressure induced gravitational systems.

$$\hbar\ (\text{Electromagnetism}[T]) \neq \hbar\ (\text{Gravitation}[P]) \quad (6)$$

As shown in Figure-1 below, a new exclusive Planck equivalent constant called the QME quantum gravitation constant ($ƚ_{QME}$) has to be derived and developed specifically for the celestial pressures-based mass-energy gravitational systems.

$$\hbar\ (\text{Electromagnetism}[T]\ \text{systems}) \equiv ƚ_{QME}\ (\text{Gravitation}[P]\ \text{systems}) \quad (7)$$

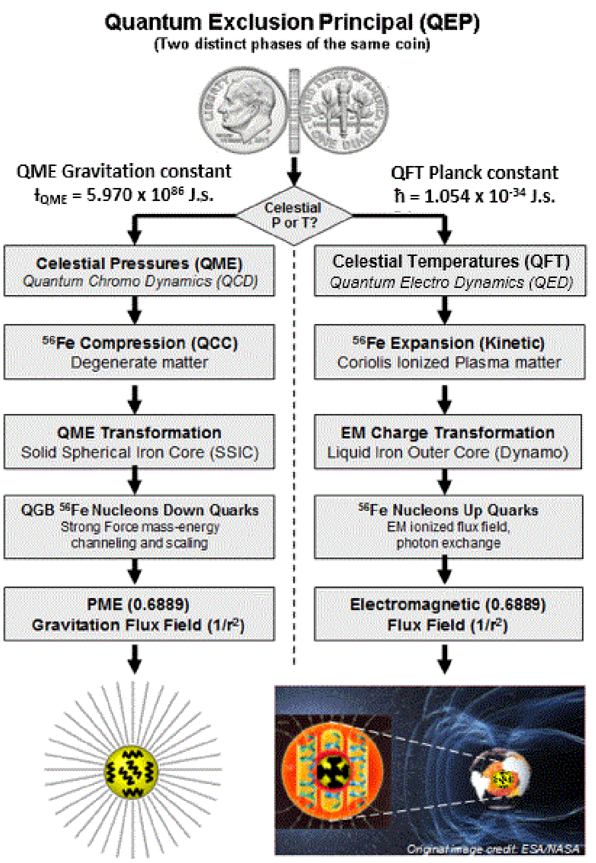


Figure-1: *Shows Quantum Exclusion Principle (QEP) Flow Chart*

We will next derive the Planck equivalent QME quantum gravitation constant ($ƚ_{QME}$) and apply it to solve the largest QFT vacuum density discrepancy in all of science.

$$\text{Electromagnetism}\ (\hbar) \equiv \text{Gravitation}\ (ƚ_{QME})$$

$$\hbar\ (1.054 \times 10^{-34}\ \text{J.s}) \equiv ƚ_{QME}\ (5.970 \times 10^{86}\ \text{J.s}) \quad (8)$$

4.2 QME Theory Laws of Mass-Energy Gravitation:

In order to derive the universal QME quantum gravitation constant ($ł_{QME}$) we will apply the following QME laws of mass-energy gravitation. Since the mass-energy distribution in the universe is based on the cosmological principle (i.e. homogeneous & isotropic), the universe can be modelled with a virtual 17% radius Gravity Generating core (GGC) [9]. This virtual core generates the universe's total passive mass-energy flux halo equivalent to all of the GGCs present in the universe. QME theory mathematically validates all three types of GGCs with 17% radii namely: (1) Solid Spherical Iron Cores (SSIC) in celestial spheres, (2) Solid Spherical Neutron Cores (SSNC) in neutron stars, and (3) Spherical Super-plasma Quark Cores (SSQC) in galaxy centers. Hence the universe can be accurately modeled and analyzed with QME laws in Table-1.

