Nuclear and Cosmic Wavefunction Models Forming a New Quantum Gravity Paradigm

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The purpose of the present paper is to present my potential discovery of

1. The Cosmic wavefunction model that governs the cosmic world,

   and

2. The Nuclear wavefunction model that governs the quantum world.

These two Quantum wavefunction models are separated by their action realms but very similar in their ingrained structural mechanisms.

The core element of this Quantum wavefunction model set is the concept of orbital/motion frequencies for both cosmic and quantum objects, and the quantization principle of the ingrained feature determination mechanisms for these objects.

Each wavefunction model can demonstrate that the orbital positions (from the captor out) of all the captives inside their system are not random, but are coordinated according to the model's mechanism which uses the orbital/motion frequencies as the shared factor.

Nuclear Wavefunction Model

Based on my research findings:

In the quantum world realm that exclusively involves quantum objects inside atoms, the discovery-postulated model is called the:

"Nuclear wavefunction model".

The Nuclear wavefunction model is a natural conclusion derived from the examination of all my discovery-postulated equations, which come themselves from the reformulation of the publicly-known equations of quantum objects using my discovery-postulated Quantum gravitational constant G_K.

The examination of all my discovery-postulated equations reveals a shared core element, defined as the orbital frequency of the quantum captive (denoted as "f_{DC}").

The discovery-postulated equations that materialize the Nuclear wavefunction model are:

1. Orbital frequency of the quantum captive (denoted as "f_{DC}"):

   $f_{DC} = \alpha^{-1}$

2. Quantum gravitational constant (G_K):

   $G_K = e^2 / (m_{proton} \text{ x } m_{electron}\, 4\pi\varepsilon_0)$ (=d1)

   $[N \cdot m^2 \cdot kg^{-2}]$ or $[m^3 \cdot kg^{-1} \cdot s^{-2}]$

3. Compton wavelength of an electron (λ_e):

   $\lambda_e = [G_K\, m_{proton} / c^2] \text{ x } f_{DC}$ [m] (=i18)

4. Bohr radius of hydrogen atom (a_0):

   $a_0 = [G_K\, m_{proton} / c^2] \text{ x } f_{DC}^2$ [m] (=b7)

5. Planck constant combination ($\hbar/c$):

   $\hbar/c = [G_K\, m_{proton} \text{ x } m_{electron} / c^2] \text{ x } f_{DC}$ (=h9)

   $[j \cdot m^{-1} \cdot s^2]$ or $[j \cdot hz^{-1} \cdot m^{-1} \cdot s]$ or $[N \cdot s^2]$ or $[kg \cdot m]$

6. Rydberg constant (R_∞):

   $R_\infty = (1/4\pi) / ([G_K\, m_{proton} / c^2] \text{ x } (\alpha^{-1})^3)$ $[m^{-1}]$ (=r22)

with all defined components as:

f_{DC} is my discovery-postulated "orbital/motion" frequency generated by the captor-acting quantum object (captor for short) for the involved captive-acting quantum object (captive for short),

α^{-1} is the reciprocal of the fine-structure constant,

G_K is my discovery-postulated Quantum gravitational constant,

λ_e is the reduced Compton wavelength of the electron,

a_0 is the Bohr radius of atom,

$\hbar$ is the reduced Planck constant,

e is the electric charge of the electron,

$m_{protton}$ is the rest mass of the proton,

$m_{electron}$ is the rest mass of the electron,

ε_0 is the permittivity of free space (aka electric constant),

c is the speed of light in vacuum.

Cosmic Wavefunction Model

Based on my research findings:

In the cosmic world realm that exclusively involves captor-acting and captive-acting celestial objects (captors and captives for short), there appears to exist a physics model called:

The Cosmic wavefunction model, which is based on my discovery-postulated:

Cosmic orbital frequency quantization mechanism (COFQM for short)

Regarding the rationale of this discovery-postulated Cosmic wavefunction model, the paper will explain in detail that:

This Cosmic wavefunction model comprises a set of quantum mechanisms and objects that the universe can use to build quantum structures that govern cosmic systems, in which celestial objects can play the role of captors, captives or both (captor in one cosmic system and at the same time captive in another).

