Number Theoretic Realization of Quantum Gravi-Mathematical Forms in Weak Gravity

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Part I

Premise:

Newly discovered Physics Forms and their pure Math Form counterparts show a precise interrelationship to Monster group symmetry across a slight energetic vacuum change from the near flat Minkowski type gentle curving space-time of the regular proton-neutron flavor fields to more extremal space-time curvature near a neutron (or black hole) star in the neutron-neutron flavor fields. The nature of the Equivalence Principle is slightly violated but parameters exhibit enough interdependent rigidity to maintain the robustness of General Relativity.

Part I.

Physics Forms using 2014 CODATA and fixed parameter values showing direct interdependence of these values to maintain symmetry across a slight energetic Vacuum change.

Part II.

Number Theoretic Forms maintaining the same relationship to symmetry across a slight energetic Vacuum change.

There is a one to one correspondence between the Physics Forms and the pure Math Forms

CAVEAT: A question answered before it is asked.

Is this a theory of quantum-gravity? No.

The story being presented takes place in the low-energy QCD and weak gravity range we consider from microgravity up to a typical neutron star or similar mass black hole. The theory of General Relativity rules in this domain.

Key concepts:

In number theory there is a relation that uses the Heegner number (163) that yields the best ‘near integer value’

$e^{\pi\sqrt{163}}$= 262537412640768743.99999999999925…

Not a coincidence and is explained in *Field Class Theory* through Complex Multiplication (CM)

Both the Physics and Math Forms (Parts I and II) utilize this as this may have some connection to the Monster group

Key concepts cont'd:

The complete Physics and Math Form (Parts I and II) have a structural affinity that maintains the Monster group symmetry which has order,

808017424794512875886459904961710757005754368000000000

$$\sim 10^{54} \text{ Elements}$$

Or even more importantly as the Super singular Primes having prime order,

$$2^{46}, 3^{20}, 5^{9}, 7^{6}, 11^{2}, 13^{3}, 17, 19, 23, 29, 31, 41, 47, 59, 71$$

Key concepts cont'd:

The dimension-ful ratio,

$$\frac{h}{G}$$

Or its inverse remains invariant throughout the proton-neutron to neutron-neutron flavor field energetic vacuum changes. This also means that the Planck mass remains invariant

$$m_P = \sqrt{\frac{hc}{2\pi G}}$$

Key concepts cont'd:

Flavor fields (Flavor physics): Flavor changes that occur in quarks change properties in larger systems or fields. An example is the proton to neutron conversion which occurs when an up quark (**u**) changes to a down quark (**d**). This is a composition change from **uud** (proton) to **udd** (neutron). As the proton and neutron can be considered as a larger field than its quark ensemble the concept is generalized to proton-neutron (pn) and neutron-neutron (nn) flavor fields. Flavor symmetries are not exact symmetries

Key concepts cont'd:

Gravitational coupling constant, not well defined in Physics literature (generally ignored).

It is the dimensionless very weak gravitational coupling force and is analogous to the three gauge forces of the Standard Model of physics which are the electromagnetic, weak and strong force except that it is extremely much weaker (exponentially) than the 3 forces. It is not the same as the Newton constant of gravity which is dimensional. It is difficult to place within the context of the Standard Model.

Key concepts cont'd:

Utilizes two Gravitational coupling constants,

1. For proton-neutron flavor fields (all type proton stars, planetary gravities and microgravity) which reside in a near flat Minkowski like space-time with non-extremal curvature under the Newton-Einstein domains.
2. For neutron-neutron flavor fields which exist in the more extremal space-time curvatures near neutron star type or similar mass black hole. Non-Newtonian, some probable corrections to GR

The weak Gravitational coupling constant is of the order,

$$\sim 5.9 \times 10^{-39}$$

The large number,

$$\sqrt[4]{\frac{e}{2}}\ 2\alpha^4\ e^{\frac{\pi}{4\alpha}} = 3.382227403 \times 10^{38} \text{ (dimensionless)}$$

α is the structurally fixed fine structure constant,
and $e = 2.718281828459 \ldots$

When divided by 2 and inverted is the proton-neutron Gravitational coupling constant,

$$\left(\sqrt[4]{\frac{e}{2}}\ \alpha^4\ e^{\frac{\pi}{4\alpha}}\right)^{-1} = 5.913262952 \times 10^{-39}$$

This a modified relation taken from Damour where A and B are of natural order unity and ‘t Hooft suggested that B = π/4

$$\text{Gravitational coupling constant} \simeq Ae^{\frac{-B}{\alpha}}$$

Our large number form is very similar to the physics form,

$$\text{Codata 2014}: \frac{hc}{\pi G m_p m_n} = 3.38175(16) \times 10^{38}$$

m_p *and* m_n are the proton and neutron particle mass

Let us set this physics form to the large number form by fixing the Newton constant G,

$$\frac{hc}{\pi G m_p m_n} = 3.382227403 \times 10^{38}$$

Everything else remains Codata 2014 except G, which is fixed into the math structure

$$G = 6.6731404355 \times 10^{-11}\ m^3 kg^{-1} s^{-2}$$

$$\sqrt[4]{\frac{e}{2}}\ 2\alpha^4\ e^{\frac{\pi}{4\alpha}} = 3.382227403 \times 10^{38}\ \text{(dimensionless)}$$

This then affords the possibility that the fine structure constant for pn can be calculated.