Table-1 QME Laws of Mass-Energy (ME) Quantum Gravitation [5]

QME Laws	Predictive, Measurable, and Testable Parameters	Fifteen Universal QME Laws for Celestial Pressure Physics
First	Cosmological & Quantum Exclusion Principle (QEP)	Mass-Energy density (%) parameters ≡ universal constants in current epoch
Second	Formation Inner Core radius	$R_C = 0.17 * R_S$; (±3.0%)
Third	Core Flux strength	Cosmic web flux dissipation= $(1/R_C^2) \Rightarrow \infty$
Fourth	Sphere Max gravity	$g_{max} = [g_S * (R_S/R_C)^2] = 34.602 * g_S$
Fifth	Core surface gravity	$g_C = g_S * [(R_S/R_C) - 1]^2 = 23.837 * g_S$
Sixth	Sphere surface gravity	$g_S = g_{max} \div 34.602$
Seventh	Halo internal gravity	$g(x) = g_S * (R(x)/R_C)^2$; $R_S \geq R(x) \geq R_C$
Eighth	Total ME (normalized)	$TME(\Omega_{tot})$ = (PME + MME) = 1.0
Ninth	Passive ME (Dark Energy)	$\Omega_\Lambda = (g_C \div g_{max}) = 0.6889$
Tenth	Total Matter ME (MME)	$\Omega_m = (g_{max} - g_C)/g_{max} = 0.3111$
Eleventh	Embedded ME (Dark Matter)	$\Omega_C = [9.087 * (g_S \div g_{max})] = 0.2626$
Twelfth	Baryon Visible Mass	BVM $(\Omega_b) = [1.1559 * (g_S/g_C)] = 0.0485$
Thirteenth	Proportional Halo size	$R_S \propto 4.88 * R_C$ (elastic sphere size)
Fourteenth	PME fraction to surface gravity	RSG = $(g_S \div g_C) = 0.0419$
Fifteenth	TME fraction to Cosmic web	SFF = $(g_S \div g_{max}) = 0.0289$

Where:
g_S = Celestial sphere external surface gravity
g_C = Solid Spherical Iron (neutron, quark) Core (SSIC) surface gravity
g_{max} = Celestial sphere maximum gravity from sphere center
R_S = Celestial sphere surface radius
R_C = Internal Core radius
TME = Total Mass-Energy (normalized)
PME = Passive Mass-Energy (%) or dark energy generated from the core surface which depletes to celestial sphere surface gravity & cosmic web in outer space.
MME = Matter Mass-Energy (%)
EME = Embedded Mass-Energy (%) that also adds ~5x core mass as dark matter
BVM = Baryon Visible Mass-Energy (%) (visible mass)
RSG = Celestial sphere Residual Surface Gravity (%)
SFF = Space Flux Field (%) or cosmic web in outer space

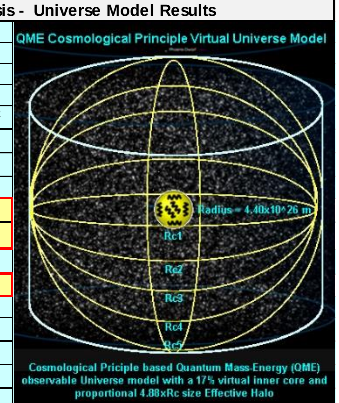
4.3 QME Universe model Results required for the derivation of the Quantum Gravitation constant ($ł_{QME}$):

In this section, we will apply the QME laws on the universe model to calculate all of the critical density parameters. In line with QME theory the universe can be modelled as a spherical gravitational halo around a 17% radius virtual core [9] at its center emitting PME flux. This is scientifically justifiable since the universe is homogeneous, isotropic, has universal critical density parameter constants, and has celestial cores (iron inner cores, neutron cores, and quark plasma cores) generating proportional size PME halos. The QME universe model critical density parameter analyses results, based on these assertions, independently match the original Wilkinson Microwave Anisotropy Probe (WMAP) study [10], the multi-year WMAP collaborative study, and the ESA Planck satellite (2015) results with mean percent errors for NASA WMAP ≤ 3.24%, multi-year NASA WMAP collaboration ≤ 2.66%, and ESA Planck satellite (2015) results ≤ 0.26% respectively. [5]

The QME universe model analyses results are summarized in Table-2.