My mathematical validation of the Cosmic wavefunction model currently exists for galaxies, star-planet systems and planet-moon systems.

The Cosmic wavefunction model is mathematically materialized by my following discovery-postulated equations with the exception of the Lorentz's factor equation, which shared a core element defined as the orbital frequency of the captive (denoted as "f_{DC}"):

1. Orbital frequency of the captive celestial object (f_{DC}) which determines its mean orbital velocity (V):

   $$f_{DC} = c / V \qquad \text{(=s1)}$$

2. Mean orbital radius of the captive celestial object (R) from prediction:

   $$R = [GM/c^2] \times f_{DC}^2 \qquad \text{(=y2)}$$

3. Fixed orbital period of the captive celestial object (T) from

prediction:

$$T = 2\pi \times ([GM/c^3] \times f_{DC}^3) \quad \text{(=j2)}$$

4. Perihelion precession angle of the captive celestial object (ε) from prediction:

$$\varepsilon = (6\pi / f_{DC}^2) / (1-e^2) \quad \text{(=d1)}$$

5. Lorentz's factor (γ) of an object in motion at a velocity V:

$$\gamma = 1/\sqrt{(1 - 1/f_{DC}^2)} \quad \text{(=s7)}$$

where:

f_{DC} is my discovery-postulated Cosmic orbital frequency generated by the captor for the involved captive (celestial object),

c is the speed of light in vacuum,

V is the mean orbital velocity of the involved captive,

R is the mean orbital radius of the involved captive,

T is the fixed orbital period of the involved captive,

ε is the angle (in radian) of the perihelion precession of the involved captive,

G is Newton's gravitation constant,

M is the mass of the captor (celestial object),

e is the eccentricity of the elliptical orbit of the involved captive.

Shared Mechanisms of Nuclear and Cosmic Wavefunction Models:

Based on my analysis, the two following observations stand out:

— Orbital/motion frequency of the captive.

— Gravitational energy of the captor, and the quantization mechanism using common quanta and quantizer values.

— Quantization-based feature determination mechanism using common quanta and quantizer values.

Key Claims From Nuclear and Cosmic Wavefunction Models

My discovery-postulated Cosmic and Nuclear wavefunction models are composed of the two following discovery-postulated mechanisms:

1. **Cosmic Orbital Frequency Quantization Mechanism (COFQM):**

   The Cosmic orbital frequency quantization mechanism (COFQM) is a mechanism that captor-acting celestial objects use to form their cosmic systems made of captive-acting celestial objects, such as a star and its planets, a planet and its moon.

   The COFQM helps the captor to define the mean orbital velocity, the mean orbital radius, the fixed orbital period, and the perihelion precession for each captive via a shared element that functions as the unique orbital frequency of this captive.

   The COFQM reveals the orbital frequencies of captive-acting celestial objects as the through-line of the latter's motion functionalities. This through-line ultimately reveals the wavefunction nature of these orbital motions.

   The COFQM defines the gravitational potential energy of the captor-acting celestial object as the quanta value, and a specific orbital frequency value for each captive-acting celestial object as the quantizer.

   The COFQM defines the Sun as the captor of the Solar system, and each planet, comet, asteroid, revolving around the Sun as the latter's captives.

   The COFQM reveals that each cosmic system is a captor-managed set of captor-captive pairs.

   The COFQM is mathematically materialized by the following discovery-postulated equations, which shared a core element defined as the orbital frequency of the captive (denoted as "f_{DC}"):

   $$\mathbf{f_{DC} = c / V} \quad \text{(=s1)}$$

   $$\mathbf{R = [GM/c^2] \times f_{DC}^2} \quad \text{(=y2)}$$

   $$\mathbf{T = 2\pi \times ([GM/c^3] \times f_{DC}^3)} \quad \text{(=j2)}$$

   $$\mathbf{\varepsilon = (6\pi / f_{DC}^2) / (1-e^2)} \quad \text{(=d1)}$$

   $$\mathbf{\gamma = 1/\sqrt{(1 - 1/f_{DC}^2)}} \quad \text{(=s7)}$$

   where:

f_{DC} is my discovery-postulated Cosmic orbital frequency generated by the captor for the involved captive (celestial object),

c is the speed of light in vacuum,

V is the mean orbital velocity of the involved captive,

R is the mean orbital radius of the involved captive,

T is the fixed orbital period of the involved captive,

ε is the angle (in radian) of the perihelion precession of the involved captive,

γ is the Lorentz's factor of an object in motion,

G is Newton's gravitation constant,

M is the mass of the captor-acting celestial object,

e is the eccentricity of the elliptical orbit of the involved captive-acting celestial object.