Solving for α,

$$\alpha = 0.00729734832518$$

Not terribly far from the Codata 2014 value,

$$\alpha = 0.0072973525376$$

<u>Define a new constant</u>: Z_{pn} What's this?

$$Z_{pn} = \sqrt[2048]{\frac{1}{\sqrt[65536]{\sqrt[4]{8e}\,\alpha^4\, e^{\frac{\pi}{4\alpha}}\,\frac{\alpha^4}{2\pi} - 1}}}$$

Z_{pn} ... defined for relatively flat space-time curvature in proton-neutron flavor fields

Inserting the structurally generated fine structure constant

$$Z_{pn} = 1.00336610183888 \ldots \text{ (dimensionless)}$$

Number Theoretic Note: In Part II Z_{pn} will have the precise value,

Mathematica (9258883200000 2^(1/10) 455^(3/5) 53911588082213^(1/5) (Log[2 Pi]/(EulerGamma Log[2] Log[Pi]))^(6/5) Zeta[3]^(12/5))/(11^(4/5) E^(Sqrt[163] Pi))

$$Z_{pn} = \frac{1}{11^{\frac{4}{5}}}\, 2^{10}\, 3^{10}\, 5^5\, 7^2\, \sqrt[10]{2}\, (5 \times 7 \times 13)^{\frac{3}{5}}\, \sqrt[5]{17\ 19\ 23\ 29\ 31\ 41\ 47\ 59\ 71}\, e^{-\sqrt{163}\pi}\, \zeta(3)^{\frac{12}{5}} \left(\frac{log(2\pi)}{\gamma log(2)\, log(\pi)}\right)^{\frac{6}{5}}$$

$$Z_{pn} = 1.0033661018388772110388306676800 \ldots$$

Since G was fixed and h/G is considered invariant the Planck Mass is fixed and invariant also,

$$m_P = \sqrt{\frac{hc}{2\pi G}} = 2.176623411508 \times\ 10^{-8}\ kg$$

Compare to:

$$\text{Codata 2014} : 2.176470(51) \times 10^{-8}\ kg$$

An excellent approximation to the charged pion mass π^{+-} is discovered

$$\pi^{+-} = \sqrt[4]{Number\ of\ symmetry\ elements\ of\ the\ Monster\ Group\ \times \left(\frac{1}{4}\frac{{m_P}^2}{{m_e}^6}\ {Z_{pn}}^5\right)^{-1}}$$

$$\pi^{+-} = 2.4882140269 \times 10^{-28}\ kg$$

$$\pi^{+-} = 139.57857\ \text{MeV}$$

The 2014 Particle Data Group (PDG) value is,

$$\pi^{+-} = 139.57018(35)\ \text{MeV}$$

(Not too bad…)

The final pn Physics form of the Vacuum that is invariant under transformations of the Monster group symmetry,

$$\frac{1}{4}\,\frac{{m_P}^2}{{m_e}^6}\,(\pi^{+-})^4\,{Z_{pn}}^5 \;=\; 8.0801742476\;\times 10^{53}$$

The value is good to 9 significant figures and calculates those digits matching the Monster integer order

The only parameters using Codata 2014 are, m_e , $m_{p,}$ $m_{n\,,}$ h,

The Planck mass m_P, Newton constant G and charged Pion mass π^{+-} are structurally fixed in the theory and are not published values

Here is a better form representation, showing an affinity of Z_{pn} with boson fields

$$\frac{1}{4}\,\frac{{m_P}^2}{{m_e}^6}\,\left(Z_{pn}\,\pi^{+-}\right)^2\left(Z_{pn}\,\pi^{+-}\right)^2 Z_{pn} = 8.0801742476\ \times 10^{53}$$

$Z_{pn}\,\pi^{+-}$ is an invariant quantity and will be shown to be equivalent to $Z_{nn}\,\pi_{nn}^{+-}$ in the slightly higher energy Vacuum

$$Z_{pn}\,\pi^{+-} = Z_{nn}\,\pi_{nn}^{+-} = 140.048407\ MeV$$

$$or\ \ 2.49658960 \times 10^{-28}\ kg$$

For neutron-neutron flavor fields the quadratic of the famous 'near integer' value is multiplied by 70^2

$$e^{2\pi\sqrt{163}}\,70^2 =$$

$$3377368758769354714663196325060244632\text{00}.0000008023\ldots$$

Where the number 70^2 is related to a solution of a particular Diophantine equation (Edouard Lucas' cannonball problem)