Table-2 QME Analyses Results - Mass-Energy Universe Model [5],[12]

Quantum Mass-Energy (QME) Standard Analysis - Universe Model Results		
SSIC Radius percent	17.00	%
Sphere Radius (Rs)	4.400E+26	m
SSIC Radius (Rc)	7.480E+25	m
BVM sphere mass (Mv)	1.500E+52	kg
Universal G constant	6.674E-11	$m^3/kg\text{-}s^2$
SSIC core volume (Vc)	1.753E+78	m^3
QCC density (ρc)	14626.89	kg/m^3
SSIC mass (Mc)	2.564E+82	kg
SSG virtual gs	**5.168E-12**	**m/s^2**
QME - CSG g_c	**1.232E-10**	**m/s^2**
QME - SMG gmax	1.788E-10	m/s^2
QME - RSG	**4.195**	**%**
QME - SFF	2.890	%
QME - TME (ρ)	8.551E-27	kg/m^3
QME - PME (ρ)	5.891E-27	kg/m^3
QME - MME (ρ)	2.660E-27	kg/m^3
QME - EME (ρ)	2.246E-27	kg/m^3
QME - BME (ρ)	4.147E-28	kg/m^3
QME - TME (m)	1.499E+52	kg
QME - PME (m)	**1.033E+52**	**kg**
QME - MME (m)	4.664E+51	kg
QME - EME (m)	3.937E+51	kg
QME - BME (m)	7.271E+50	kg



ME Density	QME	Planck	Delta
TME Ω_{tot}	100.00%	**100.00%**	0.00%
PME Ω_Λ	**68.89%**	**69.11%**	-0.22%
MME Ω_m	**31.11%**	**30.89%**	0.22%
EME Ω_c	26.26%	**25.89%**	0.37%
BVM $\Omega_{b\text{-}vi}$	**4.85%**	**4.86%**	-0.01%

Applying the QME gravitation laws to the universe model provides the universe total Passive Mass-Energy (PME) value (i.e. including gravitation) in units of mass equal to 1.033×10^{52} kg [5]. From this universe total PME value its vacuum density value can be calculated. One can obtain the universe vacuum density by isolating the portion of visible matter present in the inter-stellar, galactic, and inter-galactic space and then separating out the corresponding visible baryon matter.

4.4 Erroneous QFT Vacuum Density calculation results with Reduced Planck constant (ħ):

For all practical purposes, the expected QFT Planck vacuum density ρ_Λ has to be constructed from the combining constants of ħ, G, and c. However, that produces an unrealistic and extremely large QFT result:

$$\rho_\Lambda(QFT) = [(c^5/(\hbar * G^2))] = 5.155 \times 10^{96} \text{ kg/m}^3 \qquad (9)$$

This result of 5.155×10^{96} kg/m³ when compared to the expected value of approximately 6.0×10^{-27} kg/m³ gives us the *"The largest discrepancy between theory and experiment in all of science!" [2].*

4.5 Derivation of QME Quantum Gravitation constant:

First calculate Planck mass equivalent then substitute in PME mass from Table-1. Planck mass is given by the expression [13]:

$$m_P = (\hbar c/8\pi G)^{1/2} = m_P^2 = \hbar c/8\pi G \quad (10)$$

Expression in (10) can be written as:

$$\mathbf{\hbar = m_P^2\, 8\pi G/c} \quad \mathbf{(11)}$$

From the QME ninth law we have PME(m) = 1.033×10^{52} kg [5] (12)

From universe model substitute PME(m) ≡ m_P or equation (11) may be substituted for quantum gravitation constant ($ƚ_{QME}$) as follows:

$$\mathbf{\hbar_{QME} \equiv ƚ_{QME} = [(PME(m))^2 * 8\pi G]/c} \quad \mathbf{(13)}$$

$$ƚ_{QME} = [((1.033 \times 10^{52})^2 * (6.674 \times 10^{-11} * 8\pi)) \div (2.998 \times 10^8)]$$

From (13), the two new Planck equivalent QME quantum gravitation constant (l_{QME}) and the reduced quantum gravitation constant ($ƚ_{QME}$) values are:

$$\mathbf{ƚ_{QME} = 5.970 \times 10^{86}\ kg\text{-}m^2/s\ (J.s)} \quad \mathbf{(14)}$$
$$\mathbf{l_{QME} = 3.751 \times 10^{87}\ kg\text{-}m^2/s\ (J.s)} \quad \mathbf{(15)}$$

The QME quantum gravitation constants are based on the total amount of passive mass-energy (i.e. dark energy/gravitation) in the universe. The particle virtual quantum gravitation at the nuclide and atomic levels can be readily derived from these QME quantum gravitation constants listed in (14) & (15).