The COFQM reveals that the mean orbital velocity (V) of the involved captive-acting celestial object plays the role of its wavelength (λ):

$$\lambda = V = c / f_{DC} \qquad \text{(=s5)}$$

2. Nuclear Orbital Frequency Quantization Mechanism (NOFQM):

The Nuclear orbital frequency quantization mechanism (NOFQM for short) is a mechanism that captor-acting quantum objects in the atom — such as protons — use to form and manage their atomic systems, which include also neutrons, electrons.

The NOFQM defines the Quantum gravitational potential energy of the proton as the quanta value, and the fine-structure constant (α) as the quantizer. In the NOFQM mechanism, the fine-structure constant plays the role of the orbital frequency of the underlined wavefunction.

Here are my discovery-postulated equations of the public-known equations of quantum objects — obtained from the latter's reformulation using my discovery-postulated Quantum gravitational constant G_K:

2.1. Quantum gravitational potential energy of a proton as a quanta value:

$[G_K\, m_{proton} / c^2]$

2.2. Square value of the reciprocal of fine-structure constant as a quantizer:

$(\alpha^{-1})^2$

2.3. Quanta value and a quantizer defining the Bohr radius (a_0):

$$a_0 = [G_K\, m_{proton} / c^2] \times (\alpha^{-1})^2 \qquad [m] \qquad (=b7)$$

2.4. Quanta value and a quantizer defining the reduced Compton wavelength of the electron ($\lambda\!\!\!^{-}_e$):

$$\lambda\!\!\!^{-}_e = [G_K\, m_{proton} / c^2] \times \alpha^{-1} \qquad [m] \qquad (=i18)$$

2.5. Quanta value and a quantizer defining the reduced Planck constant combination ($\hbar/c$):

$$\hbar/c = [G_K\, m_{proton} \times m_{electron} / c^2] \times \alpha^{-1} \qquad (=h9)$$

$[j \cdot m^{-1} \cdot s^2]$ or $[j \cdot hz^{-1} \cdot m^{-1} \cdot s]$ or $[N \cdot s^2]$ or $[kg \cdot m]$

The NOFQM defines the proton as the co-captor of the atomic system along its peers, and the electron as the captive thereof.

The NOFQM reveals the atomic system is managed by the set of proton-electron pairs it has.

Origin of Nuclear Wavefunction Model From Discovery-Postulated Quantum Twin of Newton's Gravitational Constant G

Based on my previous research findings:

Newton's gravitational constant G appears to have a twin at the quantum level called "Quantum gravitational constant" (or G_K for short). The equation of my discovery-postulated Quantum gravitational constant is:

$$\mathbf{G_K = e^2 / (m_{proton} \times m_{electron}\, 4\pi\varepsilon_0)} \qquad (d1)$$

$[N \cdot m^2 \cdot kg^{-2}]$ or $[m^3 \cdot kg^{-1} \cdot s^{-2}]$

where:

e is the elementary charge constant,

$m_{electron}$ is the mass of an electron,

m_{proton} is the mass of a proton,
ε_0 is the permittivity of free space or the distributed capacitance of the vacuum (aka electric constant)

which is simply same as:

$$\mathbf{G_K = (k\,e^2) / (m_{proton} \times m_{electron})} \qquad \text{(d2)}$$
$$[N \cdot m^2 \cdot kg^{-2}] \text{ or } [m^3 \cdot kg^{-1} \cdot s^{-2}]$$

where
k is the Coulomb constant ($= 1/4\pi\varepsilon_0$)

The SI units of this discovery-postulated Quantum gravitational constant (G_K) are the same as the ones of Newton's gravitational constant, which are defined as:

[Newton·kilogram^{-2}·meter^2] or [kilogram^{-1}·meter^3·second^{-2}]

