From Ramanujan's Mock Theta Functions to Black Hole Entropies and Particle Physics: Symmetry, Supersymmetry and Golden Ratio

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Abstract

In the present research thesis, we have obtained various interesting new mathematical connections concerning the Ramanujan's mock theta functions, some like-particle solutions, Supersymmetry, some formulas of Haramein's Theory and Black Holes entropies. We obtain excellent approximations to the values of the golden ratio, its conjugate and ζ(2)

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From:

https://evolutionnews.org/2014/12/do_we_live_in_a/

Do We Live in a "Golden Ratio" Universe?

Evolution News | *@DiscoveryCSC*

December 2, 2014, 2:58 AM

We note that:

......To Boeyens and Thackeray, this evidence suggests a deep relationship in the fabric of space-time that includes biology:

> *We suggest that there is a strong case that this so-called 'Golden Ratio' (1.61803…) can be related not only to aspects of mathematics but also to physics, chemistry,* ***biology*** *and* ***the topology of space-time****….*
>
> *Apart from the Golden Ratio, a second common factor among this variety of structures is that they all represent* ***spontaneous growth patterns****. The argument* ***that this amazing consilience ('self-similarity')*** *arises from a response to a* ***common environmental constraint****, which* ***can only be an intrinsic feature of curved space-time****, is compelling. (Emphasis added.)*

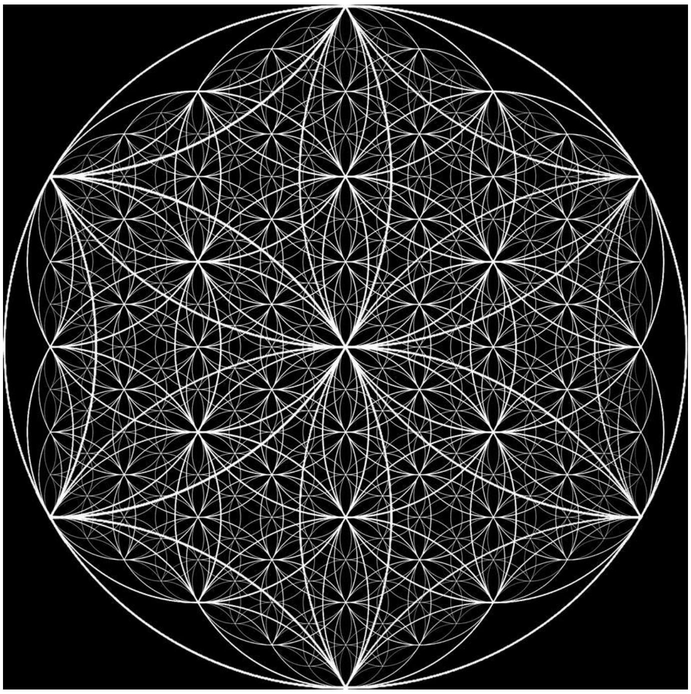
In concluding, they argue for the unification of all the sciences around the Golden Ratio:

*The time has come to recognise that relativity and quantum theories **can be integrated**, and **linked numerically to the value of a mathematical constant** — whether in the context of **space-time or biology**.*

This mathematical constant for us it can be identified with the golden ratio and the golden numbers very closed to it

From:

https://www.cosmosdawn.net/forum/threads/haramein-physics.159/



"When you look at biology, when you look at nature, what do you see? Specific fractals that obey the golden ratio 1.618 ... emerge directly from the structure of the vacuum. The vacuum directs reality and reality paints the structure of the vacuum" (Nassim Haramein)

RAMANUJAN-NARDELLI MOCK GENERAL FORMULA THAT LINKED MASS, TEMPERATURE AND RADIUS OF A QUANTUM OR SUPERMASSIVE BLACK HOLE TO AN APPROXIMATION TO ϕ AND ζ(2)

$$\sqrt{\frac{1}{\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{M}\right)\sqrt{-\frac{T\times4\pi r^3-r^2}{6.67\times10^{-11}}}}} \Rightarrow$$

$$\Rightarrow \quad 6.23179\times10^{-14}\sqrt{\frac{M}{\sqrt{r^2-4\pi r^3 T}}} \Rightarrow$$

$$\Rightarrow \mathbf{1.6182492} \cong \boldsymbol{\phi} = \frac{\sqrt{5}+1}{2} = \mathbf{1.61803398} \ldots$$

EXAMPLE:

$$\sqrt{\left(1\Big/\left(\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{3.170074\times10^{-19}}\sqrt{-\frac{3.871213\times10^{41}\times4\pi(4.707089\times10^{-46})^3-(4.707089\times10^{-46})^2}{6.67\times10^{-11}}}\right)\right)} \quad (1)$$

$\approx$ **1.6182492….**

With 1.897512108×10^{19} as mock:

$$\sqrt{\left(1\Big/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{7.161\times10^{39}}\sqrt{-\frac{1.713732\times10^{-17}\times4\pi(1.063302\times10^{13})^3-(1.063302\times10^{13})^2}{6.67\times10^{-11}}}\right)\right)} \quad (2)$$

$\approx$ **1.64567...**

From:

Mock Theta Functions
Mock Thetafuncties
(met een samenvatting in het Nederlands)

Sander Pieter Zwegers
geboren op 16 april 1975, te Oosterhout

arXiv:0807.4834v1 [math.NT] 30 Jul 2008

In this section we deal with the "seventh order" mock ϑ-functions from Ramanujan's letter. In [12, pp. 666] we find the following (slightly rewritten) identities:

$$(q)_\infty \mathcal{F}_0(q) = \left(\sum_{r,s\geq 0} - \sum_{r,s<0}\right)(-1)^{r+s} q^{\frac{3}{2}r^2+4rs+\frac{3}{2}s^2+\frac{1}{2}r+\frac{1}{2}s}$$

$$(q)_\infty \mathcal{F}_1(q) = \left(\sum_{r,s\geq 0} - \sum_{r,s<0}\right)(-1)^{r+s} q^{\frac{3}{2}r^2+4rs+\frac{3}{2}s^2+\frac{5}{2}r+\frac{5}{2}s+1}$$

$$(q)_\infty \mathcal{F}_2(q) = \left(\sum_{r,s\geq 0} - \sum_{r,s<0}\right)(-1)^{r+s} q^{\frac{3}{2}r^2+4rs+\frac{3}{2}s^2+\frac{3}{2}r+\frac{3}{2}s}.$$

For r = 0.8 and s = 0.8,   r = -0.3 and s = -0.3 ⇒ r = 0.5 and s = 0.5

0.2102241038134286357577813690583 *

0.02627801297667857946972267113229 *

0.10511205190671431787889068452915 = x

x = 5,8066753662242239585815428250026e-4

1/x = 1.722,1558584396073841277449753256

The sum of three results is:

(0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143)

Input interpretation:

$0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143$

Result:

0.3416141686968214

0.341614...

Note that:

(0.341614 * 10^4)/2 + 21

Input interpretation:

$\frac{1}{2}(0.341614 \times 10^4) + 21$

Result:

1729.07

1729.07

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(((0.341614 * 10^4)/2 + 21))^1/15

Input interpretation:

$\sqrt[15]{\frac{1}{2}(0.341614 \times 10^4) + 21}$

Result:

$1.643820\ldots$

$1.643820\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

2sqrt((6(0.341614 * 10^3 * 3)^1/14))

Input interpretation:

$2\sqrt{6\sqrt[14]{0.341614 \times 10^3 \times 3}}$

Result:

6.275222...

6.275222... ≈ 2π

And:

(0.341614 * 10^3 * Pi)+(144+13+2)

Input interpretation:

$0.341614 \times 10^3 \pi + (144 + 13 + 2)$

Result:

1232.21...

1232.21… result practically equal to the rest mass of Delta baryon 1232

Alternative representations:

$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 61.4905 ° 10^3$

- $0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 - 0.341614 \, i \log(-1) \, 10^3$

- $0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 0.341614 \cos^{-1}(-1) \, 10^3$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 1366.46 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

- $$0.341614 \times 10^3 \pi + (144 + 13 + 2) = -524.228 + 683.228 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

•

$$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 341.614 \sum_{k=0}^{\infty} \frac{2^{-k} (-6 + 50 k)}{\binom{3 k}{k}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 683.228 \int_0^{\infty} \frac{1}{1 + t^2} \, dt$$

•

$$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 1366.46 \int_0^1 \sqrt{1 - t^2} \, dt$$

•

$$0.341614 \times 10^3 \pi + (144 + 13 + 2) = 159 + 683.228 \int_0^{\infty} \frac{\sin(t)}{t} \, dt$$

10*0.61803398/(0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143)

Input interpretation:

$$10 \times \frac{0.61803398}{0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143}$$

Result:

18.09157923272491564472144043382680564608256508895392909794...

18.0915792… result very near to the black hole entropy 18.0524

2Pi/(0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143)

Input interpretation:

$$2 \times \frac{\pi}{0.2102241038134286 + 0.0262780129766785 + 0.1051120519067143}$$

Result:

18.39263673151637...

18.392636… result very near to the black hole entropy 18.2773

Alternative representations:

- More

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = \frac{360°}{0.34161416869682140000}$$

-

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = -\frac{2 i \log(-1)}{0.34161416869682140000}$$

-

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = \frac{2 \cos^{-1}(-1)}{0.34161416869682140000}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = 23.418232418515131669 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

-

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = -11.709116209257565835 + 11.709116209257565835 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

•

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = 5.8545581046287829173 \sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = 11.709116209257565835 \int_0^{\infty} \frac{1}{1+t^2}\,dt$$

•

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = 23.418232418515131669 \int_0^1 \sqrt{1-t^2}\,dt$$

•

$$(2\pi)/(0.21022410381342860000 + 0.02627801297667850000 + 0.10511205190671430000) = 11.709116209257565835 \int_0^{\infty} \frac{\sin(t)}{t}\,dt$$

From the result 18.392636, considered as an entropy, we obtain:

Mass = 3.996002e-8

Radius = 5.933470e-35

Temperature = 3.071077e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.996002e-8)* sqrt[[-((((3.071077e+30 * 4*Pi*(5.933470e-35)^3-(5.933470e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.996002\times 10^{-8}}\sqrt{-\frac{3.071077\times 10^{30}\times 4\pi(5.933470\times 10^{-35})^3-(5.933470\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249194126175864027976224246908298827340429640284965843...

1.61824919…

Now, we analyze the following Ramanujan mock theta functions (further interpretation)

$$\varphi_0(q)=\frac{(-q;q^2)_\infty}{(q^2;q^2)_\infty}\sum_{\substack{n=0\\|j|\le n}}^{\infty}(-1)^j q^{5n^2+2n-3j^2-j}(1-q^{6n+3}),$$

For q = 0.5 and j = 2, we obtain

sum (0.5^(5n^2+2n-12-2)) (1-0.5^(6n+3)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{5n^2+2n-2-12}\left(1-0.5^{6n+3}\right)=14463.8$$

14463.8

$$f_1(q)=\frac{1}{(q)_\infty}\sum_{\substack{n=0\\|j|\le n}}^{\infty}(-1)^j q^{\frac{5}{2}n^2+\frac{3}{2}n-j^2}(1-q^{2n+1}),$$

sum (0.5^(2.5n^2+1.5n-4)) (1-0.5^(2n+1)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{2.5n^2+1.5n-4}\left(1-0.5^{2n+1}\right)=8.87689$$

8.87689

$$\psi_1(q) = \frac{(-q)_\infty}{(q)_\infty} \sum_{\substack{n=0 \\ |j|\le n}}^{\infty} (-1)^j q^{\frac{5}{2}n^2+\frac{3}{2}n-\frac{3}{2}j^2-\frac{1}{2}j}(1-q^{2n+1}),$$

sum (0.5^(2.5n^2+1.5n-1.5*4-0.5*2)) (1-0.5^(2n+1)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{2.5\,n^2+1.5\,n-1.5\times 4-0.5\times 2}\left(1-0.5^{2\,n+1}\right) = 71.0151$$

71.0151

$$f_0(q) = \frac{1}{(q)_\infty} \sum_{\substack{n=0 \\ |j|\le n}}^{\infty} (-1)^j q^{\frac{5}{2}n^2+\frac{1}{2}n-j^2}(1-q^{4n+2}),$$

sum (0.5^(2.5n^2+0.5n-4)) (1-0.5^(4n+2)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{2.5\,n^2+0.5\,n-4}\left(1-0.5^{4\,n+2}\right) = 13.9766$$

13.9766

$$\varphi_1(q) = q\frac{(-q;q^2)_\infty}{(q^2;q^2)_\infty} \sum_{\substack{n=0 \\ |j|\le n}}^{\infty} (-1)^j q^{5n^2+4n-3j^2-j}(1-q^{2n+1}).$$

sum (0.5^(5n^2+4n-12-2)) (1-0.5^(2n+1)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{5\,n^2+4\,n-2-12}\left(1-0.5^{2\,n+1}\right) = 8220.$$

8220

$$F_1(q) = \frac{1}{(q^2;q^2)_\infty} \sum_{n=0}^{\infty} \sum_{j=0}^{2n} (-1)^n q^{5n^2+4n-\frac{1}{2}j^2-\frac{1}{2}j} (1+q^{2n+1}),$$

sum (0.5^(5n^2+4n-0.5*4-0.5*2)) (1+0.5^(2n+1)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{5n^2+4n-0.5\times 4-0.5\times 2} (0.5^{2n+1}+1) = 12.0176$$

Partial result 12.0176

sum (0.5^(5n^2+4n-0.5*j^2-0.5*j)) (1+0.5^(2n+1)), j= 0 to 2n

For n = 2

sum (0.5^(5*2^2+8-0.5*j^2-0.5*j)) (1+0.5^(4+1)), j= 0 to 4

Sum:

$$\sum_{j=0}^{4} (1+0.5^{4+1})\, 0.5^{-0.5 j^2-0.5 j+5\times 2^2+8} = \frac{36\,267}{8\,589\,934\,592}$$

Scientific notation:

$4.2220344766974449157714843750 \times 10^{-6}$

Partial result $4.222034476697\ldots * 10^{-6}$

Final result:

Input interpretation:

$4.2220344766974449157714843750 \times 10^{-6} \times 12.0176$

Result:

0.000050738721527159214019775390625

0.000050738721527…

$$1+2\psi_0(q) = \frac{(-q)_\infty}{(q)_\infty}\Big(1+2\sum_{n=1}^{\infty}(-1)^n q^{n^2+n} - 2\sum_{\substack{n=1\\|j|<n}}^{\infty}(-1)^j q^{\frac{5}{2}n^2-\frac{1}{2}n-\frac{3}{2}j^2-\frac{1}{2}j}(1-q^n)\Big),$$

1+2 sum (0.5^(n^2+n)), n= 1 to infinity

Input interpretation:

$$1+2\sum_{n=1}^{\infty} 0.5^{n^2+n}$$

Result:

1.53174

Partial result 1.53174

-2 sum (0.5^(2.5n^2-0.5n-1.5*4-0.5*2)) (1-0.5^n)), n= 1 to infinity

Input interpretation:

$$-2\sum_{n=1}^{\infty} 0.5^{2.5\,n^2-0.5\,n-1.5\times 4-0.5\times 2}\left(1-0.5^n\right)$$

Result:

-32.3751

Partial result: -32.3751

Input interpretation:

1.53174 + 32.3751

Result:

33.90684

Final result:
33.90684

$$F_0(q)=\frac{1}{(q^2;q^2)_\infty}\sum_{n=0}^{\infty}\sum_{j=0}^{2n}(-1)^n q^{5n^2+2n-\frac{1}{2}j^2-\frac{1}{2}j}(1+q^{6n+3}),$$

sum (0.5^(5n^2+2n-0.5*4-0.5*2)) (1+0.5^(6n+3)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{5\,n^2+2\,n-0.5\times 4-0.5\times 2}\left(0.5^{6\,n+3}+1\right)=9.06262$$

Partial result 9.06262

sum (0.5^(5*2^2+4-0.5*j^2-0.5*j)) (1+0.5^(12+3)), j= 0 to 4

Sum:

$$\sum_{j=0}^{4}(1+0.5^{12+3})\,0.5^{-0.5\,j^2-0.5\,j+5\times 2^2+4}=\frac{36\,013\,131}{549\,755\,813\,888}$$

Decimal form:

0.0000655075036775087937712669372558593 75

Partial result 0.0000655075036775…

Final result:

Input interpretation:

0.000065507503677508793771266937255859375 × 9.06262

Result:

0.000593669612977864744607359170913696289 0625

0.00059366961297…

Results:

13.9766 0.00059366961297 33.90684 14463.8 8.87689

0.000050738721527 71.0151 8220

The sum of the above results of the mock theta functions is:

(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)

Input interpretation:

14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151

Result:

22811.576074408334497

22811.576074…

Possible closed forms:

$$-\frac{63589}{3} + \frac{734959}{6\pi} + 1597\pi \approx 22811.57607440833344956125$$

$$1001 e^{\pi} - 415\pi + 3754\log(\pi) + 977\log(2\pi) - 4072\tan^{-1}(\pi) \approx 22811.57607440833344969607$$

$$-6416 + \frac{542}{\pi} + \frac{963}{\sqrt{\pi}} + 928\sqrt{\pi} + 8552\pi \approx 22811.57607440833344969696$$

$\tan^{-1}(x)$ is the inverse tangent function
$\log(x)$ is the natural logarithm

The difference is:

(13.9766 - 0.00059366961297 - 33.90684 - 14463.8 - 8.87689 - 0.000050738721527 - 71.0151 - 8220)

Input interpretation:

13.9766 – 0.00059366961297 – 33.90684 – 14463.8 – 8.87689 – 0.000050738721527 – 71.0151 – 8220

Result:

–22783.622874408334497

-22783.62287...

The various quotients are:

(13.9766 / 0.00059366961297 * 1/ 33.90684 * 1/ 14463.8 * 1/8.87689 * 1/ 0.000050738721527 * 1/71.0151 * 1/ 8220)

Input interpretation:

$$\frac{13.9766}{0.00059366961297} \times \frac{1}{33.90684} \times \frac{1}{14463.8} \times \frac{1}{8.87689} \times \frac{1}{0.000050738721527} \times \frac{1}{71.0151} \times \frac{1}{8220}$$

Result:

0.000182584586573468894796552824076936073133951325833419639...