It is close to a physics form which is also a quadratic

$$\frac{hc}{\pi G m_n^2} = 3.37709(16) \times 10^{38}$$

$$\frac{hc}{\pi G m_n^2} = \frac{m_P^2}{m_n^2}$$

Dividing the pure math form by 2 and inverting gives the weak Gravitational coupling constant (neutron-neutron) at or near the surface of a neutron star

$$\left(\frac{e^{2\pi\sqrt{163}}\,70^2}{2}\right)^{-1} = 5.921769705505\ldots \times 10^{-39}\ (dimensionless)$$

It should be noted that this value is a little larger than the proton-neutron Gravitational coupling constant

This value is unique in that the square root of its inverse is a number theoretic value of the Planck mass (similar to the Planck mass-neutron mass ratio) In this case the neutron mass value is normalized to 1

$$\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}} = 1.29949389355420880228193991 4 \ldots \times 10^{19}$$

With the neutron mass being normalized to 1 this large number is also the hierarchal gap between the Standard Model and the Planck scale energetic domain

Since the Planck mass is kept invariant across energetic Vacuum changes the neutron mass can be determined at the nn flavor

$$\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}} = \frac{m_P}{m_{n_{nn}}}$$

$$m_{n_{nn}} = 1.6749777912 \times 10^{-27}\ \text{kg}$$

Using the ratio of the nn neutron mass to pn neutron mass and the idea that h/G is invariant the new nn h, new nn G can be figured

$$\frac{m_{n_{nn}}}{m_n} = 1.0000300432$$

Since the neutron mass is squared in the large relation

$$\frac{h}{G}\,\frac{(1.0000300432)^2}{(1.0000300432)^2}$$

$$h_{nn} = 6.6264681828 \times 10^{-34} J$$

$$G_{nn} = 6.6735414066 \times 10^{-11}\, m^3 kg^{-1} s^{-2}$$

The Newton constant should definitely get larger at the higher Vacuum energy

Then $$e^{2\pi\sqrt{163}}\,70^2 = \frac{h_{nn}c}{\pi G_{nn} m_{n_{nn}}^2}$$

<u>Define a new constant</u>: Z_{nn}

$$Z_{nn} = \sqrt[2048]{\frac{1}{\sqrt[65536]{Exp\left(2\pi\sqrt{163}\right)70^2\,\frac{\alpha^4}{2\pi} - 1}}}$$

Define α as α_{nn}, should be larger as higher Vacuum energy neutron-neutron fields

That the proton-neutron and neutron-neutron fields transform under the invariance of the same symmetry, hybridization of the form is ok

There is democratization due to the *isospin* internal symmetry changes of $SU(2)$ for QCD, i.e. (going from proton transform to neutron transform or reverse)

$$\frac{m_P^2}{m_e^2}\frac{4}{\alpha_{nn}^4}\,Z_{pn} = 8.08017424 \times\ 10^{53}$$

$$\alpha_{nn} = 0.0072974615628$$

$$Z_{nn} = \sqrt[2048]{\frac{1}{\sqrt[65536]{Exp\left(2\pi\sqrt{163}\right) 70^2\ \frac{0.0072974615628^4}{2\pi}} - 1}}$$

$$\mathrm{Z_{nn}} = 1.00336611187247$$

Z_{nn} ... defined for extremal space-time curvature in neutron-neutron flavor fields

Number Theoretic Note: In Part II Z_{nn} will have the precise value,

Mathematica (2057529600000 2^(3/10) 3^(4/5) 11^(2/5) 455^(3/5) 53911588082213^(1/5) (((-83 + 14 Im[ZetaZero[1]]) (Log[2] + Log[Pi]))/(400 - Im[ZetaZero[1]]))^(6/5) Zeta[3]^(12/5))/E^(Sqrt[163] Pi)

$$Z_{nn} = 2^{11}\, 3^{8}\, 5^{5}\, 7^{2}\, 2^{3/10}\, 3^{4/5}\, 11^{2/5}\, (5 \times 7 \times 13)^{3/5}\, \sqrt[5]{17\ 19\ 23\ 29\ 31\ 41\ 47\ 59\ 71}\, e^{-\sqrt{163}\,\pi}\, \zeta(3)^{12/5}$$

$$\times \left(\frac{\big(log(2) + log(\pi)\big)(14\, Im(\rho_1) - 83)}{400\ - Im(\rho_1)}\right)^{6/5}$$

$$Z_{nn} = 1.00336611187247205 02 \ldots$$

Since, $$Z_{pn}\,\pi^{+-} = Z_{nn}\,\pi_{nn}^{+-}$$

$$\pi_{nn}^{+-} = 2.4882140020 \times 10^{-28}\ kg$$

This nn value is slightly smaller than the pn charged pion value (Strong force should decrease at higher energies)

The ratio between these two values,

$$1.00000000999993$$

Since there is a fourth power of the pion mass in the symmetry equation

$$1.000000000999993^4 = 1.00000003999973$$

There is a 6^{th} power of the electron mass in the denominator of the symmetry equation and

$$\sqrt[6]{1.00000003999973} = 1.00000000666662$$

$$m_e\, 1.00000000666662 = m_{e_{nn}} = 9.109383620 \times 10^{-31}\, kg$$

This is a slightly larger value of the electron mass in the slightly higher energy Vacuum as expected as the fine-structure constant has increased slightly in value too. The electron does not undergo flavor changes only hadrons, mesons and quarks

$$\frac{1}{4}\frac{{m_P}^2}{{m_{e_{nn}}}^6}\,(Z_{nn}\pi_{nn}^{+-})^2\,(Z_{nn}\,\pi_{nn}^{+-})^2\,Z_{nn} = \quad 8.08017400 \times 10^{53}$$