6. These two equations of the Quantum gravitational constant (G_K) help to rewrite many public-known equations of quantum objects — such as the Planck constant ($\hbar$), the so-called classical electron radius (r_e), the Bohr radius of hydrogen atoms (a_0), the Compton wavelength of electrons ($\lambda\!\!\!^{-}_e$), the Rydberg constant (R_∞), the spectral lines of hydrogen atoms, the Heisenberg uncertainty principle — as shown below:

$$\hbar/c = [G_K\, m_{proton} \times m_{electron} / c^2] \times (\alpha^{-1}) \qquad \text{(=h9)}$$
$$[j \cdot m^{-1} \cdot s^2] \text{ or } [j \cdot hz^{-1} \cdot m^{-1} \cdot s] \text{ or } [N \cdot s^2] \text{ or } [kg \cdot m]$$

$$r_e = G_K\, m_{proton} / c^2 \qquad \text{(=r6)}$$

$$a_0 = [G_K\, m_{proton} / c^2] \times (\alpha^{-1})^2 \qquad [m] \quad \text{(=b7)}$$

$$\lambda\!\!\!^{-}_e = [G_K\, m_{proton} / c^2] \times (\alpha^{-1}) \qquad [m] \quad \text{(=i18)}$$

$$R_\infty = (1/4\pi) / ([G_K\, m_{proton} / c^2] \times (\alpha^{-1})^3) \qquad [m^{-1}] \quad \text{(=r22)}$$

$$\Delta x\, \Delta p \geq ([G_K\, m_{proton} \times m_{electron} \times \alpha^{-1}] / 2c) \qquad \text{(=u50)}$$
$$[J \cdot s] \text{ or } [J \cdot hz^{-1}] \text{ or } [N \cdot m \cdot s] \text{ or } [kg \cdot m^2 \cdot s^{-1}]$$

It turns out that all the newly obtained alternative equations of these quantum objects share one core element: the Quantum gravitational constant (G_K) which demonstrates the presence of the gravitational interaction and the electromagnetic interaction between a proton and an electron. This further emphasizes that quantum gravity is inherent within the Standard model.

7. Newton's gravitational constant (G) — as an experimentally

observed value using classical objects since Cavendish — cannot be used at the atomic scale. This is because it would generate wide margins of error when applied to quantum gravity.

The discovery-postulated Quantum gravitational constant (G_K) is conversely a calculated value using parameters of quantum objects — such as the proton, electron, electric charge. As a result, the obtained value of the Quantum gravitational constant (G_K) is extremely precise at the atomic scale.

Discovery-Postulated Alternative Equation of the Planck Constant Revealing Quantum Gravitational Binding and Wave Nature of Gravity At Atomic Scale

Based on my previous research findings:

The discovery-postulated Quantum gravitational constant (G_K) has led to the reformulation of the Planck constant's equation and its derived ones.

The publicly-known equation of the reduced Planck constant ($\hbar$):

$$\hbar = [e^2 / (c\ 4\pi\varepsilon_0)] \times \alpha^{-1} \qquad \text{(h1)}$$

becomes the equation of the quantization-based energy unit of the gravitational binding between a proton and an electron, and that with the reciprocal of the fine-structure constant as the quantizer:

$$\hbar = [G_K\ m_{proton} \times m_{electron} / c] \times \alpha^{-1} \qquad \text{(=h9)}$$

[j s] or [j hz^{-1}] or [N·m·s] or [kg·m^2·s^{-1}]

Discovery-Postulated Alternative Equation of the So-called Classical Electron Radius (r_e) via Quantum Gravitational Constant (G_K) Revealing Gravitational Energy of a Proton

Based on my research findings:

The publicly-known equation of the so-called classical electron radius (r_e):

$$r_e = e^2 / [m_{electron}\ c^2\ 4\pi\varepsilon_0] \qquad \text{(=r1)}$$

where:
r_e is the so-called classical electron radius,
e is the electric charge of the electron,
$m_{electron}$ is the rest mass of the electron,
c is the speed of light in vacuum,
ε_0 is the permittivity of free space (aka electric constant).