0.0001825845865…..

From the value of the sum of the mock theta functions, we obtain:

(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)/13

Input interpretation:

$$\frac{1}{13}(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)$$

Result:

1754.736621108333422846153846153846153846153846153846...

1754.73662211

result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)^((13+5+2)/(377+34+5+1))

Input interpretation:

$$(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)^{(13+5+2)/(377+34+5+1)}$$

Result:

1.6181703...

1.6181703...

This result is a very good approximation to the value of the golden ratio 1,618033988749...

(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)^1/20

Input interpretation:

$$(14463.8 + 8.87689 + 0.00059366961297 + 33.90684 + 0.000050738721527 + 8220 + 13.9766 + 71.0151)\text{^}(1/20)$$

Result:

1.651611...

1.651611... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

We have also:

1.61803398^2+ln 22811.576074408334497

Input interpretation:

$1.61803398^2 + \log(22\,811.576074408334497)$

$\log(x)$ is the natural logarithm

Result:

12.6530574...

12.6530574… result very near to the black hole entropy 12.5664

Alternative representations:

$$1.61803^2 + \log(22\,811.5760744083344970000) = \log_e(22\,811.5760744083344970000) + 1.61803^2$$

-

$$1.61803^2 + \log(22\,811.5760744083344970000) = \log(a)\log_a(22\,811.5760744083344970000) + 1.61803^2$$

-

$$1.61803^2 + \log(22\,811.5760744083344970000) = -\text{Li}_1(-22\,810.5760744083344970000) + 1.61803^2$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$1.61803^2 + \log(22\,811.5760744083344970000) = 2.61803 + \log(22\,810.5760744083344970000) - \sum_{k=1}^{\infty} \frac{(-1)^k e^{-10.034979570304035562728920 k}}{k}$$

- $$1.61803^2 + \log(22811.5760744083344970000) = 2.61803 + 2 i \pi \left\lfloor \frac{\arg(22811.5760744083344970000 - x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (22811.5760744083344970000 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

- $$1.61803^2 + \log(22811.5760744083344970000) = 2.61803 + \left\lfloor \frac{\arg(22811.5760744083344970000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(22811.5760744083344970000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (22811.5760744083344970000 - z_0)^k z_0^{-k}}{k}$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representations:

$$1.61803^2 + \log(22811.5760744083344970000) = 2.61803 + \int_1^{22811.5760744083344970000} \frac{1}{t} \, dt$$

- $$1.61803^2 + \log(22811.5760744083344970000) = 2.61803 + \frac{1}{2 i \pi} \int_{-i \infty + \gamma}^{i \infty + \gamma} \frac{e^{-10.0349795703040355627289 2 s} \Gamma(-s)^2 \Gamma(1+s)}{\Gamma(1-s)} \, ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

From the difference between the result and 4π, we obtain:

Input interpretation:

$12.6530573690914524039 - 4\pi$

Result:

0.08668675473227945005...

0.086686... result very near to the following Ramanujan integral:

integrate [(2.71828^0.89)/(sqrt6.283185307)][4e^3.14159265 * (e^6.283185307 - cos((sqrt6.283185307)1.33416))]/[e^12.56637 - 2e^6.283185307 (cos(sqrt6.283185307)1.33416)) 1] x, [x, [0,n]

Input interpretation:

$$\left\{\int \frac{2.71828^{0.89}}{\sqrt{6.283185307}} \times \frac{4\, e^{3.14159265}\left(e^{6.283185307} - \cos\left(\sqrt{6.283185307} \times 1.33416\right)\right)}{e^{12.56637} - \left(2\, e^{6.283185307}\right)\left(\cos\left(\sqrt{6.283185307}\right) \times 1.33416\right) \times 1} x\, dx, \{x, \{0, n\}\}\right\}$$

Result:

$$\{0.0837801\, x^2, \{x, \{0, n\}\}\}$$

0.0837801

From the ratio between the result and 4π, we obtain:

12.6530573690914524039/(4Pi)

Input interpretation:

$$\frac{12.6530573690914524039}{4\pi}$$

Result:

1.00689831275811851228...

1.0068983…

Alternative representations:

$$\frac{12.653057369091452403900000}{4\pi} = -\frac{12.653057369091452403900000}{4\, i \log(-1)}$$

•

$$\frac{12.653057369091452403900000}{4\pi} = \frac{12.653057369091452403900000}{4 \cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{12.653057369091452403900000}{4\pi} = \frac{0.79081608556821577524375000}{\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}}$$

-

$$\frac{12.653057369091452403900000}{4\pi} = \frac{1.5816321711364315504875000}{-1.0000000000000000000000000 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}}$$

-

$$\frac{12.653057369091452403900000}{4\pi} = \frac{3.1632643422728631009750000}{\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$\frac{12.653057369091452403900000}{4\pi} = \frac{1.5816321711364315504875000}{\int_0^{\infty} \frac{1}{1+t^2}\, dt}$$

-

$$\frac{12.653057369091452403900000}{4\pi} = \frac{0.79081608556821577524375000}{\int_0^{1} \sqrt{1-t^2}\, dt}$$

-

$$\frac{12.653057369091452403900000}{4\pi} = \frac{1.5816321711364315504875000}{\int_0^{\infty} \frac{\sin(t)}{t}\, dt}$$

From the value 12.6530574, considered as an entropy, we obtain:

Mass = 3.314374e-8

Radius = 4.921353e-35

Temperature = 3.702670e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.314374e-8)* sqrt[[-((((3.702670e+30 * 4*Pi*(4.921353e-35)^3-(4.921353e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.314374\times 10^{-8}}\sqrt{-\frac{3.702670\times 10^{30}\times 4\pi\left(4.921353\times 10^{-35}\right)^3-\left(4.921353\times 10^{-35}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249287548385698464818703952240801063691675770865373597...

1.61824928…

Now, we take:

M = 13,12806 * 10^{39} that is the mass of SMBH87, we obtain:

13.12806e+39

Mass = 1.312806e+40

Radius = 1.949322e+13

Temperature = 9.347940e-18

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.312806e+40)* sqrt[[-((((9.347940e-18 * 4*Pi*(1.949322e+13)^3-(1.949322e+13)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.312806\times 10^{40}}\sqrt{-\frac{9.347940\times 10^{-18}\times 4\pi(1.949322\times 10^{13})^3-(1.949322\times 10^{13})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249236411471553793413095891125687319435791097791275099...

1.6182492…

Now, we calculate the inverse of Ramanujan-Nardelli expression, and obtain the following result:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.312806e+40)* sqrt[[-((((9.347940e-18 * 4*Pi*(1.949322e+13)^3-(1.949322e+13)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.312806\times 10^{40}}\sqrt{-\frac{9.347940\times 10^{-18}\times 4\pi(1.949322\times 10^{13})^3-(1.949322\times 10^{13})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951782395113344535806482983120372663284870185216397659...

0.617951782…

If we take the formula with the data of previous black hole, and inverting it, we obtain the same result. Indeed:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.314374e-8)* sqrt[[-((((3.702670e+30 * 4*Pi*(4.921353e-35)^3-(4.921353e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.314374\times 10^{-8}}\sqrt{-\frac{3.702670\times 10^{30}\times 4\pi\left(4.921353\times 10^{-35}\right)^3-\left(4.921353\times 10^{-35}\right)^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951762867746649532251414109788200328023120096861192318...

0.617951762…

We have, from the data of first black hole, the following result:

1/1.61824928 - 0.61795176

Input interpretation:

$$\frac{1}{1.61824928}-0.61795176$$

Result:

$5.750206297017478048870196314871834826337756813338424 5... \times 10^{-9}$

Decimal form:

0.0000000057502062970174780488701963148718348263377568133384245

0.000000005750206297…

Inverting the result, we obtain:

1/5.7502062970174780488701963148718348263377568133384245 × 10^-9

Input interpretation:

$$\frac{1}{5.7502062970174780488701963148718348263377568133384245\times 10^{-9}}$$

Result:

$1.739068040947819316784369179640537350716806928445859 16... \times 10^{8}$

173906804.094781931678436917964053735071680692844585916

173906804.0947819...

We note two results:

0.000000005750206297 that tends to zero and 173906804.0947819 that is a large number N.

In conclusion, mathematically the number 0.000000005750206297 can be equated to a condition of very high symmetry, equivalent to the supersymmetric vacuum, also containing an infinitesimal quantity of energy, which inverted becomes a considerable quantity. ($1.739068 * 10^8$)

This means mostly that as the reciprocal (or counterpart) of the golden ratio exists, there is also the counterpart of a black hole (white hole). Therefore it is mathematically possible to prove the symmetry between them. Furthermore, it is important highlight that the Ramanujan-Nardelli mock formula is ALWAYS valid and not only for the physical parameters of quantum black holes, but also for those of supermassive black holes as SMBH87. This raises another question: why do physical data, both of quantum black holes and supermassive black holes, provide mathematically equivalent solutions (about the golden ratio)? A possible answer might lie in the fact that as light and massive particles exist, a quantum black hole could be equated with a light-particle, while a supermassive black hole with a massive particle (A. Nardelli). It should be emphasized that both black holes, as well as particles, are subject to the laws of quantum gravity and therefore must be placed in a supersymmetric physical-mathematical context

Now, we have that:

Fourier Coefficients of Meromorphic Jacobi Forms

Define φ by:

$$\varphi(z;\tau) := \frac{\left(\vartheta_{0,0}(z;\tau)\vartheta_{0,\frac{1}{2}}(z;\tau)\vartheta_{\frac{1}{2},0}(z;\tau)\right)^9}{\Delta(\tau)\vartheta_{\frac{1}{2},\frac{1}{2}}(z;\tau)}$$
$$= -i\left(\zeta^{\frac{1}{2}} + \zeta^{-\frac{1}{2}}\right)^9 \left\{ \frac{1}{\zeta^{\frac{1}{2}} - \zeta^{-\frac{1}{2}}} - \left(9\zeta^{\frac{3}{2}} - \zeta^{\frac{1}{2}} + \zeta^{-\frac{1}{2}} - 9\zeta^{-\frac{3}{2}}\right)q + \dots \right\},$$

with $\vartheta_{a,b}(z;\tau) := \sum_{\lambda\in a+\mathbf{Z}} e^{\pi i\lambda^2\tau + 2\pi i\lambda(z+b)}$, $\zeta = e^{2\pi i z}$ and $q = e^{2\pi i\tau}$.

The function φ is meromorphic in z with simple poles in $\mathbf{Z}\tau + \mathbf{Z}$. If we take $p = -\frac{1}{2}\tau - \frac{1}{2}$ then $\mathrm{sing}_p\, \varphi(\cdot;\tau) = \{0\}$. Further

$$\operatorname*{Res}_{z=0} \varphi(z;\tau) = \frac{\left(\vartheta_{0,0}(0;\tau)\vartheta_{0,\frac{1}{2}}(0;\tau)\vartheta_{\frac{1}{2},0}(0;\tau)\right)^9}{\Delta(\tau)\vartheta'_{\frac{1}{2},\frac{1}{2}}(0;\tau)} = -\frac{1}{\pi^9}\frac{\vartheta'_{\frac{1}{2},\frac{1}{2}}(0;\tau)^8}{\Delta(\tau)}$$
$$= -\frac{1}{\pi^9}\frac{(-2\pi\eta(\tau)^3)^8}{\Delta(\tau)} = -\frac{128}{\pi},$$

From this formula:

$$\operatorname*{Res}_{z=0} \varphi(z;\tau) = \frac{\left(\vartheta_{0,0}(0;\tau)\vartheta_{0,\frac{1}{2}}(0;\tau)\vartheta_{\frac{1}{2},0}(0;\tau)\right)^9}{\Delta(\tau)\vartheta'_{\frac{1}{2},\frac{1}{2}}(0;\tau)} = -\frac{1}{\pi^9}\frac{\vartheta'_{\frac{1}{2},\frac{1}{2}}(0;\tau)^8}{\Delta(\tau)}$$
$$= -\frac{1}{\pi^9}\frac{(-2\pi\eta(\tau)^3)^8}{\Delta(\tau)} = -\frac{128}{\pi},$$

That is equal to - 40.74366543152520595683424342336 4 , we obtain:

(-128/Pi)^2+(55+13)

Input:

$$\left(-\frac{128}{\pi}\right)^2 + (55 + 13)$$

Result:

$$68 + \frac{16384}{\pi^2}$$

Decimal approximation:

1728.046272796062047336521125228177635809014164230087456286...

1728.04627…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Property:

$68 + \frac{16384}{\pi^2}$ is a transcendental number

-

Alternate form:

$$\frac{4(4096 + 17\pi^2)}{\pi^2}$$

Alternative representations:

$$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \left(-\frac{128}{180\,°}\right)^2$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \left(\frac{-128}{-i\log(-1)}\right)^2$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \left(-\frac{128}{\cos^{-1}(-1)}\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{1024}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{1024}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{16384}{\left(\sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)\right)^2}$$

Integral representations:

$$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{1024}{\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{4096}{\left(\int_0^{\infty} \frac{1}{1+t^2}\, dt\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (55+13) = 68 + \frac{4096}{\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^2}$$

(-128/Pi)^2+(89+34)

Input:

$$\left(-\frac{128}{\pi}\right)^2 + (89+34)$$

Result:

$$123 + \frac{16384}{\pi^2}$$

Decimal approximation:

1783.046272796062047336521125228177635809014164230087456286...

1783.04627…

result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Property:

$123 + \frac{16384}{\pi^2}$ is a transcendental number

-

Alternate form:

$$\frac{16384 + 123\pi^2}{\pi^2}$$

Alternative representations:

$$\left(-\frac{128}{\pi}\right)^2 + (89 + 34) = 123 + \left(-\frac{128}{180^\circ}\right)^2$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (89 + 34) = 123 + \left(\frac{-128}{-i\log(-1)}\right)^2$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (89 + 34) = 123 + \left(-\frac{128}{\cos^{-1}(-1)}\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\left(-\frac{128}{\pi}\right)^2 + (89 + 34) = 123 + \frac{1024}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2}$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (89 + 34) = 123 + \frac{1024}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k\, 1195^{-1-2k}\left(5^{1+2k} - 4 \times 239^{1+2k}\right)}{1+2k}\right)^2}$$

-

$$\left(-\frac{128}{\pi}\right)^2 + (89+34) = 123 + \frac{16384}{\left(\sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)\right)^2}$$

Integral representations:

$$\left(-\frac{128}{\pi}\right)^2 + (89+34) = 123 + \frac{1024}{\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (89+34) = 123 + \frac{4096}{\left(\int_0^\infty \frac{1}{1+t^2}\, dt\right)^2}$$

- $$\left(-\frac{128}{\pi}\right)^2 + (89+34) = 123 + \frac{4096}{\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^2}$$

1/2[((((-128/Pi)^2+(89+34))))^1/15 + ((((-128/Pi)^2+(55+13))))^1/15]

Input:

$$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2 + (89+34)} + \sqrt[15]{\left(-\frac{128}{\pi}\right)^2 + (55+13)}\right)$$

Exact result:

$$\frac{1}{2}\left(\sqrt[15]{68 + \frac{16384}{\pi^2}} + \sqrt[15]{123 + \frac{16384}{\pi^2}}\right)$$

Decimal approximation:

1.645473286969556956375729478114710499357050932152648673571...

1.6454732… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Alternate forms:

$$\frac{1}{2}\sqrt[15]{68+\frac{16384}{\pi^2}}+\frac{1}{2}\sqrt[15]{123+\frac{16384}{\pi^2}}$$

- $$\frac{2^{2/15}\sqrt[15]{4096+17\pi^2}+\sqrt[15]{16384+123\pi^2}}{2\,\pi^{2/15}}$$

- $$\frac{\sqrt[15]{4096+17\pi^2}}{2^{13/15}\,\pi^{2/15}}+\frac{\sqrt[15]{16384+123\pi^2}}{2\,\pi^{2/15}}$$

Alternative representations:

$$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{68+\left(-\frac{128}{180\,°}\right)^2}+\sqrt[15]{123+\left(-\frac{128}{180\,°}\right)^2}\right)$$

- $$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{68+\left(-\frac{128}{\cos^{-1}(-1)}\right)^2}+\sqrt[15]{123+\left(-\frac{128}{\cos^{-1}(-1)}\right)^2}\right)$$

- $$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{68+\left(\frac{-128}{-i\log(-1)}\right)^2}+\sqrt[15]{123+\left(\frac{-128}{-i\log(-1)}\right)^2}\right)$$

$\cos^{-1}(x)$ is the inverse cosine function

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{123+\frac{1024}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}}+2^{2/15}\sqrt[15]{\frac{256+17\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}}\right)$$

•

$$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{123+\frac{16384}{\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}}+\right.$$
$$\left.2^{2/15}\sqrt[15]{\frac{4096+17\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}{\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}}\right)$$

•

$$\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{2}\left(\sqrt[15]{123+\frac{16384}{\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}}+\right.$$
$$\left.2^{2/15}\sqrt[15]{\frac{4096+17\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}{\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}}\right)$$

-233/10^4-34/10^4 +1/2[((((-128/Pi)^2+(89+34))))^1/15 + ((((-128/Pi)^2+(55+13))))^1/15]

Input:

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)$$

Exact result:

$$\frac{1}{2}\left(\sqrt[15]{68+\frac{16384}{\pi^2}}+\sqrt[15]{123+\frac{16384}{\pi^2}}\right)-\frac{267}{10000}$$

Decimal approximation:

1.618773286969556956375729478114710499357050932152648673571...