4.6 PME Density calculation with the New Quantum Gravitation constant ($ƚ_{QME}$):

This large QFT vacuum density discrepancy can be resolved by applying the QME theory. Substituting QME equivalent constant $ƚ_{QME}$ from (14) to replace QFT ħ in (9) provides the correct expression for QME critical density:

$$\mathbf{\rho_{PME} = [(c^5/(\hbar * G^2))] \equiv [(c^5/(ƚ_{QME} * G^2))]} \quad \mathbf{(16)}$$

$$\rho_{PME} = [(2.998\times10^8)^5 \div (5.970\times10^{86} * (6.674\times10^{-11})^2)] = 9.105 \times 10^{-25}\ kg/m^3$$

However, couple of minor adjustments are further necessary to exactly match the measured vacuum density. As we know from the QME laws, PME permeates through any medium as it spherically dissipates, decays, and dilutes as a function of distance ($1/r^2$) from GGC surfaces. From this valid assertion we can develop the following two adjustment factors

4.6.1 Adjustment Factor for the Fraction of Residual PME present in Space Vacuum (β):

First adjustment for residual fraction of PME present in space (β):
From QME fifth law we have: $g_C = g_S * [(R_S/R_C) - 1]^2 = (23.837 * g_S)$

Applying virtual surface gravity: $g_S = 5.168 \times 10^{-12} m/s^2$
we get virtual inner core surface gravity: $g_C = 1.232 \times 10^{-10} m/s^2$

From QME fourteenth law we have [5]:

$$\mathbf{\beta = RSG = (g_S \div g_C) = 0.0419} \quad \mathbf{(17)}$$

Celestial pressure compressed GGC generate 68.89% normalized Passive Mass-Energy (PME) or dark energy of which only 4.19% remains as the Residual Surface Gravity (RSG) that fills up the universe [8].

4.6.2 Adjustment Factor for the Fraction of Visible Baryon Matter Present in the Universe (λ):

The second adjustment factor (λ) needed that also has to be physically measurable as vacuum density, is the fraction of Baryon Visible Mass (BVM) within total Matter Mass-Energy (MME). Total MME = Dark Matter + Visible Matter. From QME Tenth and Twelfth laws:

Total Mass-Energy (TME) = (PME + MME)
where: TME = (0.6889 + 0.3111) = 1.0 and
MME = (BVM + EME) = (0.0485 + 0.2626) = 0.3111

Therefore, total visible matter in the universe is given by:

$$\mathbf{\lambda = (\Omega_b/\Omega_m) = (BVM/MME) = 0.1559} \quad \mathbf{(18)}$$

$$\lambda = (BVM/MME) = (0.0485/0.3111) = 0.1559\ [5]$$

Finally modifying (16) with adjustment factors from (17) and (18) we get:

$$\mathbf{QME\ \rho_{Vacuum} = [(c^5/(ƚ_{QME} * G^2))] * \beta * \lambda} \quad \mathbf{(19)}$$

QME ρ_{Vacuum} = $[((2.998 \times 10^8)^5 \div (5.970 \times 10^{86} * (6.674 \times 10^{-11})^2))] * [(0.0419) * (0.1559)]$

$$\mathbf{QME\ \rho_{Vacuum} = 5.948 \times 10^{-27}\ kg/m^3\ !}$$

QME analyses vacuum density ρ_{Vacuum} = 5.948×10^{-27} kg/m^3 result obtained by applying QEP to derive the new Planck equivalent quantum gravitation constant $ƚ_{QME}$ solves *"<u>The largest discrepancy between theory and experiment in all of science!</u>" problem.*

The calculated QME ρ_{Vacuum} value of 5.948×10^{-27} kg/m^3 matches the expected measured value of 6.0×10^{-27} kg/m^3 with an accuracy of ≥ 99.13%. Therefore, the QME quantum gravitation constant ($ƚ_{QME}$) resolves the universe vacuum density discrepancy between QFT and the expected measured values with percent error reduction from 120 orders of magnitude down to < 1.0% of true measured values.