Not as good as the proton-neutron value but there is more uncertainty due to 9 significant figures and the redefinitions away from the Codata in the neutron-neutron regime

If the theory is correct,

$$\frac{1}{4}\frac{{m_P}^2}{{m_e}^6}\left(Z_{pn}\,\pi^{+-}\right)^2\left(Z_{pn}\,\pi^{+-}\right)^2 Z_{pn}$$

$$=$$

$$\frac{1}{4}\frac{{m_P}^2}{{m_{e_{nn}}}^6}\left(\ Z_{nn}\,\pi_{nn}^{+-}\ \right)^2\left(\ Z_{nn}\,\pi_{nn}^{+-}\ \right)^2 Z_{nn}$$

Flavor symmetry while not being an exact symmetry participates in an exact symmetry

Another way of looking at these equations as virtual Vacuum energy activity

$$\frac{m_P^2}{m_e^2}\,\frac{2\left(Z_{pn}\pi^{+-}\right)^2}{m_{e+e-}^2}\,\frac{2\left(Z_{pn}\pi^{+-}\right)^2}{m_{e+e-}^2}\;Z_{pn} = \text{Monster Group Order of Elements}$$

$$\frac{m_P^2}{m_{e_{nn}}^2}\,\frac{2\left(Z_{nn}\pi_{nn}^{+-}\right)^2}{m_{e+e-_{nn}}^2}\,\frac{2\left(Z_{nn}\pi_{nn}^{+-}\right)^2}{m_{e+e-_{nn}}^2}\;Z_{nn} = \text{Monster Group Order of Elements}$$

Where, $2m_e = m_{e+e-}$ (positron-electron pair mass)

Remember $Z_{pn}\,\pi^{+-}$ = $Z_{nn}\,\pi_{nn}^{+-} = 140.048407\ MeV$

What is the difference between $Z_{pn}\pi^{+-}$ and π^{+-}

$$Z_{pn}\pi^{+-} - \pi^{+-} = 0.46983\ MeV$$

Is this seen as a soft gamma emission near the galactic center ?

Particle Mass/Physics PANEL PN: (those values used in equations)

PN: Proton-Neutron Flavors (near flat space-time curvature)

Codata 2014:

$m_p = 1.672621898 \times 10^{-27} kg$

$m_n = 1.674927471 \times 10^{-27} kg$

$m_e = 9.10938356 \times 10^{-31} kg$

$h = 6.626070040 \times 10^{-34}\ J$

Structurally fixed:

$m_P = 2.1766234115 \times 10^{-8} kg$

$G = 6.6731404355 \times 10^{-11}\ m^3 kg^{-1} s^{-2}$

$\pi^{+-} = 2.488214026 \times 10^{-28}\ kg$

$\alpha = 0.00729734832518$

Particle Mass/Physics PANEL NN: (those values used in equations)

NN: Neutron-Neutron Flavors (toward extremal space-time curvature)

No established values at this slightly higher energetic Vacuum

These are structurally determined

$m_P = 2.1766234115 \times 10^{-8} kg$ invariant

$G_{nn} = 6.6735414066 \times 10^{-11}\, m^3 kg^{-1} s^{-2}$

$\pi_{nn}^{+-} = 2.4882140020 \times 10^{-28}\, kg$

$\alpha_{nn} = 0.0072974615628$

$m_{n_{nn}} = 1.6749777912 \times 10^{-27}$ kg

$h_{nn} = 6.6264681828 \times 10^{-34} J$

$m_{e_{nn}} = 9.109383620 \times 10^{-31}\, kg$

If you compare the structurally determined pn flavor physics group parameters to the Codata 2014 and the charged pion mass to the Particle Data group (PDG) there is not much deviation. All parameters are inter-dependent in the math structure. It looks very good.

End of Part I

Number Theoretic Realization of Quantum Gravi-Mathematical Forms in Weak Gravity

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Part II

Retort: Not Really

Number Theory: Is that part of mathematics involving intense study of properties of integers and interesting relations or patterns found as a result of that study

Analytic Number Theory: Uses real and complex analysis towards understanding integer properties and prime numbers. Like NT but more stuff added

Experimental Mathematics: Using the strength of computer algorithms to tackle complex mathematical problems

An exhaustive search for identities using computation codes was done. There is a one to one correspondence of the Physics parameters to the NT parameters. Both the proton-neutron and the neutron-neutron forms will be constructed by going from parameter to parameter and showing that the NT parameter ratios are the same or very close as the Physics based forms.