1.6187732…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$-\frac{267}{10000}+\frac{1}{2}\sqrt[15]{68+\frac{16384}{\pi^2}}+\frac{1}{2}\sqrt[15]{123+\frac{16384}{\pi^2}}$$

- $$-\frac{267}{10000}+\frac{\sqrt[15]{4096+17\pi^2}}{2^{13/15}\,\pi^{2/15}}+\frac{\sqrt[15]{16384+123\pi^2}}{2\,\pi^{2/15}}$$

$$\frac{-267\,\pi^{2/15}+5000\times 2^{2/15}\sqrt[15]{4096+17\pi^2}+5000\sqrt[15]{16384+123\pi^2}}{10000\,\pi^{2/15}}$$

Alternative representations:

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$-\frac{267}{10^4}+\frac{1}{2}\left(\sqrt[15]{68+\left(-\frac{128}{180\,^\circ}\right)^2}+\sqrt[15]{123+\left(-\frac{128}{180\,^\circ}\right)^2}\right)$$

-

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$-\frac{267}{10^4}+\frac{1}{2}\left(\sqrt[15]{68+\left(-\frac{128}{\cos^{-1}(-1)}\right)^2}+\sqrt[15]{123+\left(-\frac{128}{\cos^{-1}(-1)}\right)^2}\right)$$

•

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$-\frac{267}{10^4}+\frac{1}{2}\left(\sqrt[15]{68+\left(\frac{-128}{-i\log(-1)}\right)^2}+\sqrt[15]{123+\left(\frac{-128}{-i\log(-1)}\right)^2}\right)$$

$\cos^{-1}(x)$ is the inverse cosine function

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{-267+5000\sqrt[15]{123+\frac{1024}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}}+5000\times 2^{2/15}\sqrt[15]{\frac{256+17\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}}}{10\,000}$$

•

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$
$$\frac{1}{10\,000}\left(-267+5000\sqrt[15]{123+\frac{16\,384}{\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}}+\right.$$
$$\left.5000\times 2^{2/15}\sqrt[15]{\frac{4096+17\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}{\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}}\right)$$

•

$$-\frac{233}{10^4}-\frac{34}{10^4}+\frac{1}{2}\left(\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(89+34)}+\sqrt[15]{\left(-\frac{128}{\pi}\right)^2+(55+13)}\right)=$$

$$\frac{1}{10\,000}\left(-267+5000\sqrt[15]{123+\frac{16\,384}{\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}}+\right.$$

$$\left.5000\times 2^{2/15}\sqrt[15]{\frac{4096+17\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}{\left(\sum_{k=0}^{\infty}-\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}}\right)$$

-(-128/Pi)*1/((sqrt(5)+1)/2))

Input:

$$-\left(-\frac{128}{\pi}\right)\times\frac{1}{\frac{1}{2}\left(\sqrt{5}+1\right)}$$

Result:

$$\frac{256}{\left(1+\sqrt{5}\right)\pi}$$

Decimal approximation:

25.18097006293672876409568957816155782186468687161622386545...

25.18097… result very near to the black hole entropy 25.1327

Property:

$\frac{256}{\left(1+\sqrt{5}\right)\pi}$ is a transcendental number

Alternate forms:

$$\frac{64\left(\sqrt{5}-1\right)}{\pi}$$

•

$$\frac{256}{\pi+\sqrt{5}\,\pi}$$

- $$\frac{64\sqrt{5}-64}{\pi}$$

Series representations:

$$-\frac{-128}{\frac{1}{2}\left(\sqrt{5}+1\right)\pi}=\frac{256}{\pi+\pi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}}$$

- $$-\frac{-128}{\frac{1}{2}\left(\sqrt{5}+1\right)\pi}=\frac{256}{\pi+\pi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

- $$-\frac{-128}{\frac{1}{2}\left(\sqrt{5}+1\right)\pi}=\frac{512\sqrt{\pi}}{2\pi\sqrt{\pi}+\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

From the result 25.18097, considered as an entropy, we obtain:

Mass = 4.675628e-8

Radius = 6.942614e-35

Temperature = 2.624681e+30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.675628e-8)* sqrt[[-((((2.624681e+30 * 4*Pi*(6.942614e-35)^3-(6.942614e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.675628\times 10^{-8}}\sqrt{-\frac{2.624681\times 10^{30}\times 4\pi(6.942614\times 10^{-35})^3-(6.942614\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249166319575529812589395186550411792831356633410220195...

1.61824916…

And inverting the the expression, we have:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.675628e-8)* sqrt[[-((((2.624681e+30 * 4*Pi*(6.942614e-35)^3-(6.942614e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\Big/\left(\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.675628\times 10^{-8}}\sqrt{-\frac{2.624681\times 10^{30}\times 4\pi(6.942614\times 10^{-35})^3-(6.942614\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951809160714699969025948429861553615227691647582916928...

0.61795180…

Now, we note that:

1/1.61824916 - 0.61795180

Input interpretation:

$$\frac{1}{1.61824916}-0.61795180$$

Result:

$1.1573935870295770769935082184748361000230644334151855... \times 10^{-8}$

0.000000011573935870295770769935082184748361000230644334151855

0.00000001157393587… condition of very high symmetry (black hole ↔ white hole)

We have this other mock theta function:

$$f_0(q) = \frac{1}{(q)_\infty} \sum_{n\geq 0} \sum_{|j|\leq n} (-1)^j q^{\frac{5}{2}n^2+\frac{1}{2}n-j^2}(1-q^{4n+2}), \qquad (4.1)$$

For n = j = 2, we obtain:

sum (0.5^(2.5n^2+0.5n-4)) (1-0.5^(4n+2)), n= 0 to infinity

Infinite sum:

$$\sum_{n=0}^{\infty} 0.5^{2.5 n^2 +0.5 n-4} (1-0.5^{4 n+2}) = 13.9766$$

Partial result 13.9766

sum (0.5^(2.5*4+0.5*2-j^2)) (1-0.5^(4*2+2)), j= 0 to 4

Sum:

$$\sum_{j=0}^{4} (1-0.5^{4\times 2+2})\, 0.5^{-j^2+2.5\times 4+0.5\times 2} = \frac{67586541}{2097152}$$

Decimal form:

32.227774143218994140625

Partial result 32.22777414…

Final result:

Input interpretation:

$$13.9766 \sum_{j=0}^{4} 0.5^{2.5\times 4+0.5\times 2-j^2} (1-0.5^{4\times 2+2})$$

Result:

450.435

450.435

2*ln((((((13.9766* sum (0.5^(2.5*4+0.5*2-j^2)) (1-0.5^(4*2+2)), j= 0 to 4)))))

Input interpretation:

$$2\log\left(13.9766\sum_{j=0}^{4}0.5^{2.5\times 4+0.5\times 2-j^2}\left(1-0.5^{4\times 2+2}\right)\right)$$

log(x) is the natural logarithm

Result:

12.2204

12.2204 result very near to the black hole entropy 12.1904

13/10^2+(2*377+2*34+5)+2*13.9766* sum (0.5^(2.5*4+0.5*2-j^2)) (1-0.5^(4*2+2)), j= 0 to 4

Input interpretation:

$$\frac{13}{10^2}+(2\times 377+2\times 34+5)+2\times 13.9766\sum_{j=0}^{4}0.5^{2.5\times 4+0.5\times 2-j^2}\left(1-0.5^{4\times 2+2}\right)$$

Result:

1728.

1728

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

(13/10^2+(2*377+2*34+5)+2*13.9766* sum (0.5^(2.5*4+0.5*2-j^2)) (1-0.5^(4*2+2)), j= 0 to 4)))))))^1/15

Input interpretation:

$$\sqrt[15]{\frac{13}{10^2}+(2\times 377+2\times 34+5)+2\times 13.9766\sum_{j=0}^{4}0.5^{2.5\times 4+0.5\times 2-j^2}\left(1-0.5^{4\times 2+2}\right)}$$

Result:

1.64375

$1.64375 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Godel Universe

From:

REVIEWS OF MODERN PHYSICS VOLUME 21, NUMBER 3 JULY, 1949

An Example of a New Type of Cosmological Solutions of Einstein's Field Equations of Gravitation

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everywhere orthogonal on the world lines of matter. It is easily seen that the non-existence of such a system of three-spaces is equivalent with a rotation of matter relative to the compass of inertia. In this paper I am proposing a solution (with a cosmological term $\neq 0$) which exhibits such a rotation. This solution, or rather the four-dimensional space S which it defines, has the further properties:

(1) S is homogeneous, i.e., for any two points P, Q of S there exists a transformation of S into itself which carries P into Q. In terms of physics this means that the solution is stationary and spatially homogeneous.

(2) There exists a one-parametric group of transformations of S into itself which carries each world line of matter into itself, so that any two world lines of matter are equidistant.

(3) S has rotational symmetry, i.e., for each point P of S there exists a one parametric group of transformations of S into itself which carries P into itself.

$R = 1/a^2.$

$$r = R, \quad y = 0, \quad t = -\alpha\varphi \quad (0 \le \varphi \le 2\pi)$$

$$e^{x_1} = ch2r + \cos\varphi sh2r$$

$$x_2 e^{x_1} = \sqrt{2} \sin\varphi sh2r$$

$$tg\left(\frac{\varphi}{2} + \frac{x - 2t}{2\sqrt{2}}\right) = e^{-2r} tg\frac{\varphi}{2}, \quad \text{where} \quad \left|\frac{x_0 - 2t}{2\sqrt{2}}\right| < \frac{\pi}{2}$$

$$x_3 = 2y.$$

We have from:

$$tg\left(\frac{\varphi}{2} + \frac{x - 2t}{2\sqrt{2}}\right) = e^{-2r} tg\frac{\varphi}{2},$$

For r = 1/25, for a = 5, $a^2 = 25$ and $\varphi = 2.399963$ = golden angle, we obtain:

exp((((-2*1/(5^2)))) * tan (2.399963/2)

Input interpretation:

$$\exp\left(\left(-2 \times \frac{1}{5^2}\right) \tan\left(\frac{2.399963}{2}\right)\right)$$

Result:

0.8140277...

0.8140277...

(2.103786766-0.0864055)*(((((exp((((-2*1/(5^2)))) * tan (2.399963/2))))))

Where 2.103786766 and 0.0864055 are Ramanujan mock theta functions

Input interpretation:

$$(2.103786766 - 0.0864055) \exp\left(\left(-2 \times \frac{1}{5^2}\right) \tan\left(\frac{2.399963}{2}\right)\right)$$

Result:

1.642204...

1.642204… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

Alternative representations:

$$(2.10379 - 0.0864055) \exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) = 2.01738 \exp\left(\frac{2 \cot\left(1.19998 - \frac{\pi}{2}\right)}{5^2}\right)$$

•

$$(2.10379 - 0.0864055) \exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) = 2.01738 \exp\left(-\frac{2\left(-i + \frac{2 i}{1+e^{2.39996 i}}\right)}{5^2}\right)$$

•

$$(2.10379 - 0.0864055) \exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) =$$
$$2.01738 \exp\left(-\frac{2 i \left(e^{-1.19998 i} - e^{1.19998 i}\right)}{5^2 \left(e^{-1.19998 i} + e^{1.19998 i}\right)}\right)$$

$\cot(x)$ is the cotangent function

i is the imaginary unit

Series representations:

$$(2.10379 - 0.0864055) \exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) =$$
$$2.01738 \exp\left(-\frac{2}{25} i \left(1 + 2 \sum_{k=1}^{\infty} (-1)^k q^{2k}\right)\right) \text{ for } q = 0.362375 + 0.932032 i$$

•

$$(2.10379 - 0.0864055) \exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) =$$
$$2.01738 \exp\left(-\frac{2}{25} i \sum_{k=-\infty}^{\infty} (-1)^k e^{2.39996 i k} \operatorname{sgn}(k)\right)$$

•

$$(2.10379 - 0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) = 2.01738\exp\left(-0.767988\sum_{k=1}^{\infty}\frac{1}{-5.75982+(1-2k)^2\pi^2}\right)$$

sgn(x) is the sign of x

Integral representations:

$$(2.10379 - 0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) = 2.01738\exp\left(-\frac{2}{25}\int_0^{1.19998}\sec^2(t)\,dt\right)$$

•

$$(2.10379 - 0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right) = 2.01738\exp\left(-\frac{4}{25\pi}\int_0^{\infty}\frac{-1+t^{2.39996/\pi}}{-1+t^2}\,dt\right)$$

sec(x) is the secant function

-24/10^3 + (2.103786766-0.0864055)*(((((exp((((-2*1/(5^2)))) * tan (2.399963/2))))))

Input interpretation:

$$-\frac{24}{10^3} + (2.103786766 - 0.0864055)\exp\left(\left(-2\times\frac{1}{5^2}\right)\tan\left(\frac{2.399963}{2}\right)\right)$$

Result:

1.618204...

1.618204…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$2.01738\exp\left(\frac{2\cot\left(1.19998-\frac{\pi}{2}\right)}{5^2}\right)-\frac{24}{10^3}$$

-

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$2.01738\exp\left(-\frac{2\left(-i+\frac{2i}{1+e^{2.39996i}}\right)}{5^2}\right)-\frac{24}{10^3}$$

-

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$2.01738\exp\left(-\frac{2i\left(e^{-1.19998i}-e^{1.19998i}\right)}{5^2\left(e^{-1.19998i}+e^{1.19998i}\right)}\right)-\frac{24}{10^3}$$

$\cot(x)$ is the cotangent function

i is the imaginary unit

Series representations:

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$-0.024+2.01738\exp\left(-\frac{2}{25}i\left(1+2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)\right) \text{ for } q=0.362375+0.932032i$$

-

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$-0.024+2.01738\exp\left(-\frac{2}{25}i\sum_{k=-\infty}^{\infty}(-1)^k e^{2.39996ik}\operatorname{sgn}(k)\right)$$

-

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$-0.024+2.01738\exp\left(-0.767988\sum_{k=1}^{\infty}\frac{1}{-5.75982+(1-2k)^2\pi^2}\right)$$

sgn(x) is the sign of x

Integral representations:

$$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$-0.024+2.01738\exp\left(-\frac{2}{25}\int_0^{1.19998}\sec^2(t)\,dt\right)$$

- $$-\frac{24}{10^3}+(2.10379-0.0864055)\exp\left(\frac{\tan\left(\frac{2.39996}{2}\right)(-2)}{5^2}\right)=$$
$$-0.024+2.01738\exp\left(-\frac{4}{25\pi}\int_0^{\infty}\frac{-1+t^{2.39996/\pi}}{-1+t^2}\,dt\right)$$

sec(x) is the secant function

From the radius r = 0.04, we obtain:

Mass = 2.693872e+25

Radius = 0.04

Temperature = 0.004555536

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.693872e+25)* sqrt[[-((((0.004555536* 4*Pi*(0.04)^3-(0.04)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{2.693872\times 10^{25}}\sqrt{-\frac{0.004555536\times 4\pi\times 0.04^3-0.04^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6182492293885704249223742666425565577391284150870046577 54...

1.6182492…

And, inverting the expression, we have:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.693872e+25)* sqrt[[-((((0.004555536* 4*Pi*(0.04)^3-(0.04)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{2.693872\times 10^{25}}\sqrt{-\frac{0.004555536\times 4\pi\times 0.04^3-0.04^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951785076909319689918819332719568798255231754609478508...

0.61795178…

Now, we note that:

1/1.6182492 - 0.61795178

Input interpretation:

$$\frac{1}{1.6182492} - 0.61795178$$

Result:

$1.629935859075351311775714148352429279742576112504798 3... \times 10^{-8}$

0.000000016299358590753513117757141483524292797425761125047983

0.000000016299358 59… condition of very high symmetry (black hole ↔ white hole)

For a = 1,272019646, r = 1/ 1,272019646^2 = 0.618033992164644, we obtain:

exp(-2*0.61803398) tan (2.399963/2)

Input interpretation:

$$\exp(-2\times 0.61803398)\tan\left(\frac{2.399963}{2}\right)$$

Result:

0.747232...

0.747232…

Alternative representations:

$$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = -\cot\left(1.19998-\frac{\pi}{2}\right)\exp(-1.23607)$$

- $$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = \exp(-1.23607)\left(-i+\frac{2\,i}{1+e^{2.39996\,i}}\right)$$

- $$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = \frac{i\exp(-1.23607)\left(e^{-1.19998\,i}-e^{1.19998\,i}\right)}{e^{-1.19998\,i}+e^{1.19998\,i}}$$

cot(x) is the cotangent function

i is the imaginary unit

Series representations:

$$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = i\exp(-1.23607)+2\,i\exp(-1.23607)\sum_{k=1}^{\infty}(-1)^k q^{2k}$$

for $q = 0.362375+0.932032\,i$

- $$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = i\exp(-1.23607)\sum_{k=-\infty}^{\infty}(-1)^k e^{2.39996\,i\,k}\,\mathrm{sgn}(k)$$

-

$$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = 9.59985\exp(-1.23607)\sum_{k=1}^{\infty}\frac{1}{-5.75982+(1-2k)^2\pi^2}$$

sgn(x) is the sign of x

Integral representations:

$$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = \exp(-1.23607)\int_0^{1.19998}\sec^2(t)\,dt$$

-

$$\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right) = \frac{2\exp(-1.23607)}{\pi}\int_0^{\infty}\frac{-1+t^{2.39996/\pi}}{-1+t^2}\,dt$$

sec(x) is the secant function

sqrt((((((2/((((((exp(-2*0.61803398) tan (2.399963/2))))))))))

Input interpretation:

$$\sqrt{\frac{2}{\exp(-2\times 0.61803398)\tan\left(\frac{2.399963}{2}\right)}}$$

Result:

1.636015...