alternatively becomes the equation of the gravitational energy of a proton:

$$\mathbf{r_e = G_K\, m_{proton} / c^2} \qquad \mathbf{[m]} \qquad \text{(=r6)}$$

where:
r_e is the so-called classical electron radius,
G_K is my discovery-postulated Quantum gravitational constant,
m_{proton} is the rest mass of the proton,
c is the speed of light in vacuum

This equation reformulation is possible because the other publicly-known equation of the so-called classical electron radius (r_e):

$$r_e = [\hbar / (m_{electron}\, c)] \times \alpha \qquad \text{(=a5)}$$

contains the value "$\hbar/c$" that has a new value via the Quantum gravitational constant G_K as:

$$\hbar/c = [G_K\, m_{proton} \times m_{electron} / c^2] \times \alpha^{-1} \qquad \text{(=h12)}$$

$[j \cdot m^{-1} \cdot s^2]$ or $[j \cdot hz^{-1} \cdot m^{-1} \cdot s]$ or $[N \cdot s^2]$ or $[kg \cdot m]$

Discovery-Postulated Alternative Equation of the Bohr Radius of Atoms (a_0) via Quantum Gravitational Constant (G_K) Revealing Gravitational Energy of a Proton and Quantization Mechanism of Generic Atomic Radius

Based on my research findings:

The publicly-known equation of Bohr radius (a_0):

$$\mathbf{a_0 = r_e \times (\alpha^{-1})^2} \qquad \text{(b2)}$$

where:

a_0 is the Bohr radius of atoms,
r_e is the so-called classical electron radius,
α is the fine-structure constant,
c is the speed of light in vacuum.

alternatively becomes:

$$\mathbf{a_0 = [G_K \, m_{proton} / c^2] \times (\alpha^{-1})^2} \quad \text{(b7)}$$

Numerical verification for this equation is provided in the chapter Step-by-step numerical verifications of cited equations.

This equation reformulation is possible because the other publicly-known equation of Bohr radius of atoms (a_0):

$$a_0 = r_e \times (\alpha^{-1})^2 \quad \text{(b2)}$$

contains the term of the so-called classical electron radius (r_e) that has a new value via the Quantum gravitational constant G_K as:

$$r_e = G_K \, m_{proton} / c^2 \quad \text{(=r6)}$$

Discovery-Postulated Alternative Equation of the Compton Wavelength of an Electron ($ƛ_e$) via Quantum Gravitational Constant (G_K) Revealing Gravitational Energy of a Proton and Quantization Mechanism of Electron's Compton Wavelength

Based on my research findings:

The publicly-known equation of the reduced Compton wavelength of the electron ($ƛ_e$):

$$ƛ_e = \hbar / (m_{electron} \, c) \quad \text{(=i15)}$$

where:
$ƛ_e$ is the reduced Compton wavelength of the electron,
$\hbar$ is the Planck constant,
$m_{electron}$ is the mass of the electron,
c is the speed of light in vacuum.

alternatively becomes the equation of the gravitational energy of a proton, and that multiplied by the reciprocal of the fine-structure constant as the quantizer:

$$\lambdabar_e = [G_K \, m_{proton} / c^2] \times \alpha^{-1} \qquad [m] \qquad (i18)$$

where
$\lambdabar_e$ is the reduced Compton wavelength of the electron,
G_K is my discovery-postulated Quantum gravitational constant,
m_{proton} is the mass of a proton,
c is the speed of light in vacuum,
α^{-1} is the inverse/reciprocal value of the fine-structure constant.

Discovery-Postulated Alternative Equation of the Rydberg Constant (R_∞) via Quantum Gravitational Constant (G_K) Revealing Gravitational Energy of a Proton and Quantization Mechanism of Rydberg Constant

Based on my research findings:

The publicly-known equation of the Rydberg constant (R_∞) has a much simpler alternative one through its reformulation using my discovery-postulated Quantum gravitational constant, which appears to be hiding inside the Planck constant (h).