Key concepts:

The 15 Super singular primes are important in the coding as there should be no other primes involved in the NT structures

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 41, 47, 59, 71

There is one exception to this rule and that is the use of the prime 83. The explanation of its existence may be due to corrections to General Relativity in the extremal limit of a neutron star or black hole

Key concepts:

The NT Planck mass (energy)

$$\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}} = 1.2994938935542088022819399914\ldots \times\ 10^{19}$$

Particle mass version: $$\frac{m_P}{m_n} = 1.2995329345 \times 10^{19}\ dimensionless$$

Knowing that the NT forms for the pn and nn flavor fields should be invariant to the precise integer Monster elements

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Key concepts:

Knowing the above a core calculation was found enabled the pn and nn NT forms to be discovered

For pn this form has something to do with the electron mass

$$\frac{3^5 \times 5^4 \times 7^2\ \zeta(3)^2\ log(2\pi)}{22\ \gamma\ log(2)\ log(\pi)} = 1961370.3749964353\ \ldots$$

Mathematica (7441875 Zeta[3]^2 Log[2 Pi])/(22 EulerGamma Log[2] Log[Pi])

For nn this form has something to do with the electron mass corrected at extremal space-time curvature

$$3^4 \times 5^4 \times 7^2\, \zeta(3)^2 \left(\frac{3}{22\, \gamma\, log(2)\, log(\pi)}\right)^{4/5} log(2\pi)\ \sqrt[5]{\frac{14\, Im(\rho_1) - 83}{400 - Im(\rho_1)}}$$

$$= 1961370.3782655364 \ldots$$

Mathematica 2480625 ((-83 + 14 Im[ZetaZero[1]])/(400 - Im[ZetaZero[1]]))^(1/5) (3/(22 EulerGamma Log[2] Log[Pi]))^(4/5) Log[2 Pi] Zeta[3]^2

$\zeta(3)$ is the Riemann zeta function, Apery's constant

γ is the Euler-Mascheroni constant

$Im(\rho_1)$ is the imaginary part of the first nontrivial zero of the Riemann zeta function

PN Flavor fields

We will use this form with Z to the 5th power as fifth roots pop up in the calculations

$$\frac{1}{4}\,\frac{{m_P}^2}{{m_e}^6}\,(\pi^{+-})^4\,{Z_{pn}}^5$$

= 80801742479451287588645990496171075700575436800000000

All parameters will be pure math and exact. We have a head start as the Planck mass and Monster integer are known

$$\frac{1}{4}\,\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{{m_e}^6}\,(\pi^{+-})^4\,{Z_{pn}}^5 = Monster\ Integer$$

The charged pion mass

$$\sqrt[4]{\frac{1}{2048}} = 0.1486508893753\ \ldots$$

Mathematica (1/2048)^(1/4)

The particle mass ratio

$$\frac{\pi^{+-}}{m_n} = 0.14855652379$$

$$\frac{1}{4}\,\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{{m_e}^6}\left(\sqrt[4]{\frac{1}{2048}}\right)^4 {Z_{pn}}^5 = Monster\ Integer$$

The electron mass

$$\left(\sqrt[6]{\frac{\left(2^{3/10}\times\ 35^{3/5}\ e^{1/5\left(3\sqrt{163}\,\pi\right)}\right)^5}{\left(\frac{3^5\times 5^4\times 7^2\ \zeta(3)^2\ log(2\pi)}{22\,\gamma\ log(2)\ log(\pi)}\right)^6}}\right)^{-1}=\left(\frac{22\ \sqrt[4]{2}\,e^{\frac{\sqrt{163}\,\pi}{2}}\ \gamma\ log(2)\ log(\pi)}{3^5\times 5^3\times 7\,\sqrt{35}\,\zeta(3)^2\log(2\pi)}\right)^{-1}$$

Mathematica (((2^(3/10) 35^(3/5) E^((3 Sqrt[163] Pi)/5))^5/((7441875 Zeta[3]^2 Log[2 Pi])/(22 EulerGamma Log[2] Log[Pi]))^6)^(1/6))^(-1)

Mathematica (212625 Sqrt[35] Log[2 Pi] Zeta[3]^2)/(22 2^(1/4) E^((Sqrt[163] Pi)/2) EulerGamma Log[2] Log[Pi])

Electron mass

$$\frac{3^5 \times 5^3 \times 7\sqrt{35}\,\zeta(3)^2 log(2\pi)}{22\sqrt[4]{2}\,e^{\frac{-\sqrt{163}\,\pi}{2}}\,\gamma\, log(2)\, log(\pi)} = \frac{1}{1837.92383617813025 8\ldots}$$

(Mathematica 22 2^(1/4) E^((Sqrt[163] Pi)/2) EulerGamma Log[2] Log[Pi])/(212625 Sqrt[35] Log[2 Pi] Zeta[3]^2)

The particle mass ratio

$$\frac{m_n}{m_e} = 1838.6836606985$$

$$\frac{1}{4}\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{{m_e}^6}\left(\sqrt[4]{\frac{1}{2048}}\right)^4 {Z_{pn}}^5 = Monster\ Integer$$

$$\frac{1}{4}\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{\left(\frac{3^5\times 5^3\times 7\sqrt{35}\,\zeta(3)^2\,\log(2\pi)}{22\sqrt[4]{2}\,e^{\frac{-\sqrt{163}\,\pi}{2}}\,\gamma\,log(2)\,log(\pi)}\right)^6}\left(\sqrt[4]{\frac{1}{2048}}\right)^4 {Z_{pn}}^5 = Monster\ Integer$$