$1.636015\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

All 2nd roots of 2.67655:

$1.63602\,e^{0} \approx 1.6360$ (real, principal root)

-

$1.63602\,e^{i\pi} \approx -1.6360$ (real root)

Alternative representations:

$$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \sqrt{-\frac{2}{\cot\left(1.19998-\frac{\pi}{2}\right)\exp(-1.23607)}}$$

- $$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \sqrt{\frac{2}{\exp(-1.23607)\left(-i+\frac{2i}{1+e^{2.39996\,i}}\right)}}$$

- $$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \sqrt{\frac{2}{\frac{i\exp(-1.23607)\left(e^{-1.19998\,i}-e^{1.19998\,i}\right)}{e^{-1.19998\,i}+e^{1.19998\,i}}}}$$

$\cot(x)$ is the cotangent function

i is the imaginary unit

Series representations:

$$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)^k}{k!} \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

- $$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k z_0^{-k}\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)^k}{k!}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Integral representations:

$$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \sqrt{\frac{2}{\exp(-1.23607)\int_0^{1.19998}\sec^2(t)\,dt}}$$

- $$\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \sqrt{\frac{\pi}{\exp(-1.23607)\int_0^{\infty}\frac{-1+t^{2.39996/\pi}}{-1+t^2}\,dt}}$$

$\sec(x)$ is the secant function

(21/10^3-2/10^3)+sqrt((((((2/((((((exp(-2*0.61803398) tan (2.399963/2))))))))))))

Input interpretation:

$$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.61803398)\tan\left(\frac{2.399963}{2}\right)}}$$

Result:

1.655015...

1.655015… is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

Alternative representations:

$$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} =$$
$$\frac{19}{10^3}+\sqrt{-\frac{2}{\cot\left(1.19998-\frac{\pi}{2}\right)\exp(-1.23607)}}$$

- $$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{10^3}+\sqrt{\frac{2}{\exp(-1.23607)\left(-i+\frac{2i}{1+e^{2.39996 i}}\right)}}$$

- $$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{10^3}+\sqrt{\frac{2}{\frac{i\exp(-1.23607)\left(e^{-1.19998 i}-e^{1.19998 i}\right)}{e^{-1.19998 i}+e^{1.19998 i}}}}$$

$\cot(x)$ is the cotangent function

i is the imaginary unit

Series representations:

$$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{1000}+\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)^k}{k!} \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

- $$\left(\frac{21}{10^3}-\frac{2}{10^3}\right)+\sqrt{\frac{2}{\exp(-2\times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{1000}+\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k z_0^{-k}\left(-z_0+\frac{2}{\exp(-1.23607)\tan(1.19998)}\right)^k}{k!}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Integral representations:

$$\left(\frac{21}{10^3} - \frac{2}{10^3}\right) + \sqrt{\frac{2}{\exp(-2 \times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{1000} + \sqrt{\frac{2}{\exp(-1.23607)\int_0^{1.19998}\sec^2(t)\,dt}}$$

-

$$\left(\frac{21}{10^3} - \frac{2}{10^3}\right) + \sqrt{\frac{2}{\exp(-2 \times 0.618034)\tan\left(\frac{2.39996}{2}\right)}} = \frac{19}{1000} + \sqrt{\frac{\pi}{\exp(-1.23607)\int_0^{\infty}\frac{-1+t^{2.39996/\pi}}{-1+t^2}\,dt}}$$

$\sec(x)$ is the secant function

From the radius r = 0.6180340, we obtain:

Mass = 4.162261e+26

Radius = 0.6180340

Temperature = 0.0002948405

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.162261e+26)* sqrt[[-((((0.0002948405* 4*Pi*(0.6180340)^3-(0.6180340)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.162261\times10^{26}}\sqrt{-\frac{0.0002948405\times4\pi\times0.6180340^3-0.6180340^2}{6.67\times10^{-11}}}}}$$

Result:

1.618249186861822588389469782336620430470649306318800268422...

1.61824918…

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.162261e+26)* sqrt[[-((((0.0002948405* 4*Pi*(0.6180340)^3-(0.6180340)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.162261\times10^{26}}\sqrt{-\frac{0.0002948405\times4\pi\times0.6180340^3-0.6180340^2}{6.67\times10^{-11}}}}}}$$

Result:

0.617951801316361162124260301010388837348402481388148532100...

0.6179518…

Now, we note that:

1/1.61824918 - 0.6179518

Input interpretation:

$$\frac{1}{1.61824918}-0.6179518$$

Result:

$3.936647136135116101217489880019590060907678012850900 9... \times 10^{-9}$

0.0000000039366471361351161012174898800195900609076780128509009

0.000000003936647136… condition of very high symmetry (black hole ↔ white hole)

Now, for r = 1/64, for a = 8, $a^2 = 64$ and $\varphi = \pi/3$, we obtain:

exp((((-2*1/(8^2)))) * tan (Pi/3*1/2)

Input:

$$\exp\left(\left(-2\times\frac{1}{8^2}\right)\tan\left(\frac{\pi}{3}\times\frac{1}{2}\right)\right)$$

Exact result:

$$e^{-1/\left(32\sqrt{3}\right)}$$

Decimal approximation:

0.9821195900519909367224000136855177292568126075723136595 91...

0.98211959…. result that is very near to the value of Ramanujan mock theta function $\chi(q)$ **= 1.962364415...** divided by 2, thence 0,9811822075

Property:

$e^{-1/\left(32\sqrt{3}\right)}$ is a transcendental number

- **Alternative representations:**

$$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{-\left(2\cot\left(\frac{\pi}{3}\right)\right)/8^2}$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{\left(2\cot\left(\frac{2\pi}{3}\right)\right)/8^2}$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{\left(2\cot\left(-\frac{\pi}{3}\right)\right)/8^2}$$

$\cot(x)$ is the cotangent function

Series representations:

$$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = \exp\left(-\frac{1}{32}\,i\left(1+2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)\right) \text{ for } q = \sqrt[6]{-1}$$

-

$$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{-\frac{3\sum_{k=1}^{\infty}\frac{1}{2-9k+9k^2}}{32\pi}}$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = \exp\left(-\frac{1}{32}\, i \sum_{k=-\infty}^{\infty} (-1)^k\, \mathcal{A}^{(i k \pi)/3}\, \operatorname{sgn}(k)\right)$$

i is the imaginary unit

$\operatorname{sgn}(x)$ is the sign of x

Integral representations:

$$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{-1/32\int_0^{\pi/6}\sec^2(t)\,dt}$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{-\frac{1}{16\pi}\int_0^{\infty}\frac{-1+\sqrt[3]{t}}{-1+t^2}\,dt}$$

$\sec(x)$ is the secant function

Multiple-argument formulas:

$$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = e^{\tan\left(\frac{\pi}{12}\right)/\left(16\left(-1+\tan^2\left(\frac{\pi}{12}\right)\right)\right)}$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = \exp\left(\frac{\tan\left(\frac{\pi}{18}\right)\left(-3+\tan^2\left(\frac{\pi}{18}\right)\right)}{32-96\tan^2\left(\frac{\pi}{18}\right)}\right)$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = \exp\left(\frac{\tan\left(-\frac{5\pi}{6}\right)+\tan(\pi)}{32\left(-1+\tan\left(-\frac{5\pi}{6}\right)\tan(\pi)\right)}\right)$$

- $$e^{\left(\tan\left(\frac{\pi}{3\times 2}\right)(-2)\right)/8^2} = \exp\left(-\frac{U_{-\frac{5}{6}}(\cos(\pi))\sin(\pi)}{32\, T_{\frac{1}{6}}(\cos(\pi))}\right)$$

$T_n(x)$ is the Chebyshev polynomial of the first kind

$U_n(x)$ is the Chebyshev polynomial of the second kind

34+10^3* sqrt(((((3/(((((exp((((-2*1/(8^2)))) * tan (Pi/3*1/2))))))

Input:

$$34+10^3\sqrt{\frac{3}{\exp\left(\left(-2\times\frac{1}{8^2}\right)\tan\left(\frac{\pi}{3}\times\frac{1}{2}\right)\right)}}$$

Exact result:

$$34+1000\sqrt{3}\sqrt[64\sqrt{3}]{e}$$

Decimal approximation:

1781.746497303103700386887353503416769832025844338571135072...

1781.746497…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Property:

$34+1000\sqrt{3}\sqrt[64\sqrt{3}]{e}$ is a transcendental number

-

Alternate form:

$$2\left(17+500\sqrt{3}\sqrt[64\sqrt{3}]{e}\right)$$

Alternative representations:

$$34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times2}\right)(-2)}{8^2}\right)}}=34+10^3\sqrt{\frac{3}{\exp\left(\frac{2\cot\left(-\frac{\pi}{3}\right)}{8^2}\right)}}$$

-

$$34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times2}\right)(-2)}{8^2}\right)}}=34+10^3\sqrt{\frac{3}{\exp\left(-\frac{2\left(-i+\frac{2i}{1+e^{(i\pi)/3}}\right)}{8^2}\right)}}$$

-

$$34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+10^3\sqrt{\frac{3}{\exp\left(-\frac{2\,i\left(e^{-(i\pi)/6}-e^{(i\pi)/6}\right)}{8^2\left(e^{-(i\pi)/6}+e^{(i\pi)/6}\right)}\right)}}$$

$\cot(x)$ is the cotangent function

i is the imaginary unit

Series representations:

$$34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-x+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}\right)^k\left(-\frac{1}{2}\right)_k}{k!} \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

-

$$34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)^k z_0^{-k}}{k!}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Integral representations:

$$34+10^3 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000 \sqrt{\frac{3}{\exp\left(-\frac{1}{32} \int_0^{\frac{\pi}{6}} \sec^2(t)\,dt\right)}}$$

•

$$34+10^3 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000 \sqrt{\frac{3}{\exp\left(-\frac{1}{16\pi} \int_0^{\infty} \frac{-1+\sqrt[3]{t}}{-1+t^2}\,dt\right)}}$$

$\sec(x)$ is the secant function

Multiple-argument formulas:

$$34+10^3 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000\sqrt{3} \sqrt{\frac{1}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}}$$

•

$$34+10^3 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} =$$
$$34+1000 \sqrt{1+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}} \sqrt{\frac{3}{3+\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}}$$

•

$$34+10^3 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}} = 34+1000 \sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{12}\right)}{16\left(-1+\tan^2\left(\frac{\pi}{12}\right)\right)}\right)}}$$

((((((((34+10^3* sqrt(((((3/(((((exp((((-2*1/(8^2)))) * tan (Pi/3*1/2)))))))))))))))))))^1/15

Input:

$$\sqrt[15]{34+10^3 \sqrt{\frac{3}{\exp\left(\left(-2\times\frac{1}{8^2}\right)\tan\left(\frac{\pi}{3}\times\frac{1}{2}\right)\right)}}}$$

Exact result:

$$\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}$$

Decimal approximation:

1.647111733258362016045328449799145277985105681442362283476...

$1.64711173\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Property:

$\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}$ is a transcendental number

- **Alternate form:**

$$\sqrt[15]{2\left(17 + 500\sqrt{3}\sqrt[64\sqrt{3}]{e}\right)}$$

All 15th roots of 34 + 1000 sqrt(3) e^(1/(64 sqrt(3))):

$\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}\; e^0 \approx 1.64711$ (real, principal root)

- $\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}\; e^{(2 i \pi)/15} \approx 1.50471 + 0.6699\, i$

- $\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}\; e^{(4 i \pi)/15} \approx 1.1021 + 1.2240\, i$

- $\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}\; e^{(2 i \pi)/5} \approx 0.5090 + 1.5665\, i$

- $\sqrt[15]{34 + 1000\sqrt{3}\sqrt[64\sqrt{3}]{e}}\; e^{(8 i \pi)/15} \approx -0.17217 + 1.63809\, i$

Alternative representations:

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{2\cot\left(-\frac{\pi}{3}\right)}{8^2}\right)}}}$$

•

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(-\frac{2\left(-i+\frac{2i}{1+e^{(i\pi)/3}}\right)}{8^2}\right)}}}$$

•

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(-\frac{2i\left(e^{-(i\pi)/6}-e^{(i\pi)/6}\right)}{8^2\left(e^{-(i\pi)/6}+e^{(i\pi)/6}\right)}\right)}}}$$

cot(x) is the cotangent function

i is the imaginary unit

Series representations:

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \left(34+1000\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-x+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^{\wedge}(1/15) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

•

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} =$$

$$\left(34+1000\left(\frac{1}{z_0}\right)^{1/2\left\lfloor \arg\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2+1/2\left\lfloor \arg\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)/(2\pi)\right\rfloor} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}-z_0\right)^k z_0^{-k}}{k!}\right)\hat{\ }(1/15)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Integral representations:

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+1000\sqrt{\frac{3}{\exp\left(-\frac{1}{32}\int_0^{\frac{\pi}{6}}\sec^2(t)\,dt\right)}}}$$

-

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+1000\sqrt{\frac{3}{\exp\left(-\frac{1}{16\pi}\int_0^{\infty}\frac{-1+\sqrt[3]{t}}{-1+t^2}\,dt\right)}}}$$

$\sec(x)$ is the secant function

Multiple-argument formulas:

$$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+1000\sqrt{3}\sqrt{\frac{1}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}}}$$

- $$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+1000\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{12}\right)}{16\left(-1+\tan^2\left(\frac{\pi}{12}\right)\right)}\right)}}}$$

- $$\sqrt[15]{34+10^3\sqrt{\frac{3}{\exp\left(\frac{\tan\left(\frac{\pi}{3\times 2}\right)(-2)}{8^2}\right)}}} = \sqrt[15]{34+1000\sqrt{1+\frac{3}{\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}}\sqrt{\frac{3}{3+\exp\left(-\frac{1}{32}\tan\left(\frac{\pi}{6}\right)\right)}}}$$

From:

Dark Energy and the Entropy of the Observable Universe

Charles H. Lineweaver[a] and Chas A. Egan[b]

[a]Planetary Scinece Institute, Research School of Astronomy and Astrophysics, and Research School of Earth Sciences Australian National University

[b]Research School of Astronomy and Astrophysics, Australian National University

TABLE 1. The entropy of the universe including the Gibbons-Hawking entropy of the cosmic event horizon as well as the entropy of the dominant components contained within the cosmic event horizon. See Egan & Lineweaver (2009) for details.

Component	Entropy S [k]
Cosmic Event Horizon	$2.6 \pm 0.3 \times 10^{122}$
SMBHs	$1.2^{+1.1}_{-0.7} \times 10^{103}$
$*$Stellar BHs ($42-140\ M_\odot$)	$1.2 \times 10^{98^{+0.8}_{-1.6}}$
Stellar BHs ($2.5-15\ M_\odot$)	$2.2 \times 10^{96^{+0.6}_{-1.2}}$
Photons	$2.03 \pm 0.15 \times 10^{88}$
Relic Neutrinos	$1.93 \pm 0.15 \times 10^{88}$
Dark Matter	$6 \times 10^{86 \pm 1}$
Relic Gravitons	$2.3 \times 10^{86^{+0.2}_{-3.1}}$
ISM & IGM	$2.7 \pm 2.1 \times 10^{80}$
Stars	$3.5 \pm 1.7 \times 10^{78}$
Total	$\mathbf{2.6 \pm 0.3 \times 10^{122}}$

Now, we take the value of entropy of the SMBHs (see above Table), that is 1.2e+103 and obtain:

Mass = 3.227709e+43

Radius = 4.792669e+16

Temperature = 3.802087e-21

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.227709e+43)* sqrt[[-((((3.802087e-21* 4*Pi*(4.792669e+16)^3-(4.792669e+16)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.227709\times 10^{43}}\sqrt{-\frac{3.802087\times 10^{-21}\times 4\pi\,(4.792669\times 10^{16})^3-(4.792669\times 10^{16})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249177750757353556737215934818154288348393018629145645...

1.61824917…

And:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.227709e+43)* sqrt[[-((((3.802087e-21* 4*Pi*(4.792669e+16)^3-(4.792669e+16)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\left/\left(\sqrt{1\left/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.227709\times 10^{43}}\sqrt{-\frac{3.802087\times 10^{-21}\times 4\pi\,(4.792669\times 10^{16})^3-(4.792669\times 10^{16})^2}{6.67\times 10^{-11}}}\right)\right.}\right)\right.$$

Result:

0.617951804795552902917423346262870948350706557393717250341...

0.6179518…

We note that from the sum of the following mock theta functions, we obtain:

1,66162973 + 1,61052934 = 3,27215907 result very near to the above mass

Now, we take the value of entropy of the Dark Matter (see above Table), that is 6e+86 and obtain:

Mass = 2.282335e+35

Radius = 3.388928e+8

Temperature = 5.376964e-13

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.282335e+35)* sqrt[[-((((5.376964e-13* 4*Pi*(3.388928e+8)^3-(3.388928e+8)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.282335\times 10^{35}} \sqrt{-\frac{5.376964\times 10^{-13}\times 4\pi\,(3.388928\times 10^8)^3-(3.388928\times 10^8)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249384551483716088848997113146322772021711772117307692...

1.61824938…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.282335e+35)* sqrt[[-((((5.376964e-13* 4*Pi*(3.388928e+8)^3-(3.388928e+8)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.282335\times 10^{35}} \sqrt{-\frac{5.376964\times 10^{-13}\times 4\pi\,(3.388928\times 10^8)^3-(3.388928\times 10^8)^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951725825720867926567921544259241414502245363908026198...

0.61795172…

We note that from the product of the following mock theta function, we obtain:

1,142443242 × 2 = 2,284886484 result practically equal to the above mass

Now, we take the value of entropy of the Relic Gravitons (see above Table), that is 2.3e+86 and obtain:

Mass = 1.413083e+35

Radius = 2.098218e+8

Temperature = 8.684580e-13

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.413083e+35)* sqrt[[-((((8.684580e-13* 4*Pi*(2.098218e+8)^3-(2.098218e+8)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.413083\times 10^{35}}\sqrt{-\frac{8.684580\times 10^{-13}\times 4\pi\,(2.098218\times 10^8)^3-(2.098218\times 10^8)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249412507425466457294406965660633119741684428418618635...

1.618249412…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.413083e+35)* sqrt[[-((((8.684580e-13* 4*Pi*(2.098218e+8)^3-(2.098218e+8)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.413083\times 10^{35}}\sqrt{-\frac{8.684580\times 10^{-13}\times 4\pi\,(2.098218\times 10^8)^3-(2.098218\times 10^8)^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951715150343933937268506882373542721256098995083948227...