The publicly-known equation of Rydberg constant (R_∞):

$$R_\infty = m_{electron} \, e^4 / (8 \varepsilon_0^2 \, h^3 c) \qquad [m^{-1}] \qquad (=r20)$$

where:
R_∞ is Rydberg constant,
$m_{electron}$ is the rest mass of the electron,
e is the electric charge of the electron,
ε_0 is the permittivity of free space (aka electric constant),
h is the Planck constant,
c is the speed of light in vacuum.

alternatively becomes the equation of the gravitational energy of a proton, and that readjusted via a quantization-based value using the cubic value of the reciprocal of the fine-structure constant as the quantizer:

$$R_\infty = (1/4\pi) / ([G_K \, m_{proton} / c^2] \times (\alpha^{-1})^3) \qquad [m^{-1}] \qquad (=r22)$$

where:

G_K is my discovery-postulated Quantum gravitational constant,

m_{proton} is the rest mass of the proton,

α^{-1} is the reciprocal of the fine-structure constant,

c is the speed of light in vacuum.

Differences Between Quantum and Cosmic Spatial Occupation Determination Tools for all Captor-captive Pairs

As a conclusion from my research findings:

As far as the spatial occupation determination tool for all captor-captive pairs is concerned, Nature appears to use the same mechanism of orbital frequency to determine the radius of the physical boundary (surface or sphere) of the involved captor-captive pair as follows:

1. For quantum objects:
   - The Quantum orbital frequency comes from the inverse/reciprocal of the fine-structure constant (α^{-1}).
   - The Orbital quanta value comes from the gravitational potential energy of the captor-acting quantum object (such as the proton).
2. For celestial objects:
   - The Cosmic orbital frequency comes from my discovery-postulated Cosmic orbital frequency quantization mechanism (COFQM).
   - The Orbital quanta value comes from the gravitational potential energy of the captor-acting celestial object (such as the Sun), which is a fundamental part of my discovery-postulated Cosmic orbital frequency quantization mechanism (COFQM).

Discovery-Postulated Deep Correlation Between Orbital Period And Orbital Radius In Cosmic Orbital Frequency Quantization Mechanism

According to the Cosmic orbital frequency quantization mechanism (COFQM):

The quantization equation dedicated to the determination of the mean orbital radius R of a specific captive, defined as follows:

$$R = [GM/c^2] \times f_{DC}^2 \qquad (=y2)$$

and

The quantization equation dedicated to the determination of the orbital period T of a specific captive, defined as follows:

$$T = 2\pi \times ([GM/c^3] \times f_{DC}^3) \qquad (=j2)$$

are deeply correlated.

This is because

The manifestation of the said deep correlation between these two quantization equations above resides in

The pair of gravitational potential energy (GM/c^2) with a Cosmic orbital frequency of power 2 (f_{DC}^2)

(that determines the mean orbital radius of the involved captive)

and

The pair of gravitational potential energy (GM/c^3) with a Cosmic orbital frequency of power 3 (f_{DC}^3)

(that determines the orbital period of the involved captive).

Concretely for every captive,

The gravitational potential energy level must jump from "GM/c^2" to "GM/c^3" and the Cosmic orbital frequency level must jump from "f_{DC}^2" to "f_{DC}^3" when the captor's calculation changes from mean orbital radius to orbital period.

Discovery-Postulated Cosmic Orbital Frequency Behind Captives' Perihelion Precession Mechanism As Simpler Alternative to Einstein's Equation of Perihelion Precession Angle

Based on my previous findings:

My two discovery-postulated equivalent Cosmic orbital frequency-based equations for the angle (ε) of perihelion precession of any captive:

$$\boldsymbol{\varepsilon = (6\pi / f_{DC}^2) / (1\text{-}e^2)} \qquad (=d1)$$

and

$$\boldsymbol{\varepsilon = (6\pi \text{ x } [v/c]^2) / (1\text{-}e^2)} \qquad (d0.0)$$

where:
ε is the angle of perihelion precession of a given captive,
f_{DC} is the Cosmic orbital frequency of the said captive,
v is the orbital velocity of the said captive,
c is the speed of light in vacuum.

yield exactly the same result as Einstein's equation for the angle (ε) of perihelion precession of any captive:

$$\boldsymbol{\varepsilon = 24\pi^3 \text{ x } [a^2 / T^2 c^2 (1\text{-}e^2)]} \qquad (e1)$$

An example of COFQM for the planet Mercury is as follows:

— Gravitational potential energy of the Sun as a quanta value:

$[G\, m_{sun} / c^2]$ = 1,476.6919 m or 1.476619 km

$[G\, m_{sun} / c^3]$ = 4.9257139750994e-6 seconds

based on: Msun = 1.9885e+30 kg,
G = 6.6743e-11 (N kg^{-2} m^2),
c = 299,792,458 m

The Gravitational potential energy of the Sun is needed for the prediction of the mean orbital radius and the fixed orbital period of Mercury.