Z_{pn} constant

$$Z_{pn} = \frac{1}{11^{4/5}}\, 2^{10}\, 3^{10}\, 5^5\, 7^2\, \sqrt[10]{2}\, (5 \times 7 \times 13)^{3/5}$$

$$\sqrt[5]{17\ 19\ 23\ 29\ 31\ 41\ 47\ 59\ 71}\ e^{-\sqrt{163}\pi}\, \zeta(3)^{12/5} \left(\frac{log(2\pi)}{\gamma log(2)\ log(\pi)}\right)^{6/5}$$

$$Z_{pn} = 1.00336610183887721103883066768 0\ldots$$

Mathematica (9258883200000 2^(1/10) 455^(3/5) 53911588082213^(1/5) (Log[2 Pi]/(EulerGamma Log[2] Log[Pi]))^(6/5) Zeta[3]^(12/5))/(11^(4/5) E^(Sqrt[163] Pi))

$$\frac{1}{4}\;\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\;70^2}{2}}\right)^2}{\left(\frac{3^5\times 5^3\times 7\sqrt{35}\,\zeta(3)^2\,\log(2\pi)}{22\,\sqrt[4]{2}\,e^{\frac{-\sqrt{163}\,\pi}{2}}\,\gamma\,log(2)\,log(\pi)}\right)^6}\quad\left(\sqrt[4]{\frac{1}{2048}}\right)^4$$

$$\left(\frac{1}{11^{4/5}}\;2^{10}\;3^{10}\;5^5\;7^2\;\sqrt[10]{2}\;(5\times 7$$

$$= 80801742479451287588645990496171075700575436800000000$$

<u>for pn fields</u> , precise and exact

NN Flavor fields

We will use this form with Z to the 5th power as fifth roots pop up in the calculations

$$\frac{1}{4}\,\frac{{m_P}^2}{{m_{e_{nn}}}^6}\,(\pi_{nn}^{+-})^4\,{Z_{nn}}^5$$

= 8080174247945128758864599049617107570057543680000000

$$\frac{1}{4}\,\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{m_{e_{nn}}^6}\,(\pi_{nn}^{+-})^4\,{Z_{nn}}^5 = Monster\ Integer$$

The charged pion mass

$$\sqrt[4]{\frac{1}{2048}\times\frac{1}{\sqrt[4]{\frac{(2\times 11)^4}{3^4}\left(\frac{22}{3}\right)^{4/5}\left(\frac{\gamma\,log(2)\,log(\pi)(14\,Im(\rho_1)-83)}{400-Im(\rho_1)}\right)^{24/5}}}}$$

$$\pi_{nn}^{+-} = 0.1486508890037...$$

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Mathematica (1/2048/((234256/81) (22/3)^(4/5) ((EulerGamma Log[2] Log[Pi] (14 Im[ZetaZero[1]] - 83))/(400 - Im[ZetaZero[1]]))^(24/5))^(1/4))^(1/4)
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The nn charged pion mass is slightly smaller than the pn charged pion mass

$$\pi_{nn}^{+-} \qquad = 0.14865088900 37...$$

$$\pi^{+-} \qquad = 0.1486508893753 \ldots$$

The particle mass ratio

$$\frac{\pi^{+-}}{m_{nn}} = 0.148552059323$$

$$\frac{1}{4}\,\frac{\left(\sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{m_{e_{nn}}^6}\left(\sqrt[4]{\frac{1}{2048}\times\frac{1}{\sqrt[4]{\frac{(2\times 11)^4}{3^4}\left(\frac{22}{3}\right)^{4/5}\left(\frac{\gamma\,log(2)\,log(\pi)(14\,Im(\rho_1)-83)}{400-Im(\rho_1)}\right)^{24/5}}}}\right)^4$$

$$\times\ {Z_{nn}}^5\ = Monster\ Integer$$

The nn electron mass $m_{e_{nn}}$

$$\left(\frac{2^{9/20}\,e^{\frac{\sqrt{163}\,\pi}{2}}\,\sqrt[5]{\frac{11}{3}\gamma\,log(2)\,log(\pi)}\,\left(\frac{400-Im(\rho_1)}{14\,Im(\rho_1)-83}\right)^{4/5}}{3^4\times 5^3\times 7\sqrt{35}\,\zeta(3)^2\,log(2\pi)}\right)^{-1}$$

$$\left(\frac{2^{9/20}\, e^{\frac{\sqrt{163}\,\pi}{2}}\, \sqrt[5]{\frac{11}{3}\gamma\, log(2)\, log(\pi)}\, \left(\frac{400 - Im(\rho_1)}{14\, Im(\rho_1) - 83}\right)^{4/5}}{3^4 \times 5^3 \times 7\sqrt{35}\,\zeta(3)^2\, log(2\pi)}\right)^{-1}$$