0.61795171…

We note that the following mock theta function: 1.40643658 result very near to the above mass

Now, we take the value of entropy of the Photons (see above Table), that is 2.03e+88 and obtain:

Mass = 1.327553e+36

Radius = 1.971219e+9

Temperature = 9.244102e-14

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.327553e+36)* sqrt[[-((((9.244102e-14* 4*Pi*(1.971219e+9)^3-(1.971219e+9)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.327553\times 10^{36}}\sqrt{-\frac{9.244102\times 10^{-14}\times 4\pi(1.971219\times 10^9)^3-(1.971219\times 10^9)^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249279956294085307526151371395494433377293636349951666...

1.61824927…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.327553e+36)* sqrt[[-((((9.244102e-14* 4*Pi*(1.971219e+9)^3-(1.971219e+9)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.327553\times 10^{36}}\sqrt{-\frac{9.244102\times 10^{-14}\times 4\pi(1.971219\times 10^9)^3-(1.971219\times 10^9)^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951765766896029243820543772166136411226826987606006002...

0.61795176…

We note that the following mock theta function: 1.333425959 result very near to the above mass

Now, we take the value of total entropy of the Cosmic Event Horizon (see above Table), that is 2.6e+122 and obtain:

Mass = 1.502417e+53

Radius = 2.230866e+26

Temperature = 8.168194e-31

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.502417e+53)* sqrt[[-((((8.168194e-31* 4*Pi*(2.230866e+26)^3-(2.230866e+26)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.502417\times 10^{53}}\sqrt{-\frac{8.168194\times 10^{-31}\times 4\pi\,(2.230866\times 10^{26})^3-(2.230866\times 10^{26})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249303130610422283548654105281344937250648131909449671...

1.618249303…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.502417e+53)* sqrt[[-((((8.168194e-31* 4*Pi*(2.230866e+26)^3-(2.230866e+26)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.502417\times 10^{53}}\sqrt{-\frac{8.168194\times 10^{-31}\times 4\pi\,(2.230866\times 10^{26})^3-(2.230866\times 10^{26})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951756917450104459059997949352513108039907727922075393...

0.61795175…

We note that from the following sum of mock theta functions: 1,40643658 + 0,0864055 = 1,49284208 result very near to the above mass

From:

Physical Review & Research International
3(4): 270-292, 2013

Quantum Gravity and the Holographic Mass

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We can now examine the relationship between η_ρ and R and find

$$m_{p'} = 2\frac{\eta_\rho}{R} = 1.603498 \times 10^{-24} gm \qquad (24)$$

We now proceed to calculate the rest mass of the proton as above, utilizing the new muonic hydrogen measured proton charge radius $r_p = 0.84184 \times 10^{-13} cm$ and find $\eta = 4.340996 \times 10^{40}$, $\eta_\rho = 9.448222 \times 10^{35} gm$, and $R = 1.130561 \times 10^{60}$. Again utilizing equation (24) we obtain

$$m_{p'} = 2\frac{\eta_\rho}{R} = 1.6714213 \times 10^{-24} gm \ . \qquad (25)$$

We note that the value 1.6714213, is very near to the following Ramanujan mock theta function $\boldsymbol{\chi(q)}$ **= 1.66162973306…** While the value 1.603498, is very near to the mock theta function **1.61052934557...**

Now, we take the value of proton mass above calculated and obtain:

Mass = 1.671421e-27

Radius = 2.481812e-54

Temperature = 7.342275e+49

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.671421e-27)* sqrt[[-((((7.342275e+49* 4*Pi*(2.481812e-54)^3-(2.481812e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\left/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{1.671421\times 10^{-27}}\sqrt{-\frac{7.342275\times 10^{49}\times 4\pi\left(2.481812\times 10^{-54}\right)^3-\left(2.481812\times 10^{-54}\right)^2}{6.67\times 10^{-11}}}\right)\right.}$$

Result:

1.618249246920422797340579072522193662979384292209223010310...

1.6182492…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.671421e-27)* sqrt[[-((((7.342275e+49* 4*Pi*(2.481812e-54)^3-(2.481812e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\left/\left(\sqrt{1\left/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{1.671421\times 10^{-27}}\sqrt{-\frac{7.342275\times 10^{49}\times 4\pi\left(2.481812\times 10^{-54}\right)^3-\left(2.481812\times 10^{-54}\right)^2}{6.67\times 10^{-11}}}\right)\right.}\right)\right.$$

Result:

0.617951778382118952966250598814905883875825867894874235074...

0.6179517…

1/1.6182492 – 0.6179517

Input interpretation:

$$\frac{1}{1.6182492} - 0.6179517$$

Result:

$9.6299358590753513117757141483524292797425761125047983... \times 10^{-8}$

0.000000096299358590753513117757141483524292797425761125047983

0.0000000962993585… condition of very high symmetry (black hole ↔ white hole)

Here the hierarchy problem between the Planck mass and the proton rest mass is resolved as we clearly demonstrate that the rest mass of the proton is a function of the Planck vacuum oscillators holographic surface to volume geometric relationship of spacetime, the energy levels of which include the gravitational mass-energy $m_{h'}$ derived from the same primary quantity of Planck entities. We express the relationship of the proton surface horizon to its volume Planck oscillators as a fundamental constant we term ϕ

$$\phi = \frac{\eta}{R} = \frac{\eta_p}{R_p} = 3.839682 \times 10^{-20} \tag{44}$$

which appears as a fundamental geometric ratio from equations (38) to (43), whether in dimensionless quantities or in mass ratios. The inverse relationship

$$\frac{1}{\phi} = \frac{R}{\eta} = \frac{R_p}{\eta_p} = 2.604382 \times 10^{19} \tag{45}$$

$$\phi = \frac{2\ell}{r_p}$$

We note that the value 3.839682 is very near to the following sum of Ramanujan mock theta functions: **3.966959492155 (R_1)**. While 2.604382 is near to the following mock theta function $\chi(q)$ = **2.6709253774829…**

Now, we have that, adding 1.22e+19 to 2.604382e+19, we obtain:

Input interpretation:

$2.604382 \times 10^{19} + 1.22 \times 10^{19}$

Result:

38 243 820 000 000 000 000

3.824382×10^{19}

3.824382×10^{19}

((((((3.82438234207937 × 10^19)^1/89))))))

Input interpretation:

$\sqrt[89]{3.82438234207937 \times 10^{19}}$

Result:

1.6596968842810764...

1.6596968... We note that, the result 1,656340... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$ i.e. 1,65578...

Indeed:

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}} + \sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots \Rightarrow$$

$$\Rightarrow \sqrt[89]{3.82438234207937 \times 10^{19}}$$

$$= 1.6596968842810764\ldots$$

-((((((((((((((34+5+2)/((10^3)))))))))))))) + (((((((((((((((((3.82438234207937 × 10^19)^1/89))))))))))))))))))

Input interpretation:

$$-\frac{34+5+2}{10^3} + \sqrt[89]{3.82438234207937 \times 10^{19}}$$

Result:

1.6186968842810764...

1.6186968...

This result is a very good approximation to the value of the golden ratio 1,618033988749...

And:

1/2* ((((((((((((((((1.6596968842810764 + (-(((((((((((((34+5+2)/((10^3))))))))))))))) + (((((((((((((((((3.82438234207937 × 10^19)^1/89)))))))))))))))))))

Input interpretation:

$$\frac{1}{2}\left(1.6596968842810764+\left(-\frac{34+5+2}{10^3}+\sqrt[89]{3.82438234207937\times 10^{19}}\right)\right)$$

Result:

1.6391968842810764...

$1.6391968... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Furthermore, we have also that:

2sqrt[3* ((((((((((((((((1.6596968842810764 + (-(((((((((((((34+5+2)/((10^3))))))))))))))) + (((((((((((((((((3.82438234207937 × 10^19)^1/89)))))))))))))))))))]

Input interpretation:

$$2\sqrt{3\left(1.6596968842810764+\left(-\frac{34+5+2}{10^3}+\sqrt[89]{3.82438234207937\times 10^{19}}\right)\right)}$$

Result:

6.2722185247921516...

6.2722185... a good approximation to 2π

Planck mass = 2.1765099115858176875432916976833e-5 gm

$$m_h = \frac{R}{\eta} m_\ell$$

((((((((((2.960912e+118/3.828339e+79)))))) ((((((((2.176509911585e-5)))))))))

Input interpretation:

$$\frac{2.960912\times10^{118}}{3.828339\times10^{79}}\times2.176509911585\times10^{-5}$$

Result:

$1.6833551875450333734812930620825376227131400850342668... \times 10^{34}$

$1.6833551875....*10^{34}$ = holographic gravitational mass

We have that:

(1.6833551875411662760272797158245e+34-0.055e+34-2*0.005e+34)

Input interpretation:

$1.6833551875411662760272797158245\times10^{34} - 0.055\times10^{34} - 2\times0.005\times10^{34}$

Result:

16 183 551 875 411 662 760 272 797 158 245 000

Scientific notation:

$1.6183551875411662760272797158245\times10^{34}$

$1.6183551875... * 10^{34}$

This result is a multiple very closed to the value of the golden ratio 1,618033988749...

We now proceed to calculate the rest mass of the proton as above, utilizing the new muonic hydrogen measured proton charge radius $r_p = 0.84184\times10^{-13}cm$ and find $\eta = 4.340996\times10^{40}$, $\eta_\rho = 9.448222\times10^{35}gm$, and $R = 1.130561\times10^{60}$. Again utilizing equation (24) we obtain

$$m_{p'} = 2\frac{\eta_\rho}{R} = 1.6714213\times10^{-24}gm\,. \qquad (25)$$

$$m_{p'} = 2\frac{\eta}{R}m_\ell$$

(2*4.340996e+40*2.176509911585e-5)/(1.130561e+60)

Input interpretation:

$$\frac{2 \times 4.340996 \times 10^{40} \times 2.176509911585 \times 10^{-5}}{1.130561 \times 10^{60}}$$

Result:

$1.6714216782908376743935090631995973680323308516745226... \times 10^{-24}$

1.67142167829…*10^{-24}

Now, we have the following mathematical connections:

(((((1.130561e+60/4.340996e+40)^2 *(2.176509911585e-5))))*1.0061571663^21

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$\left(\left(\frac{1.130561 \times 10^{60}}{4.340996 \times 10^{40}}\right)^2 \times 2.176509911585 \times 10^{-5}\right) \times 1.0061571663^{21}$$

Result:

$1.6793924565536048507431233294688786530276166276171290... \times 10^{34}$

1.6793924565…* 10^{34}

(((((1.130561e+60/4.340996e+40)^2*(2.176509911585e-5)))))+(1.7168646644e+34 - 0.50970737445e+34 - 1.0061571663e+34)

Where 1.7168646644, 0.50970737445 and 1.0061571663 are Ramanujan mock theta functions

Input interpretation:

$$\left(\frac{1.130561 \times 10^{60}}{4.340996 \times 10^{40}}\right)^2 \times 2.176509911585 \times 10^{-5} + (1.7168646644 \times 10^{34} - 0.50970737445 \times 10^{34} - 1.0061571663 \times 10^{34})$$

Result:

$1.6772840040427102953084122501577899885768100494596832... \times 10^{34}$

$1.677284\ldots * 10^{34}$

And:

-(55/10^3+5/10^3+1/10^3)*10^34+(((((1.130561e+60/4.340996e+40)^2 *(2.176509911585e-5))))*1.0061571663^21

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$-\left(\frac{55}{10^3}+\frac{5}{10^3}+\frac{1}{10^3}\right)\times 10^{34}+\left(\left(\frac{1.130561\times 10^{60}}{4.340996\times 10^{40}}\right)^2\times 2.176509911585\times 10^{-5}\right)\times 1.0061571663^{21}$$

Result:

$1.618392456553604850743123329468878653027616627617129 0\ldots\times 10^{34}$

$1.6183924\ldots * 10^{34}$

From:

$$m_{p'} = 2\frac{m_\ell^2}{m_{h'}}.$$

We obtain:

$m_{h'}$ = (((2*(2.176509911585e-5)^2))) / ((((1.67142167829e-24))))

Input interpretation:

$$\frac{2\,(2.176509911585\times 10^{-5})^2}{1.67142167829\times 10^{-24}}$$

Result:

$5.668462311765968948987341663994901780519732186726656 5\ldots\times 10^{14}$

$5.668462311765968 9\ldots \times 10^{14}$ gm = $m_{h'}$ that is a holographic gravitational mass. We note that the value 5.66846231176... is very near to the following sum of Ramanujan mock theta functions: **5.608437361 (R_2)**

From the inverse of the result, we have:

1/ 5.6684623117659689× 10^14

Input interpretation:

$$\frac{1}{5.6684623117659689 \times 10^{14}} \text{ grams}$$

Unit conversions:

1.7641468620587109 fg (femtograms)

$1.7641468620587109 \times 10^{-18}$ kg (kilograms)

1.7641468620587109 is a value near to the following Ramanujan mock theta function $\phi(q)$ = **1.7168646644**

Input interpretation:

$1764.1468620587109 \times 10^{-21}$ kg (kilograms)

$1764.14686\ldots * 10^{-21}$

result is a sub-multiple that is in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

(1764.1468620587109*10^-21)-34 * 10^-21 -1 * 10^-21

Input interpretation:

$$1764.1468620587109 \times 10^{-21} - \frac{34}{10^{21}} - \frac{1}{10^{21}}$$

Result:

$1.7291468620587109 \times 10^{-18}$

Input interpretation:

$1729.1468620587109 \times 10^{-21}$ kg (kilograms)

$1729.146820587109 * 10^{-21}$

Result that is a sub-multiple of the Hardy-Ramanujan number

We note that:

(((2*(2.176509911585e-5)^2))) / ((((5.668462311765968e+14))))

Input interpretation:

$$\frac{2\,(2.176509911585\times 10^{-5})^2}{5.668462311765968\times 10^{14}}$$

Result:

$1.6714216782900002798215685385485193869299182683111367... \times 10^{-24}$

$1.67142137829... * 10^{-24}$

Now, we take this value 5.6684623117659689… × 10^{14} gm = m_h, that is the holographic gravitational mass, in kg, and obtain:

Mass = 5.668462e+11

Radius = 8.416824e-16

Temperature = 2.164967e+11

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.668462e+11)* sqrt[[-((((2.164967e+11* 4*Pi*(8.416824e-16)^3-(8.416824e-16)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\middle/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{5.668462\times 10^{11}}\sqrt{-\frac{2.164967\times 10^{11}\times 4\pi\,(8.416824\times 10^{-16})^3-(8.416824\times 10^{-16})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249282938759834618658735000576208080252921683857456171...

1.61824928…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.668462e+11)* sqrt[[-((((2.164967e+11* 4*Pi*(8.416824e-16)^3-(8.416824e-16)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.668462\times 10^{11}}\sqrt{-\frac{2.164967\times 10^{11}\times 4\pi(8.416824\times 10^{-16})^3-(8.416824\times 10^{-16})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951764627998582752043341680484744881268362613149004267...

0.61795176…

Now, we observe that from:

$$\frac{F_g}{F_s}=\frac{F_g}{F_e}\frac{F_e}{F_s}=\frac{Gm_pm_p/r^2}{e^2/r^2}\alpha=\frac{Gm_p^2}{e^2}\alpha=5.905742\times 10^{-39}$$

We obtain:

5.905742e-40*(-1.602176634e-19)^2)*(3*10^8)^2))) * 1/ (((1/137.0359*(1.672622e-24)^2)))

(where $3*10^8$ is the speed of light in vacuum)

Input interpretation:

$$5.905742\times 10^{-40}(-1.602176634\times 10^{-19})^2(3\times 10^8)^2\times\frac{1}{\frac{1}{137.0359}(1.672622\times 10^{-24})^2}$$

Result:

$6.683077757046886573375125044956550731481496780499908\ldots\times 10^{-11}$

$6.683077757\ldots*10^{-11}$ result that is the value of Gravitational constant

And from:

$$4\phi^2 = \frac{Gm_{p'}^2}{\hbar c} = \frac{Gm_{p'}m_{p'}}{\hbar c}. \qquad (52)$$

Where $4\phi^2 = 5.897264\times10^{-39}$ is the exact value for the coupling constant between gravitation and confinement at the proton scale or the strong interaction. The typical

We obtain:

((((4*(3.839682e-20)^2)*(1.054571817e-31)*(3e+11)))) / (1.67142167829e-24)^2

Input interpretation:

$$\frac{(4(3.839682\times10^{-20})^2)\times1.054571817\times10^{-31}\times3\times10^{11}}{(1.67142167829\times10^{-24})^2}$$

Result:

$6.678452805216948634461412163552509352610687638348249 8... \times 10^{-11}$

$6.6784528\ldots*10^{-11}$ result that is the value of Gravitational constant

We note that the value 6.6784528... is very neat to the following sum of Ramanujan mock theta functions: 1.1424432422 + 2.6709253774829 + 1.897512108 + 1.0061571663 = 6.7170378939829

From this expression, we obtain also:

(2^2/10^3-55/10^3)+10^11((((4*(3.839682e-20)^2)*(1.054571817e-31)*(3e+11)))) / (2*1.67142167829e-24)^2

Input interpretation:

$$\left(\frac{2^2}{10^3}-\frac{55}{10^3}\right)+10^{11}\times\frac{(4(3.839682\times10^{-20})^2)\times1.054571817\times10^{-31}\times3\times10^{11}}{(2\times1.67142167829\times10^{-24})^2}$$

Result:

1.618613201304237158615353040888127338152671909587062468501...

1.61861320…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

From:

$$\eta_\rho = \eta m_\ell = 1.026562 \times 10^{36} gm$$

And

$$R = 1.280404 \times 10^{60}$$

We note that the value 1.280404 is very near to the value of the following Ramanujan mock theta function: **f(q) = 1.22734321771259...**

We have:

(2*1.026562e+36)/(1.280404e+60)

Input interpretation:

$$\frac{2 \times 1.026562 \times 10^{36}}{1.280404 \times 10^{60}}$$

Result:

$1.603497021252667126938060174757342213863749254141661 5\ldots \times 10^{-24}$

$1.60349702125\ldots*10^{-24}$ gm = $1.603497021252667\ldots*10^{-27}$ kgm

Indeed:

$$m_{p'} = 2\frac{\eta_\rho}{R} = 1.603498 \times 10^{-24} gm$$

This is the holographic proton mass. Now, we take the value in kg 1.603497e-27 and obtain:

Mass = 1.603497e-27

Radius = 2.380955e-54

Temperature = 7.653293e+49

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.603497e-27)* sqrt[[-((((7.653293e+49* 4*Pi*(2.380955e-54)^3-(2.380955e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.603497\times 10^{-27}}\sqrt{-\frac{7.653293\times 10^{49}\times 4\pi\,(2.380955\times 10^{-54})^3-(2.380955\times 10^{-54})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249228523522462172095182591974226962275989532032246905...