— The discovered Orbital frequency of Mercury ($f_{DC\_mercury}$) as a quantizer:

$f_{DC\_mercury}$ = 6,262.62

The discovered Orbital frequency of Mercury comes from the latter's observed mean orbital velocity as:

$f_{DC\_mercury} = c / V_{mercury}$
= 299,792,458 [$m \cdot s^{-1}$] / 47,870 [$m \cdot s^{-1}$]

— The predicted mean orbital radius (semi-major axis) of

Mercury ($R_{mercury}$) from the relevant quanta value and quantizer:

$R_{mercury} = [G\ m_{sun} / c^2] \times f_{DC\_mercury}^2$ →

$R_{mercury} = 1{,}476.6919$ km x $6{,}262.62^2$ →

$R_{mercury} = 57{,}916{,}386$ km →

which tightly matches Mercury's observed mean orbital radius of 57,910,000 km (Δ=0.011%).

— The predicted orbital period (semi-major axis) of Mercury ($T_{mercury}$) from the relevant quanta value and quantizer:

$T_{mercury} = 2\pi \times ([G\ m_{sun} / c^3] \times f_{DC\_mercury}^3)$

$T_{mercury} = 2\pi \times 4.925713975e\text{-}6\ [s] \times 6{,}262.62^3$ →

$T_{mercury} = 7{,}601{,}814\ [s] = 87.98$ Earth days →

which tightly matches Mercury's observed orbital period of 87.97 days (Δ=0.011%).

— The predicted perihelion precession angle in radian of Mercury ($\varepsilon_{mercury}$) from the relevant quantizer:

$\varepsilon_{mercury} = (6\pi / f_{DC\_mercury}^2) / (1\text{-}e_{mercury}^2)$ →

where $e_{mercury}$ is orbit eccentricity of Mercury.

$\varepsilon_{mercury} = (6\pi / 6{,}262.62^2) / (1 - 0.206^2)$ →

$\varepsilon_{mercury} = 5.01904618e\text{-}7$ [radian] →

$\varepsilon_{mercury} = 2.87570163295258e\text{-}5$ [degrees] →

based on: 5.01904618e-7 [radian] x 180 / π

$\varepsilon_{mercury} = 0.10352525$ [arcs] →

based on: 2.87570163295258e-5 [degrees] x 3600

$\varepsilon_{mercury} = 0.4297057$ [arcs] per Earth year →

based on: 0.10352525 [arcs] x (365.2421988 day per year / 87.994617 day per revolution)

$\varepsilon_{mercury}$ = 42.97057 [arcs] per Earth century →

which tightly matches Mercury's observed perihelion precession angle of 43 seconds per century (Δ=0.07%).

Conclusion

Based on all my findings so far:

My discovery-postulated Nuclear and Cosmic Wavefunction Models can be summarized by the following set of discovery-postulated equations:

$$\textbf{(Nuclear)}\ F_{DC} = \alpha^{-1}$$

$$G_K = e^2 / (M_{proton} \times M_{electron}\ 4\pi\varepsilon_0)$$

$$ƛ_e = [G_K\ M_{proton} / c^2] \times F_{DC}$$

$$a_0 = [G_K\ M_{proton} / c^2] \times F_{DC}^2$$

$$\hbar/c = [G_K\ M_{proton} \times M_{electron} / c^2] \times F_{DC}$$

$$\equiv$$

$$\textbf{(Cosmic)}\ F_{DC} = c / V_{captive}$$

$$R_{captive} = [GM_{captor} / c^2] \times F_{DC}^2$$

$$T_{captive} = 2\pi \times ([GM_{captor} / c^3] \times F_{DC}^3)$$

$$\varepsilon_{captive} = (6\pi / F_{DC}^2) / (1-e^2)$$