Mathematica ((2^(9/20) E^((Sqrt[163] Pi)/2) ((400 - Im[ZetaZero[1]])/(-83 + 14 Im[ZetaZero[1]]))^(4/5) ((11 EulerGamma Log[2] Log[Pi])/3)^(1/5))/(70875 Sqrt[35] Log[2 Pi] Zeta[3]^2))^-1

$$= \frac{1}{1837.9238239253\,\ldots}$$

$$\left(\frac{2 \sqrt[20]{2}\, e^{\frac{\sqrt{163}\,\pi}{2}} \left(11\, \gamma\, log(2)\, log(\pi)\right)^{4/5} \sqrt[5]{\frac{400 - Im(\rho_1)}{14\, Im(\rho_1) - 83}}}{3^4 \times 5^3 \times 7 \times 3^{4/5} \sqrt{35}\, \zeta(3)^2\, log(2\pi)} \right)^{-1}$$

$$m_{e_{nn}} = \frac{1}{1837.9238239253 \ldots}$$

The particle mass ratio

$$\frac{m_{nn}}{m_{e_{nn}}} = 1838.68366060888$$

The nn electron mass is slightly larger than the pn electron mass

$$m_{e_{nn}} = \frac{1}{1837.9238239253\ldots}$$

$$m_e = \frac{1}{1837.9238361781\ldots}$$

Then,

$$\frac{1}{4}\,\frac{\left(\sqrt{\dfrac{e^{2\pi\sqrt{163}}\,70^2}{2}}\right)^2}{\left(\left(\dfrac{2^{9/20}\,e^{\frac{\sqrt{163}\,\pi}{2}}\,\sqrt[5]{\dfrac{11}{3}\gamma\,log(2)\,log(\pi)}\,\left(\dfrac{400-Im(\rho_1)}{14\,Im(\rho_1)-83}\right)^{4/5}}{3^4\times 5^3\times 7\sqrt{35}\,\zeta(3)^2\,log(2\pi)}\right)^{-1}\right)^6}$$

$$\times\left(\sqrt[4]{\frac{1}{2048}\times\frac{1}{\sqrt[4]{\dfrac{(2\times 11)^4}{3^4}\left(\dfrac{22}{3}\right)^{4/5}\left(\dfrac{\gamma\,log(2)\,log(\pi)(14\,Im(\rho_1)-83)}{400-Im(\rho_1)}\right)^{24/5}}}}\right)^4$$

$$\times\ {Z_{nn}}^5 \quad = Monster\ Integer$$

Z_{nn} constant

$$Z_{nn} = 2^{11}\, 3^{8}\, 5^{5}\, 7^{2}\, 2^{3/10}\, 3^{4/5}\, 11^{2/5}\, (5 \times 7 \times 13)^{3/5}$$

$$\times \sqrt[5]{17\ 19\ 23\ 29\ 31\ 41\ 47\ 59\ 71}\; e^{-\sqrt{163}\,\pi}\, \zeta(3)^{12/5}$$

$$\times \left(\frac{\big(log(2) + log(\pi)\big)(14\, Im(\rho_1) - 83)}{400 - Im(\rho_1)}\right)^{6/5}$$

Mathematica (2057529600000 2^(3/10) 3^(4/5) 11^(2/5) 455^(3/5) 53911588082213^(1/5) (((-83 + 14 Im[ZetaZero[1]]) (Log[2] + Log[Pi]))/(400 - Im[ZetaZero[1]]))^(6/5) Zeta[3]^(12/5))/E^(Sqrt[163] Pi)

$$Z_{nn} = 1.0033661118724720502\ldots$$

$$\frac{1}{4}\ \frac{\left(\sqrt{\dfrac{e^{2\pi\sqrt{163}}\ 70^2}{2}}\right)^2}{\left(\left(\dfrac{2^{9/20}\ e^{\frac{\sqrt{163}\,\pi}{2}}\ \sqrt[5]{\dfrac{11}{3}\gamma\ log(2)\ log(\pi)}\ \left(\dfrac{400-Im(\rho_1)}{14\ Im(\rho_1)-83}\right)^{4/5}}{3^4\times 5^3\times 7\sqrt{35}\,\zeta(3)^2\ log(2\pi)}\right)^{-1}\right)^6}$$

$$\times\ \left(\sqrt[4]{\frac{1}{2048}\times\frac{1}{\sqrt[4]{\dfrac{(2\times 11)^4}{3^4}\left(\dfrac{22}{3}\right)^{4/5}\left(\dfrac{\gamma\ log(2)\ log(\pi)(14\ Im(\rho_1)-83)}{400-Im(\rho_1)}\right)^{24/5}}}}\right)^4$$

$$\times\left(2^{11}\ 3^8\ 5^5\ 7^2\ 2^{3/10}\ 3^{4/5}\ 11^{2/5}\ (5\times 7\times\times 13)^{3/5}\ \sqrt[5]{17\ 19\ 23\ 29\ 31\ 41\ 47\ 59\ 71}\ e^{-\sqrt{163}\,\pi}\ \zeta(3)^{12/5}\ \left(\frac{\big(log(2)+log(\pi)\big)(14\ Im(\rho_1)-83)}{400\ -Im(\rho_1)}\right)^{6/5}\right)^5$$

$$= 808017424794512875886459904961710757005754368000000000$$

<u>for nn fields</u> , precise and exact

Particle Mass/Physics PANEL NT PN: (those values used in equations)