1.618249228…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.603497e-27)* sqrt[[-((((7.653293e+49* 4*Pi*(2.380955e-54)^3-(2.380955e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\Big/\left(\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.603497\times 10^{-27}}\sqrt{-\frac{7.653293\times 10^{49}\times 4\pi\,(2.380955\times 10^{-54})^3-(2.380955\times 10^{-54})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951785407240348641747867226937616176913194536133970811...

0.61795178….

The electron and the holographic mass solution

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Following the holographic principle of 't hooft [24], based on the Bekenstein-Hawking formulae for the entropy of a black hole [25] [26], Haramein [15] [16] defines the holographic bit of information as an oscillating Planck spherical unit (PSU), given as

$$PSU = \frac{4}{3}\pi r_\ell^3 \qquad \text{Eqn. 4}$$

where $r_\ell = \frac{\ell}{2}$ and ℓ is the Planck length.

The electron and the holographic mass solution 7

$$m_e = \frac{1}{2}\frac{v_\ell}{v_e}\frac{\eta_e}{R_e} m_\ell = \frac{1}{2}\frac{c}{\alpha c}\phi_e m_\ell = \frac{1}{2\alpha}\phi_e m_\ell \qquad \text{Eqn. 15}$$

where

$$\phi_e = \frac{\eta_e}{R_e} \text{ where } \eta_e - \frac{4\pi a_0^2}{\pi r_\ell^2} \text{ and } R_e - \frac{4/3\pi a_0^3}{4/3\pi r_\ell^3} - \frac{a_0^3}{r_\ell^3}$$

With this solution we find a mass of, $m_e = 9.10938(30)\times 10^{-28} g$, which compared to the measured

This holographic mass solution, can as well be formulated in terms of charge relationships,

$$m_e = \frac{1}{2}\frac{v_\ell}{v_e}\phi_e m_\ell = \frac{1}{2\alpha}\phi_e m_\ell = \frac{1}{2}\frac{q_\ell^2}{q^2}\phi_e m_\ell \qquad \text{Eqn. 16}$$

where

$$\alpha = \frac{q^2}{q_\ell^2}$$

For:

Bohr radius = a_0 = 5.291777 * 10^{-11} m

Planck length = 1,616252 × 10^{-35} m

r_ℓ = 1/2 * 1.616252 * 10^{-35} = 8.08126 × 10^-36

we obtain the following expressions:

((4*Pi*(5.291777e-11)^2)) / ((Pi*(8.08126e-36)^2))

Input interpretation:

$$\frac{4\pi(5.291777\times10^{-11})^2}{\pi(8.08126\times10^{-36})^2}$$

Result:

$$1.7151610308591131765454424387880777138403969108611544...\times10^{50}$$

1.7151610308591131765454424387880777138403969108611544 × 10^50

(((4/3*Pi*(5.291777e-11)^3))) / (((4/3*Pi*(8.08126e-36)^3)))

Input interpretation:

$$\frac{\frac{4}{3}\pi(5.291777\times10^{-11})^3}{\frac{4}{3}\pi(8.08126\times10^{-36})^3}$$

Result:

$$2.8078077225570472141844563076805651347417339758175418...\times10^{74}$$

2.8078077225570472141844563076805651347417339758175418 × 10^74

$$\phi_e = (1.7151610308591131765454424387880777138403969108611544 \times 10^{50})/(2.8078077225570472141844563076805651347417339758175418 \times 10^{74})$$

Input interpretation:

$$\frac{1.7151610308591131765454424387880777138403969108611544\times10^{50}}{2.8078077225570472141844563076805651347417339758175418\times10^{74}}$$

Result:

$$6.1085416108804282568974467367011119327212768036143623...\times10^{-25}$$

6.1085416108804282568974467367011119327212768036143623 × 10^-25

This holographic mass solution, can as well be formulated in terms of charge relationships,

$$m_e = \frac{1}{2}\frac{v_\ell}{v_e}\phi_e m_\ell = \frac{1}{2\alpha}\phi_e m_\ell = \frac{1}{2}\frac{q_\ell^2}{q^2}\phi_e m_\ell \qquad \text{Eqn. 16}$$

We have:

(((1/(2*0.0072973525693) *
6.1085416108804282568974467367011119327212768036143623e-25 *
2.176509911585e-5)))

Input interpretation:

$$\frac{1}{2\times 0.0072973525693}\times 6.1085416108804282568974467367011119327212768036143623\times 10^{-25}\times 2.176509911585\times 10^{-5}$$

Result:

$9.1096745258986498531292756509554824061297494504511600... \times 10^{-28}$

$9.10967452589...*10^{-28}$ holographic mass solution electron

(6.1085416108804282568974467367011119327212768036143623 × 10^-25 *
2.176509911585e-5)/2*0.0072973525693

Input interpretation:

$$(6.1085416108804282568974467367011119327212768036143623\times 10^{-25}\times 2.176509911585\times 10^{-5})/(2\times 0.0072973525693)$$

Result:

$9.1096745258986498531292756509554824061297494504511600... \times 10^{-28}$

$9.10967452589... * 10^{-28}$

From the holographic mass of electron 9.109675e-28, we obtain:

Mass = 9.109675e-28

Radius = 1.352651e-54

Temperature = 1.347143e+50

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(9.109675e-28)* sqrt[[-((((1.347143e+50* 4*Pi*(1.352651e-54)^3-(1.352651e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{9.109675\times 10^{-28}}\sqrt{-\frac{1.347143\times 10^{50}\times 4\pi\,(1.352651\times 10^{-54})^3-(1.352651\times 10^{-54})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.6182495280822872978400432874412722081465370135626209 24258...

1.61824952…

And:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(9.109675e-28)* sqrt[[-((((1.347143e+50* 4*Pi*(1.352651e-54)^3-(1.352651e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{9.109675\times 10^{-28}}\sqrt{-\frac{1.347143\times 10^{50}\times 4\pi\,(1.352651\times 10^{-54})^3-(1.352651\times 10^{-54})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951671016430802750908334239055330614322347371975011098...

0.61795167…

From:

$$\alpha = \frac{\phi_e h}{8\pi r_\ell m_e c} = \frac{\phi_e \lambda_e}{8\pi r_\ell} = 7.29735(34)\times 10^{-3} \qquad \text{Eqn. 21}$$

which is in agreement with that of the CODATA 2014 value. The ratio of the proton mass to the electron mass, μ can also be given in terms of the geometric solution (Eqn. 11 and Eqn. 15)

$$\mu = \frac{m_p}{m_e} = \frac{2\phi m_\ell}{\phi_e m_\ell / 2\alpha} = 4\alpha \frac{\phi}{\phi_e} = 1836.152(86) \qquad \text{Eqn.22}$$

Therefore, from the holographic ratio of Eqn. 22 we can now deduce a new expression for the proton radius r_p yielding a more precise prediction than the earlier result in reference [15] [16].

$$\mu = 4\alpha \frac{4r_\ell / r_p}{4r_\ell / a_0} = 4\alpha \frac{a_0}{r_p} \qquad \text{Eqn.23}$$

giving,

$$r_p = 4\frac{\alpha}{\mu} a_0 = 0.84123564042(46)\times 10^{-13} cm \qquad \text{Eqn. 24}$$

From (eqn.24), we obtain:

0.84123564042 * 2 =

Input interpretation:

0.84123564042 × 2

Result:

1.68247128084

1.68247128084 result very near to the value 1.6833551875….*10^{34} = holographic gravitational mass and to the following Ramanujan mock theta function: $\boldsymbol{\chi(q)}$ **= 1.66162973306…**

From the formula of the torus volume V = $2\pi^2 R r^2$, for r = 0.84123564042, i.e. the proton radius value without exponent and R = 1.7168646644 that is a Ramanujan mock theta function, we obtain:

2Pi^2*(1.7168646644)*(0.84123564042)^2

Input interpretation:

$2\pi^2 \times 1.7168646644 \times 0.84123564042^2$

Result:

23.982868791...

23.982868791… result very near to the black hole entropy 23.9078

Alternative representations:

$$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 3.43372932880000 \times 0.841235640420000^2\, (180\,°)^2$$

- $$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 3.43372932880000 \times 0.841235640420000^2\, (-i \log(-1))^2$$

- $$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 20.6023759728000 \times 0.841235640420000^2\, \zeta(2)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\zeta(s)$ is the Riemann zeta function

Series representations:

$$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 38.879562448386 \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

- $$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 9.7198906120965 \left(-1.00000000000000 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

- $$2\pi^2\, 1.71686466440000 \times 0.841235640420000^2 = 2.42997265302411 \left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$2\pi^2\ 1.71686466440000 \times 0.841235640420000^2 = 9.7198906120965 \left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

- $$2\pi^2\ 1.71686466440000 \times 0.841235640420000^2 = 38.879562448386 \left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

- $$2\pi^2\ 1.71686466440000 \times 0.841235640420000^2 = 9.7198906120965 \left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2$$

(1.7168646644 + 0.5957823226)+24*3 * 2Pi^2*(1.7168646644)*(0.84123564042)^2

Where 0.5957823226 and 1.7168646644 are two Ramanujan mock theta functions

Input interpretation:

$$(1.7168646644 + 0.5957823226) + 24 \times 3 \times 2\,(\pi^2 \times 1.7168646644 \times 0.84123564042^2)$$

Result:

1729.0791999...

1729.079…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

Alternative representations:

$$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 247.228511673600 \times 0.841235640420000^2\ (180\,°)^2$$

- $$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 247.228511673600 \times 0.841235640420000^2\ (-i \log(-1))^2$$

- $$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 1483.37107004160 \times 0.841235640420000^2\ \zeta(2)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\zeta(s)$ is the Riemann zeta function

Series representations:

$$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 2799.32849628378 \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

- $$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 699.83212407094 \left(-1.00000000000000 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

- $$(1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 2.31265 + 174.958031017736 \left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$(1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2 = 2.31265+699.83212407094\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

- $$(1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2 = 2.31265+2799.32849628378\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

- $$(1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2 = 2.31265+699.83212407094\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2$$

55+(1.7168646644 + 0.5957823226)+24*3
2Pi^2(1.7168646644)*(0.84123564042)^2

Input interpretation:

$$55+(1.7168646644+0.5957823226)+24\times 3\times 2\left(\pi^2\times 1.7168646644\times 0.84123564042^2\right)$$

Result:

1784.0791999...

1784.07919…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Note that the result 1784 is the sum of 1729, that is the Hardy-Ramanujan number and 55, that is a Fibonacci's number

Alternative representations:

$$55+(1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2 = 57.3126+247.228511673600\times 0.841235640420000^2\,(180\,°)^2$$

-

$$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 247.228511673600 \times 0.841235640420000^2\ (-i \log(-1))^2$$

- $$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 1483.37107004160 \times 0.841235640420000^2\ \zeta(2)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\zeta(s)$ is the Riemann zeta function

Series representations:

$$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 2799.32849628378 \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

- $$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 699.83212407094 \left(-1.00000000000000 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

- $$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 174.958031017736 \left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations:

$$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 699.83212407094 \left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

- $$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 2799.32849628378 \left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

- $$55 + (1.71686466440000 + 0.595782) + (24\pi^2\ 3 \times 2)\ 1.71686466440000 \times 0.841235640420000^2 = 57.3126 + 699.83212407094 \left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2$$

((((((1.7168646644 + 0.5957823226)+24*3 * 2Pi^2*(1.7168646644)*(0.84123564042)^2)))))^1/15

Input interpretation:

$$((1.7168646644 + 0.5957823226) + 24 \times 3 \times 2\,(\pi^2 \times 1.7168646644 \times 0.84123564042^2))\ \hat{}\ (1/15)$$

Result:

1.643820248500447992665100887039195792750485448712724644231...

1.64382024... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

-8/10^4-5^2/10^3+((((((1.7168646644 + 0.5957823226)+24*3 * 2Pi^2*(1.7168646644)*(0.84123564042)^2)))))^1/15

Input interpretation:

$$-\frac{8}{10^4} - \frac{5^2}{10^3} + ((1.7168646644 + 0.5957823226) + 24 \times 3 \times 2\,(\pi^2 \times 1.7168646644 \times 0.84123564042^2))\ \hat{}\ (1/15)$$

Result:

1.618020248500447992665100887039195792750485448712724644231...

1.6180202485…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\,3\times 2)\,1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=-\frac{5^2}{10^3}-\frac{8}{10^4}+\sqrt[15]{2.31265+247.228511673600\times 0.841235640420000^2\,(180\,°)^2}$$

•

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\,3\times 2)\,1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=-\frac{5^2}{10^3}-\frac{8}{10^4}+\sqrt[15]{2.31265+1483.37107004160\times 0.841235640420000^2\,\zeta(2)}$$

•

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\,3\times 2)\,1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=-\frac{5^2}{10^3}-\frac{8}{10^4}+\sqrt[15]{2.31265+247.228511673600\times 0.841235640420000^2\,(-i\log(-1))^2}$$

$\zeta(s)$ is the Riemann zeta function

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\,3\times 2)\,1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=-\frac{129}{5000}+\sqrt[15]{2.31265+2799.32849628378\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}$$

•

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=$$
$$-\frac{129}{5000}+\sqrt[15]{2.31265+699.83212407094\left(-1.00000000000000+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}$$

- $$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=$$
$$-\frac{129}{5000}+\sqrt[15]{2.31265+174.958031017736\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2}$$
for ($x\in\mathbb{R}$ and $x>0$)

$\binom{n}{m}$ is the binomial coefficient

$\mathbb{R}$ is the set of real numbers

Integral representations:

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=$$
$$-\frac{129}{5000}+\sqrt[15]{2.31265+699.83212407094\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}$$

- $$-\frac{8}{10^4}-\frac{5^2}{10^3}+\left((1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2\right)\wedge(1/15)=$$
$$-\frac{129}{5000}+\sqrt[15]{2.31265+2799.32849628378\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2}$$

-

$$-\frac{8}{10^4}-\frac{5^2}{10^3}+((1.71686466440000+0.595782)+(24\pi^2\ 3\times 2)\ 1.71686466440000\times 0.841235640420000^2)\ \hat{}\ (1/15)=$$

$$-\frac{129}{5000}+\sqrt[15]{2.31265+699.83212407094\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2}$$

which is in agreement with that of the CODATA 2014 value. The ratio of the proton mass to the electron mass, μ can also be given in terms of the geometric solution (Eqn. 11 and Eqn. 15)

$$\mu=\frac{m_p}{m_e}=\frac{2\phi m_\ell}{\phi_e m_\ell/2\alpha}=4\alpha\frac{\phi}{\phi_e}=1836.152(86) \qquad \text{Eqn.22}$$

From eqn.(22), we obtain:

1836.15286

(1836.15286)^1/15

Input interpretation:

$\sqrt[15]{1836.15286}$

Result:

1.650417889...

1.650417… is very near to the 14th root of the following Ramanujan's class invariant $Q=(G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

(((ln(1836.15286))))^1/4

Input interpretation:

$\sqrt[4]{\log(1836.15286)}$

$\log(x)$ is the natural logarithm

Result:

1.655725842...

1.655725842… is very near to the 14th root of the following Ramanujan's class invariant $Q=(G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

-(21/10^3+8/10^3+3/10^3)+(1836.15286)^1/15

Input interpretation:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}+\frac{3}{10^3}\right)+\sqrt[15]{1836.15286}$$

Result:

1.618417889...

1.618417889…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

From the ratio of the proton mass to the electron mass 1836.153 , we obtain:

Mass = 1836.153

Radius = 2.726414e-24

Temperature = 6.683557e+19

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1836.153)* sqrt[[-((((6.683557e+19 * 4*Pi*(2.726414e-24)^3-(2.726414e-24)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1836.153}\sqrt{-\frac{6.683557\times 10^{19}\times 4\pi\,(2.726414\times 10^{-24})^3-(2.726414\times 10^{-24})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618249412781809428209084250490766868721362704658676564931...

1.6182494…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1836.153)* sqrt[[-((((6.683557e+19 * 4*Pi*(2.726414e-24)^3-(2.726414e-24)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1836.153}\sqrt{-\frac{6.683557\times 10^{19}\times 4\pi(2.726414\times 10^{-24})^3-(2.726414\times 10^{-24})^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951715045566488362427224300833487229740692011464228465...

0.61795171…

From:

$$R_\infty = \frac{\alpha\phi_o}{8\pi\ell} = 1.097373(36)\times 10^5\, cm^{-1} \qquad \text{Eqn. 20}$$

(1.09737336e+5)^1/23

Input interpretation:

$$\sqrt[23]{1.09737336\times 10^5}$$

Result:

1.656326095...

1.656326095… is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

-(55/10^5+3/10^3) +(1.09737336e+5)^1/24

Input interpretation:

$$-\left(\frac{55}{10^5}+\frac{3}{10^3}\right)+\sqrt[24]{1.09737336\times 10^5}$$

Result:

1.618315244...