The theoretical QME quantum gravitation constant $ƚ_{QME}$ based vacuum density result of 5.948×10^{-27} kg/m^3 also independently matches the ESA Planck satellite (2015) measured vacuum density value of ρ_{planck} = 5.957×10^{-27} kg/m^3 with a percent accuracy of ≥ 99.85%.

5.0 RESULTS and CONCLUSION:

QME theory solves "*The Largest Discrepancy between (QFT) Theory and Experiment in all of Science*", with a Universe Vacuum Density value = 5.948 x 10^{-27} kg/m^3:

1. *From QME theory the Quantum Exclusion Principle (QEP) is applied to derive a Planck constant equivalent new universal quantum gravitation constant $ƚ_{QME}$ = 5.970 x 10^{86} J.s. Applying this reduced quantum gravitation constant $ƚ_{QME}$ to the QFT density expression provides an accurate universe vacuum density result of 5.948 x10^{-27} kg/m^3. The universal quantum gravitation constant ($ƚ_{QME}$) is shown to resolve the universe vacuum density discrepancy between QFT and the measured expected values with percent error reduction from 120 orders of magnitude down to < 1.0% of true measured values. See overall results summary Table below:*

Universe Vacuum Density Expected Target Value Comparison with Results using QFT ħ, QME/QEP $ƚ_{QME}$, ΛCDM, and CMB methods	Vacuum Density (kg/m^3)	Delta (%)
Expected True Value – Latest Observations and Measurements (latest consensus target):*	6.0 x 10^{-27}	--
QFT - Quantum-scale Planck constant (ħ):	5.155 x 10^{96}	≥ 10^{120}
QME/QEP theory - Planck binary equivalent New Quantum Gravitation constant ($ƚ_{QME}$):	5.948 x 10^{-27}	0.87 %
QME theory - Lambda-CDM basis:	5.891 x 10^{-27}	0.96 %
ESA Planck satellite (2015) CMB basis:	5.957 x 10^{-27}	0.15 %

* *legacy academia nominal value ~7.0 x 10^{-27} kg/m^3 [11]; resulting from high H_0*

QME /QEP Confirms Exclusivity of Quantum Gravitation constant ($ƚ_{QME}$) for Gravitation & Planck constant (ħ) for Electromagnetism:

2. *Quantum Exclusion Principle states that celestial gravitation and electromagnetism are two distinct binary phases. Celestial compressed inner iron cores, neutron cores, and quark/gluon cores with 17% radii exclusively generate gravitation. On the other hand, celestial temperature expanded iron outer core Dynamo Coriolis flows exclusively produce electromagnetism. These two celestial phenomena require two different sets of constants as summarized in the Table below:*

QFT - Planck constants	QME/QEP – Khan constants
Planck/Electromagnetism (T)	QME/Gravitation (P)
Celestial Temperature driven Quantum expansion	Celestial Pressures induced Quantum compaction
Dynamo's/Coriolis Outer cores [9]	17% proportional radius Inner cores [9]
Electron-Proton-Photon systems	Quark-gluon-Strong force mechanism
h = 6.626 x 10^{-34} J.s	**I = 3.751 x 10^{87} J.s**
ħ = 1.054 x 10^{-34} J.s	**ƚ = 5.970 x 10^{86} J.s**

QME Quantum Gravitation constants ($ƚ_{QME}$) derived to reconcile GUT and TOE Theories:

3. *QME quantum gravitation constant ($ƚ_{QME}$) can be successfully applied to the ongoing research in the scientific fields related to Grand Unification Theory (GUT) and the Theory of Everything (TOE) that will help unify quantum scale with the universe large scale structure.*

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