NT PN: Proton-Neutron Flavors (near flat space-time curvature)

$$\pi^{+-} = \sqrt[4]{\frac{1}{2048}} = 0.1486508893753\ldots$$

$$\frac{\pi^{+-}}{m_n} = 0.14855652379$$

$$m_e = \frac{3^5 \times 5^3 \times 7\sqrt{35}\,\zeta(3)^2 log(2\pi)}{22\sqrt[4]{2}\,e^{\frac{-\sqrt{163}\,\pi}{2}}\gamma\, log(2)\, log(\pi)} = \frac{1}{1837.92383617813025 8\ldots}$$

$$\frac{m_e}{m_n} = \frac{1}{1838.6836606985}$$

$$m_P = \sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}} = 1.29949389\ldots \times 10^{19}$$

$$\frac{m_P}{m_n} = 1.2995329345 \times 10^{19}$$

Particle Mass/Physics PANEL NT NN: (those values used in equations)

NT NN: Neutron-Neutron Flavors (toward extremal space-time curvature)

$$\pi_{nn}^{+-} = \sqrt[4]{\frac{1}{2048} \times \frac{1}{\sqrt[4]{\frac{(2\times 11)^4}{3^4}\left(\frac{22}{3}\right)^{4/5}\left(\frac{\gamma\, log(2)\, log(\pi)(14\, Im(\rho_1) - 83)}{400 - Im(\rho_1)}\right)^{24/5}}}} = 0.1486508890037...$$

$$\frac{\pi^{+-}}{m_{nn}} = 0.148552059323$$

$$m_{e_{nn}} = \left(\frac{2^{9/20}\, e^{\frac{\sqrt{163}\,\pi}{2}} \sqrt[5]{\frac{11}{3}\gamma\, log(2)\, log(\pi)} \left(\frac{400 - Im(\rho_1)}{14\, Im(\rho_1) - 83}\right)^{4/5}}{3^4 \times 5^3 \times 7\sqrt{35}\,\zeta(3)^2\, log(2\pi)}\right)^{-1} = \frac{1}{1837.9238239253\ldots}$$

Particle Mass/Physics PANEL NT NN: (cont'd)

$$m_{e_{nn}} = \frac{1}{1837.9238239253\ldots}$$

$$\frac{m_{e_{nn}}}{m_{nn}} = \frac{1}{1838.68366060888}$$

The particle mass version of the Planck mass is very close to the NT version

$$\frac{m_P}{m_{nn}} = 1.299493893557 \times 10^{19}$$

$$m_P = \sqrt{\frac{e^{2\pi\sqrt{163}}\,70^2}{2}} = 1.2994938935542088\ldots \times 10^{19}$$

$$PN\ Physics = NN\ Physics$$

$$PN\ Physics = NT\ PN \qquad PN\ Physics = NT\ NN$$

$$NN\ Physics = NT\ NN \qquad NN\ Physics = NT\ PN$$

$$NT\ PN = NT\ NN$$

$$PN\ Physics = NN\ Physics = NT\ PN = NT\ NN$$

All under symmetry transform of the Monster group

NT- Number theoretic

Weak Realm of Newton-Einstein Gravity

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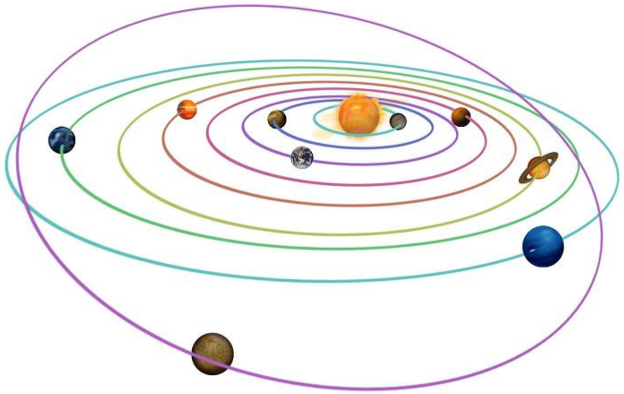
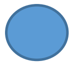
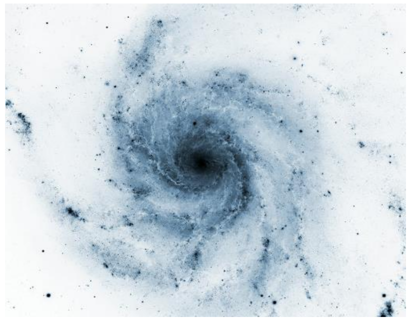


200,000,000,000 $g's$



Neutron Star



Galaxy Center

More Space-Time curvature

Not to size scale