1.618315244…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

From:

From equations (29) and (47) we have

$$m_{p'} = 2\phi m_\ell = 4\ell \frac{m_\ell}{r_p}. \quad (54)$$

Dividing by $2m_\ell$ on both sides we find

$$\phi = \frac{2\ell}{r_p} \quad (55)$$

or

$$r_p = \frac{2\ell}{\phi}. \quad (56)$$

For:

ϕ = (3.839682e-20)

ℓ = 1,616252 × 10^{-35}

m_l = 2.176509911585e-5

r_p = (2*1.616252e-35) / (3.839682e-20) =

8.418676338300932212615523889738785659854123336 2554503 × 10^-16

$m_{p'}$ = ((((4*1.616252e-35)(2.176509911585e-5)))) / ((((2*1.616252e-35) / (3.839682e-20)))) = 1.671421186066903194 × 10^-24

we have that:

Substituting $m_{h'}$ for m and r_p for r_s, we can derive that the radius at which the unification energy $m_{h'} = 5.668464 \times 10^{14}\, gm$ is achieved due to mass dilation can be computed as

$$r = r_p \frac{m_{h'}^2}{m_{h'}^2 - m_{p'}^2} = r_p \frac{m_{h'}^2}{(m_{h'}^2 - (2\phi^2 m_{h'})^2)} = r_p \frac{m_{h'}^2}{m_{h'}^2(1-4\phi^4)} = \frac{r_p}{(1-4\phi^4)} \qquad (71)$$

or the dimensionless quantity $(r - r_p)/r_p = 8.694428 \times 10^{-78}$. Consequently we can assert for all intent and purposes, that the Schwarzschild mass occurs at or extremely close to the horizon. We now compute the mass dilation from the velocity found at ℓ from r_p utilizing equation (70) and find

$$m_{pd}^{\ell} = \frac{m_{p'}}{\sqrt{1 - \dfrac{r_p}{r_p + \ell}}} = \sqrt{\frac{2}{\phi}\frac{(r_p + \ell)}{r_p}}\, m_{p'} = 1.206294 \times 10^{-14}\, gm$$

where m_{pd}^{ℓ} is the dilated mass at one Planck length from r_p.

1.671421186066903194e-24*sqrt(((((2/(3.839682e-20))*(8.4186763383009e-16+1.616252e-35)/ (8.4186763383009e-16))))))

Input interpretation:

$$1.671421186066903194 \times 10^{-24} \sqrt{\frac{2}{3.839682 \times 10^{-20}} \times \frac{8.4186763383009 \times 10^{-16} + 1.616252 \times 10^{-35}}{8.4186763383009 \times 10^{-16}}}$$

Result:

$1.2062942887882328533722208496742131748630695956553441... \times 10^{-14}$

$1.206294... * 10^{-14}$

This result multiplied by 1/2 give us:

0.603147×10^{-14}

$0.603147 * 10^{-14}$

We obtain also:

-34+55colog((((((((1.671421186066903194e-24*sqrt(((((2/(3.839682e-20))*(8.4186763383009e-16+1.616252e-35)/ (8.4186763383009e-16))))))))))))

Input interpretation:

$$-34+55\left(-\log\left(1.671421186066903194\times10^{-24}\sqrt{\frac{2}{3.839682\times10^{-20}}\times\frac{8.4186763383009\times10^{-16}+1.616252\times10^{-35}}{8.4186763383009\times10^{-16}}}\right)\right)$$

log(x) is the natural logarithm

Result:

1728.67510...

1728.67510…

This result is very near to the mass of candidate glueball $f_0(1710)$ meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. As a consequence, it is sometimes called a Zagier as a pun on the Gross–Zagier theorem. The number 1728 is one less than the Hardy–Ramanujan number 1729

21+55colog((((((((1.671421186066903194e-24*sqrt(((((2/(3.839682e-20))*(8.4186763383009e-16+1.616252e-35)/ (8.4186763383009e-16)))))))))))))

Input interpretation:

$$21+55\left(-\log\left(1.671421186066903194\times10^{-24}\sqrt{\frac{2}{3.839682\times10^{-20}}\times\frac{8.4186763383009\times10^{-16}+1.616252\times10^{-35}}{8.4186763383009\times10^{-16}}}\right)\right)$$

log(x) is the natural logarithm

Result:

1783.67510...

1783.67510 result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Note that the result 1783.67510 is about the sum of 1729, that is the Hardy-Ramanujan number and 55, that is a Fibonacci's number

(((((((((((21+55colog((((((((1.671421186066903194e-24*sqrt(((((2/(3.839682e-20))*(8.4186763383009e-16+1.616252e-35)/ (8.4186763383009e-16))))))))))))))))))))))))^1/15

Input interpretation:

$$\left(21+55\left(-\log\left(1.671421186066903194\times 10^{-24}\sqrt{\frac{2}{3.839682\times 10^{-20}}\times\frac{8.4186763383009\times 10^{-16}+1.616252\times 10^{-35}}{8.4186763383009\times 10^{-16}}}\right)\right)\right)\hat{}\,(1/15)$$

log(x) is the natural logarithm

Result:

1.647230531...

$1.647230531 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

sqrt[6(((((((((((21+55colog((((((((1.671421186066903194e-24*sqrt(((((2/(3.839682e-20))*(8.4186763383009e-16+1.616252e-35)/ (8.4186763383009e-16))))))))))))))))))))))))^1/15]

Input interpretation:

$$\sqrt{\left(6\left(21+55\left(-\log\left(1.671421186066903194\times 10^{-24}\sqrt{\left(\frac{2}{3.839682\times 10^{-20}}\times\frac{8.4186763383009\times 10^{-16}+1.616252\times 10^{-35}}{8.4186763383009\times 10^{-16}}\right)}\right)\right)\right)\hat{}\,(1/15)\right)}$$

log(x) is the natural logarithm

Result:

3.143784851...

$3.143784851\ldots \approx \pi$

From 5.668464e+14, we obtain:

13+ln^2(5.668464e+14)

Input interpretation:

$13 + \log^2(5.668464 \times 10^{14})$

log(x) is the natural logarithm

Result:

1167.0363...

1167.0363...

((((13+ln^2(5.668464e+14))))^1/14

Input interpretation:

$\sqrt[14]{13 + \log^2(5.668464 \times 10^{14})}$

log(x) is the natural logarithm

Result:

1.65606529...

1.65606529... is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164,2696$ i.e. 1,65578...

(34+13+5)ln(5.668464e+14))

Input interpretation:

$(34 + 13 + 5) \log(5.668464 \times 10^{14})$

log(x) is the natural logarithm

Result:

1766.4977...

1766.4977... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

((((34+13+5)ln(5.668464e+14)))))^1/15

Input interpretation:

$\sqrt[15]{(34 + 13 + 5) \log(5.668464 \times 10^{14})}$

log(x) is the natural logarithm

Result:

1.64616819...

$1.64616819... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934...$

sqrt ((((6*((((((34+13+5)ln(5.668464e+14)))))^1/15)))))

Input interpretation:

$$\sqrt{6 \sqrt[15]{(34+13+5) \log(5.668464 \times 10^{14})}}$$

log(x) is the natural logarithm

Result:

3.142770932...

$3.142770932... \approx \pi$

From:

Journal of High Energy Physics, Gravitation and Cosmology, 2019, 5, 412-424
http://www.scirp.org/journal/jhepgc
ISSN Online: 2380-4335 - ISSN Print: 2380-4327
DOI: 10.4236/jhepgc.2019.52023 Mar. 13, 2019 412 Journal of High Energy Physics, Gravitation and Cosmology

Resolving the Vacuum Catastrophe: A Generalized Holographic Approach*

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We have:

In the case of the proton, the mass-energy in terms of Planck mass was calculated as $M_R = Rm_\ell = 2.45\times10^{55}$ g , which is equivalent to the mass of the observable universe (*i.e.* $M_u = 136\times2^{256}\times m_p = N_{Edd}m_p = 2.63\times10^{55}$ g in terms of the Eddington number; and $M_u \approx 3.63\times10^{55}$ g from density measurements). Since these values for the mass of the observable universe are just approximations, we will take the mass of the observable universe to be the mass-energy of the proton, as calculated above. The mass-energy density of the universe can thus be defined in terms of the mass-energy density of the proton. Thus, at the cosmological scale the mass-energy density, or vacuum energy density, is calculated to be,

$$\rho_u = \rho_R = \frac{M_R}{V_U} = \frac{Rm_\ell}{V_U} = 2.26\times10^{-30}\ \text{g/cm}^3 = 0.265\rho_{crit} \qquad (15)$$

where $V_U = 1.08\times10^{85}\,\text{cm}^3$ and was found by taking r_U as the Hubble radius $r_H = c/H_o = 1.37\times10^{28}\,\text{cm}$. Thus, when the vacuum energy density of the Un-

We take the eq. (15) and obtain V_U :

(2.45*10^55) /(2.26*10^-30)

Input interpretation:

$$\frac{2.45\times10^{55}}{2.26\times10^{-30}}$$

Result:

$1.084070796460176991150442477876106194690265486725663 7\ldots\times10^{85}$

$1.08407079646\ldots..*10^{85}$

We note that the result is a multiple very near to the following Ramanujan mock theta functions: φ(q) = **1.08094974** and χ(q) = **1.08753454**

We have that:

(((((2.45*10^55) /(2.26*10^-30)))))^6

Input interpretation:

$$\left(\frac{2.45\times10^{55}}{2.26\times10^{-30}}\right)^6$$

Result:

$1.6231022183016330409439312876378058571976821838312281... \times 10^{510}$

$1.6231022183…*10^{510}$

The result is a multiple very closed to the value 1.629 (see Fig. Appendix A)

And:

-5e-3 * 10^510+((((((2.45*10^55) /(2.26*10^-30)))))^6))))))

Input interpretation:

$$-5 \times 10^{-3} \times 10^{510} + \left(\frac{2.45 \times 10^{55}}{2.26 \times 10^{-30}}\right)^6$$

Result:

$1.6181022183016330409439312876378058571976821838312281... \times 10^{510}$

$1.6181022183…*10^{510}$

This result is a multiple very closed to the value of the golden ratio 1,618033988749...

We note that also the exponent of result, i.e. 510, is a Fibonacci's number

From the (15), we have also that:

(2.45e+55)/(1.08407079646e+85)

Input interpretation:

$$\frac{2.45 \times 10^{55}}{1.08407079646 \times 10^{85}}$$

Result:

$2.2600000000003689795918367949354435651910098683371740... \times 10^{-30}$

$2.26 * 10^{-30}$

And:

1/2.6709253774829 ln^2((((2.45e+55)/(1.08407079646e+85))))

Where $\chi(q)$ = **2.6709253774829** is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{2.6709253774829} \log^2\left(\frac{2.45 \times 10^{55}}{1.08407079646 \times 10^{85}}\right)$$

log(x) is the natural logarithm

Result:

1744.611192296...

1744.611... result in the range of the mass of candidate "glueball" $f_0(1710)$ ("glueball" =1760 ± 15 MeV).

-1/Pi * ln((((2.45e+55)/(1.08407079646e+85))))

Input interpretation:

$$-\frac{\log\left(\frac{2.45 \times 10^{55}}{1.08407079646 \times 10^{85}}\right)}{\pi}$$

log(x) is the natural logarithm

Result:

21.72852928547...

21.7285... result very near to the black hole entropy 21.7656

1/(2e) ((((colog((((2.45*10^55)/(1.08407079646*10^85))))))))

Input interpretation:

$$\frac{1}{2e}\left(-\log\left(\frac{2.45 \times 10^{55}}{1.08407079646 \times 10^{85}}\right)\right)$$

log(x) is the natural logarithm

Result:

12.55612778297...

12.556127... result practically equal to the black hole entropy 12.5664

Now, we have that:

Using the current value of $H_o = 67.4 \pm 0.5 \text{ km} \cdot \text{s}^{-1} \cdot \text{Mpc}^{-1}$ for Hubble's constant [14], gives the critical density at the present time as, $\rho_{crit} = 8.53 \times 10^{-30} \text{ g/cm}^3$ and thus $\rho_b = 0.049 \rho_{crit} = 4.18 \times 10^{-31} \text{ g/cm}^3$, $\rho_d = 0.268 \rho_{crit} = 2.29 \times 10^{-30} \text{ g/cm}^3$ and $\rho_\Lambda = 0.683 \rho_{crit} = 5.83 \times 10^{-30} \text{ g/cm}^3$. The vacuum energy density at the cosmological scale is thus of the order 10^{-30} g/cm^3.

fined in terms of the mass-energy density of the proton. Thus, at the cosmological scale the mass-energy density, or vacuum energy density, is calculated to be,

$$\rho_u = \rho_R = \frac{M_R}{V_U} = \frac{Rm_\ell}{V_U} = 2.26 \times 10^{-30} \text{ g/cm}^3 = 0.265 \rho_{crit} \qquad (15)$$

where $V_U = 1.08 \times 10^{85} \text{ cm}^3$ and was found by taking r_U as the Hubble radius $r_H = c/H_o = 1.37 \times 10^{28} \text{ cm}$. Thus, when the vacuum energy density of the Un-

We note that $r_H = c / H_0 = 1.37 * 10^{28}$ cm. We obtain:

(3*10^5 Km s^-1)/(67.4 Km s^-1 Mpc^-1)

Input interpretation:

$\frac{3 \times 10^5 \text{ km/s (kilometers per second)}}{67.4 \text{ km/s/Mpc (kilometers per second per megaparsec)}}$

Result:

4451 Mpc (megaparsecs)

Unit conversions:

14.52 billion ly (light years)

1.373×10^{23} km (kilometers)

1.373×10^{26} meters

Input interpretation:

convert 1.373×10^{26} meters to centimeters

Result:

1.373×10^{28} cm (centimeters)

$1.373 * 10^{28}$ cm

But, the result that we obtain from the simple division, is:

(3*10^5)/((67.4/3.086*10^19))

Input interpretation:

$$\frac{3\times 10^5}{\frac{67.4}{3.086\times 10^{19}}}$$

Result:

$1.3735905044510385756676557863501483679525222551928783... \times 10^{23}$

$1.373590504...*10^{23}$

This result is very near to the average between the following Ramanujan mock theta functions:

(1.333425959 +1.40643658)/2 = 2.739862539 / 2 = 1.3699312695

We have also that:

(55+21+5)+8*2^2*ln((((3*10^5)/((67.4/3.086*10^19)))))

Input interpretation:

$$(55+21+5)+8\times 2^2 \log\left(\frac{3\times 10^5}{\frac{67.4}{3.086\times 10^{19}}}\right)$$

log(x) is the natural logarithm

Result:

1785.8603...

1785.8603... result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV).

Note that the result 1785.8603 is near to the sum of 1729, that is the Hardy-Ramanujan number and 55, that is a Fibonacci's number

And:

((((((55+21+5)+8*2^2*ln((((3*10^5)/((67.4/3.086*10^19)))))))))))^1/15

Input interpretation:

$$\sqrt[15]{(55+21+5)+8\times 2^2 \log\left(\frac{3\times 10^5}{\frac{67.4}{3.086\times 10^{19}}}\right)}$$

log(x) is the natural logarithm

Result:

1.647364992222832482408562540293495177985856772165449245999...

1.647364992.... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

sqrt((((((((((((6*((((((55+21+5)+8*2^2*ln((((3*10^5)/((67.4/3.086*10^19))))))))))^1/15))))))))))))

Input interpretation:

$$\sqrt{6\sqrt[15]{(55+21+5)+8\times 2^2 \log\left(\frac{3\times 10^5}{\frac{67.4}{3.086\times 10^{19}}}\right)}}$$

log(x) is the natural logarithm

Result:

3.143913159318653142122275047352313373463341671604717900435...

3.1439131593.... ≈ π

Now, we have that:

In the case of the proton, the mass-energy in terms of Planck mass was calculated as $M_R = Rm_\ell = 2.45\times10^{55}\,\mathrm{g}$, which is equivalent to the mass of the observable universe (*i.e.* $M_u = 136\times2^{256}\times m_p = N_{Edd}m_p = 2.63\times10^{55}\,\mathrm{g}$ in terms of the Eddington number; and $M_u \approx 3.63\times10^{55}\,\mathrm{g}$ from density measurements). Since these values for the mass of the observable universe are just approximations, we will take the mass of the observable universe to be the mass-energy of the proton, as calculated above. The mass-energy density of the universe can thus be defined in terms of the mass-energy density of the proton. Thus, at the cosmological scale the mass-energy density, or vacuum energy density, is calculated to be,

$$\rho_u = \rho_R = \frac{M_R}{V_U} = \frac{Rm_\ell}{V_U} = 2.26\times10^{-30}\,\mathrm{g/cm^3} = 0.265\rho_{crit} \tag{15}$$

where $V_U = 1.08\times10^{85}\,\mathrm{cm^3}$ and was found by taking r_U as the Hubble radius $r_H = c/H_o = 1.37\times10^{28}\,\mathrm{cm}$. Thus, when the vacuum energy density of the Universe is considered in terms of the proton density and the protons PSU packing (*i.e.* its volume entropy, *R*) we find the density scales by a factor of 10^{122}. As well, it should be noted that this value for the mass-energy density is found to be equivalent to the dark matter density, $\rho_d = 0.268\rho_{crit}$.

Similarly, the vacuum energy density can be considered in terms of the PSU surface tiling (*i.e.* its surface entropy, η), as the radius expands from the Planck scale ρ_ℓ to the cosmological scale. The vacuum density at the cosmological scale is thus given as,

$$\rho_u = \frac{\rho_\ell}{\eta} = 8.53\times10^{-30}\,\mathrm{g/cm^3}\,(=\rho_{crit}) \tag{16}$$

It should as well be noted that the equivalence found between the critical density and that found from the surface entropy (Equation (16)) yields a critical mass that obeys the Schwarzschild solution for a universe with a radius of the Hubble radius,

$$M_{crit} = \frac{\rho_\ell}{\eta}V_u = \frac{m_\ell}{\phi} = 9.24\times10^{55}\,\mathrm{g}\left(\equiv\frac{r_s c^2}{2G}\right) \tag{19}$$

From the result of (16), we obtain:

(9.86e+93 / 8.53e-30)

Input interpretation:

$$\frac{9.86\times 10^{93}}{8.53\times 10^{-30}}$$

Result:

$1.1559202813599062133645955451348182883939038686987104... \times 10^{123}$

1.155920281359… * 10^{123} = η = surface entropy (We note that this value is near to the following Ramanujan mock theta function **f(q) = 1.1424432422...**)

Indeed:

Input interpretation:

$$\frac{9.86\times 10^{93}}{1.1559202813599062133645955451348182883939038686987104\times 10^{123}}$$

Result:

$8.530000000000000000000000000000000000000000000000002... \times 10^{-30}$

8.53 * 10^{-30}

We have that:

(1.1559202 * 10^123)^1/24^2

Input interpretation:

$$\sqrt[24^2]{1.1559202\times 10^{123}}$$

Result:

1.635501385658436748796895414378250724045435956558153140639...

1.635501385...

Result that is a golden number very near to the value 0.637 + 1 (see Fig. Appendix A)

And:

21+55+288+5 * ln (1.1559202 * 10^123)

Input interpretation:

$$21+55+288+5\log(1.1559202\times 10^{123})$$

$\log(x)$ is the natural logarithm

Result:

1780.8143159...

1780.814... result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$21+55+288+5\log(1.15592\times 10^{123}) = 364+5\log_e(1.15592\times 10^{123})$$

- $$21+55+288+5\log(1.15592\times 10^{123}) = 364+5\log(a)\log_a(1.15592\times 10^{123})$$

- $$21+55+288+5\log(1.15592\times 10^{123}) = 364-5\,\mathrm{Li}_1(1-1.15592\times 10^{123})$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

- **Series representations:**

$$21+55+288+5\log(1.15592\times 10^{123}) = 364+5\log(1.15592\times 10^{123})-5\sum_{k=1}^{\infty}\frac{(-1)^k e^{-283.363k}}{k}$$

- $$21+55+288+5\log(1.15592\times 10^{123}) = 364+10\,i\,\pi\left\lfloor\frac{\arg(1.15592\times 10^{123}-x)}{2\pi}\right\rfloor + 5\log(x)-5\sum_{k=1}^{\infty}\frac{(-1)^k (1.15592\times 10^{123}-x)^k x^{-k}}{k} \quad \text{for } x<0$$

-

$$21+55+288+5\log(1.15592\times 10^{123}) =$$
$$364+5\left\lfloor\frac{\arg(1.15592\times 10^{123}-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+5\log(z_0)+$$
$$5\left\lfloor\frac{\arg(1.15592\times 10^{123}-z_0)}{2\pi}\right\rfloor\log(z_0)-5\sum_{k=1}^{\infty}\frac{(-1)^k\,(1.15592\times 10^{123}-z_0)^k\,z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

Integral representations:

$$21+55+288+5\log(1.15592\times 10^{123}) = 364+5\int_1^{1.15592\times 10^{123}}\frac{1}{t}\,dt$$

•

$$21+55+288+5\log(1.15592\times 10^{123}) =$$
$$364+\frac{5}{2i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-283.363s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

Γ(x) is the gamma function

(((((21+55+288+5 * ln (1.1559202 * 10^123))))))^1/15

Input interpretation:

$$\sqrt[15]{21+55+288+5\log(1.1559202\times 10^{123})}$$

log(x) is the natural logarithm

Result:

1.64705426972...

1.64705426972… ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

((((((((((6*(((((21+55+288+5 * ln (1.1559202 * 10^123))))))^1/15))))))))))^1/2

Input interpretation:

$$\sqrt{6 \sqrt[15]{21 + 55 + 288 + 5 \log(1.1559202 \times 10^{123})}}$$

$\log(x)$ is the natural logarithm

-

Result:

3.14361664621...

3.14361664261… a very good approximations to π

Note that:

0.049sqrt(1.1559202813599062133645955451348182883939038686987104 × 10^123) *2.176509911585e-5

Where 0.049 is ρ_b, and 2.1765099... * 10^{-5} is the Planck mass m_p

Input interpretation:

$$0.049 \sqrt{1.1559202813599062133645955451348182883939038686987104 \times 10^{123}} \times 2.176509911585 \times 10^{-5}$$

Result:

$3.6259404824258387495463765274951071154484201901188659... \times 10^{55}$

3.6259404824... * 10^{55} grams or 3.6259404824...×10^{52} kilograms that is the mass of the observable universe

$M_u \approx 3.63 \times 10^{55}$ g from density measurements

From the Hawking radiation calculator, we have, with the above mass, an entropy of 1.514376e+121.

Now, we have the following data.

67,4 × 67,4 = 4.542,76 where 67.4 is the Hubble's constant

Using the current value of $H_o = 67.4 \pm 0.5 \text{ km} \cdot \text{s}^{-1} \cdot \text{Mpc}^{-1}$ for Hubble's constant

Multiplying 4.542,76 * 30860000000000000000 (3.086×10^19 km = 1 Mpc)

= 140.189.573.600.000.000.000.000 km = 1.4018957360e+26 m

For 2.26e-30 (see eq.15), 8.53e-30 (see eq.16) and 9.24e+55 (see eq.19), we obtain the following formula:

1.514376e+121*((((9.24e+55 * (8.53e-30+2.26e-30)))) / 1.4018957360e+26

Input interpretation:

$$(1.514376\times10^{121})\times\frac{9.24\times10^{55}\,(8.53\times10^{-30}+2.26\times10^{-30})}{1.4018957360\times10^{26}}$$

Result:

$1.0769893764025258437621783307856498109785248679863307... \times 10^{122}$

1.0769893764… * 10^{122}

(We note that this result is very near to the following partial Ramanujan mock theta function: φ(q) = 1.075226 + 0.00572374 = 1.08094974, precisely to the value 1.075226)

Thus, *when the vacuum energy density of the Universe is considered in terms of the proton density and the protons PSU packing (i.e. its volume entropy, R) we find the density scales by a factor of* 10^{122}

Furthermore, we have (from Wikipedia):

The cosmological constant Λ has the value of

$$\Lambda = 1.1056 \times 10^{-52}\ \mathrm{m}^{-2}$$

or 2.888×10^{-122} in reduced Planck units or 4.33×10^{-66} eV^2 in natural units. A positive vacuum energy density resulting from a cosmological constant implies a negative pressure, and vice versa. If the energy density is positive, the associated negative pressure will drive an accelerated expansion of the universe, as observed.

For the inverse of the cosmological constant in reduced Planck unit, we obtain:

$1/2.888\times10^{-122}$

1/(2.888e-122)

Input:

$$\frac{1}{\frac{2.888}{10^{122}}}$$

Result:

$3.4626038781163434903047091412742382271468144044321329... \times 10^{121}$

3.46260387… * 10^{121}

We have also, with the previous data, the following expression:

3.46260387e+121*((((9.24e+55 * (8.53e-30+2.26e-30)))) / 1.4018957360e+26

Input interpretation:

$$(3.46260387 \times 10^{121}) \times \frac{9.24 \times 10^{55} (8.53 \times 10^{-30} + 2.26 \times 10^{-30})}{1.4018957360 \times 10^{26}}$$

Result:

$2.4625242229672635226561527968011452743301588870800303... \times 10^{122}$

2.462524222… * 10^{122}

(This result is very near to the sum of the following Ramanujan mock theta functions: 0.50970737445 + 1.962364415 = 2.47207178945)

Note that, from 1.514376e+121, we obtain:

1+sqrt(1.514376e+121 / 3.46260387e+121)

Input interpretation:

$$1 + \sqrt{\frac{1.514376 \times 10^{121}}{3.46260387 \times 10^{121}}}$$

Result:

1.6613258...

1.6613258… is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164{,}2696$ i.e. 1,65578...

From the average of the two values 2.462524222… * 10^{122} and 1.0769893764… * 10^{122}, we obtain:

1/2((((2.462524222 * 10^122)+(1.0769893764 * 10^122))))

Input interpretation:

$$\frac{1}{2}\left(2.462524222\times 10^{122}+1.0769893764\times 10^{122}\right)$$

Result:

1.76976×10^{122}

$1.76976 * 10^{122}$

((((2.462524222 * 10^122)/(1.0769893764 * 10^122))))

Input interpretation:

$$\frac{2.462524222\times 10^{122}}{1.0769893764\times 10^{122}}$$

Result:

2.286488869770804918405878529889647294017634842846347690305...

2.2864888…

And:

1+sqrt((((((((((1.0769893764 * 10^122))))/((((2.462524222 * 10^122))))))))

Input interpretation:

$$1+\sqrt{\frac{1.0769893764\times 10^{122}}{2.462524222\times 10^{122}}}$$

Result:

1.6613257820...

1.661325782… is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$ i.e. 1,65578... Furthermore, this result is equal to the previous result, obtained from the following expression:

1+sqrt(1.514376e+121 / 3.46260387e+121)

Input interpretation:

$$1+\sqrt{\frac{1.514376\times10^{121}}{3.46260387\times10^{121}}}$$

Result:

1.6613258...

1.6613258…

Note that:

1/sqrt((((2.462524222 * 10^122)/(1.0769893764 * 10^122))))

Input interpretation:

$$\frac{1}{\sqrt{\frac{2.462524222\times10^{122}}{1.0769893764\times10^{122}}}}$$

Result:

0.6613257820...

0.661325782...

This result is practically the same previous above result less 1 and near to the value 0.639 (see Fig. Appendix A)

Now:

From the result 3.6259404824...$\times10^{52}$ kilograms that is the mass of the observable universe, we obtain:

Mass = 3.625940e+52

Radius = 5.383983e+25

Temperature = 3.384510e-30

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.625940e+52)* sqrt[[-((((3.384510e-30* 4*Pi*(5.383983e+25)^3-(5.383983e+25)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.625940\times 10^{52}}\sqrt{-\frac{3.384510\times 10^{-30}\times 4\pi(5.383983\times 10^{25})^3-(5.383983\times 10^{25})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249170706044001470353350246083669643374330068500668327...

1.61824917…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.625940e+52)* sqrt[[-((((3.384510e-30* 4*Pi*(5.383983e+25)^3-(5.383983e+25)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1\Big/\left(\sqrt{1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.625940\times 10^{52}}\sqrt{-\frac{3.384510\times 10^{-30}\times 4\pi(5.383983\times 10^{25})^3-(5.383983\times 10^{25})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951807485678384823132138568466779291134882397852816343...

0.6179518…

We note that the result $3.6259404824...\times 10^{52}$ is very near to the following Ramanujan mock theta function multiplied by 2:

$\boldsymbol{\psi(q)}$ **= 1.8236681145196...** = 2 * 1.8236681145196 = 3.6473362290392

From:

(50) $$ds^2 = -\frac{\Delta}{\rho^2}[dt - a\sin^2\theta d\phi]^2 + \frac{\sin^2\theta}{\rho^2}[(r^2+a^2)d\phi - adt]^2 + \frac{\rho^2}{\Delta}dr^2 + \rho^2 d\theta^2 .$$

We define the quantities in terms of charge, q, and the quantity a is defined as $a \equiv s/M$, the angular momentum,

spin is zero. The Kerr geometry is valid for an uncharged system or q = 0 and a Schwarzschild geometry for $q = s = 0$. The case we consider that is relevant to including torque is the case for $M^2 = q^2 + (s/M)^2$ for the

(54) $$ds^2 = \frac{-\Delta}{\rho^2}[dt - 2\sin^2\theta d\phi]^2 + \frac{\sin^2\theta}{\rho^2}[(r^2+a^2)d\phi - adt]^2 + \frac{\rho^2}{\Delta}dr^2 + \rho^2 d\theta^2 + \frac{\pi\ell^2 W r^4 \Theta \cos^2\theta dr^2}{2mR}$$

(9.38073005788799e+62/3.799856259684e+28 dt)((-2sin^2(Pi^2/2)*d)^2+sin^2(Pi)/(3.799856259684e+28) (3.799856259684e+28*Pi/2*d)^2+

+(3.799856259684e+28)/(-9.38073005788799e+62) d*(3.799856259684e+28)+(3.799856259684e+28)*d*Pi^2

a = 0 or s/M = 4,156013418e-49; r = 1.949322e+14; m = 2.406152e+48

θ = π ; $\phi = \pi/2$; spin = 0 or 0.9375

$$\rho^2 \equiv r^2 + a^2\cos^2\theta$$

$$\Delta \equiv r^2 - 2mr + a^2 + q^2 .$$

ρ^2 = 3.799856259684e+28 Δ = -9.38073005788799e+62

For a = s = 0, or a = s/M = 4,156013418e-49; we obtain:

(3.799856e+28)/(-9.38073e+62) (3.799856e+28)+ (3.799856e+28)*Pi^2

Input interpretation:

$$-\frac{3.799856\times 10^{28}}{9.38073\times 10^{62}}\times 3.799856\times 10^{28}+3.799856\times 10^{28}\,\pi^2$$

Result:

$3.750308\ldots\times 10^{29}$

$3.750308\ldots * 10^{29}$ partial result

(9.38073e+62/3.799856e+28)(-2sin^2(Pi^2/2))^2 + [sin^2(Pi)/ (3.799856e+28) (3.799856e+28*Pi/2)^2] + 3.750308 × 10^29

Input interpretation:

$$\frac{9.38073\times 10^{62}}{3.799856\times 10^{28}}\left(-2\sin^2\left(\frac{\pi^2}{2}\right)\right)^2+\frac{\sin^2(\pi)}{3.799856\times 10^{28}}\left(3.799856\times 10^{28}\times\frac{\pi}{2}\right)^2+3.750308\times 10^{29}$$

Result:

$8.93728\ldots\times 10^{34}$

$8.93728\ldots * 10^{34} = ds^2$

sqrt((((((((9.38073e+62/3.799856e+28)(-2sin^2(Pi^2/2))^2 + [sin^2(Pi)/ (3.799856e+28) (3.799856e+28*Pi/2)^2] + 3.750308 × 10^29)))))))

Input interpretation:

$$\sqrt{\frac{9.38073\times 10^{62}}{3.799856\times 10^{28}}\left(-2\sin^2\left(\frac{\pi^2}{2}\right)\right)^2+\frac{\sin^2(\pi)}{3.799856\times 10^{28}}\left(3.799856\times 10^{28}\times\frac{\pi}{2}\right)^2+3.750308\times 10^{29}}$$

Result:

$2.98953\ldots\times 10^{17}$

$2.98953\ldots * 10^{17}$

We have also:

((((((9.38073e+62/3.799856e+28)(-2sin^2(Pi^2/2))^2 + [sin^2(Pi)/ (3.799856e+28) (3.799856e+28*Pi/2)^2] + 3.750308 × 10^29)))))^1/165

Where 165 = 144+21

Input interpretation:

$$\left(\frac{9.38073\times 10^{62}}{3.799856\times 10^{28}}\left(-2\sin^2\left(\frac{\pi^2}{2}\right)\right)^2+\frac{\sin^2(\pi)}{3.799856\times 10^{28}}\left(3.799856\times 10^{28}\times\frac{\pi}{2}\right)^2+3.750308\times 10^{29}\right)\hat{}\,(1/165)$$

Result:

1.6286414606070786972103472023474434871517029337463165699922...

1.62864146…. a very good approximation to 1.629 (see Fig. Appendix A)

0.922 / 0.566 = 1.628975265.....

With ds, we obtain:

Input interpretation:

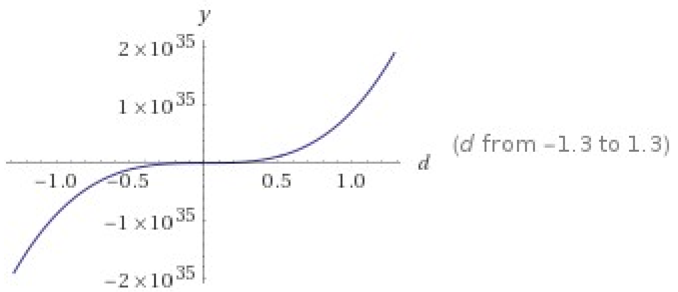
$$\left(\frac{9.38073005788799\times 10^{62}}{3.799856259684\times 10^{28}}\,d\right)\left(\left(-2\sin^2\left(\frac{\pi^2}{2}\right)d\right)^2+\frac{\sin^2(\pi)}{3.799856259684\times 10^{28}}\left(3.799856259684\times 10^{28}\times\frac{\pi}{2}\,d\right)^2\right)$$

Result:

$8.93724007559\times 10^{34}\,d^3$

$8.93724007559 * 10^{34}$

Plot:



-

Geometric figure:

- Properties

line

Root:

$d = 0$

-

Polynomial discriminant:

$\Delta = 0$

-

Property as a function:
Parity
odd

-

Derivative:

$$\frac{d}{dd}(89\,372\,400\,755\,901\,212\,037\,998\,591\,242\,613\,518\,d^3) = 268\,117\,202\,267\,703\,636\,113\,995\,773\,727\,840\,554\,d^2$$

-

Indefinite integral:

$$\int \frac{(9.38073005788799\times 10^{62}\,d)\left(\left(-2\sin^2\left(\frac{\pi^2}{2}\right)d\right)^2 + \frac{\sin^2(\pi)\left(\frac{1}{2}\,3.799856259684\times 10^{28}\,\pi\,d\right)^2}{3.799856259684\times 10^{28}}\right)}{3.799856259684\times 10^{28}}\,dd = 2.234310018898\times 10^{34}\,d^4 + \text{constant}$$

(3.799856259684e+28)/(-9.38073005788799e+62) d*(3.799856259684e+28)+(3.799856259684e+28)*d*Pi^2 + (8.93724007559×10^34 d^3)

Input interpretation:

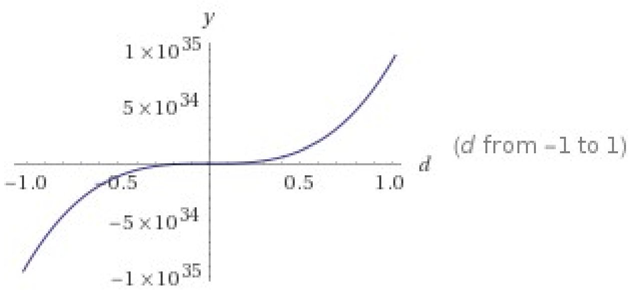
$$-\frac{3.799856259684\times 10^{28}}{9.38073005788799\times 10^{62}}\,d\times 3.799856259684\times 10^{28} + 3.799856259684\times 10^{28}\,d\,\pi^2 + 8.93724007559\times 10^{34}\,d^3$$

Result:

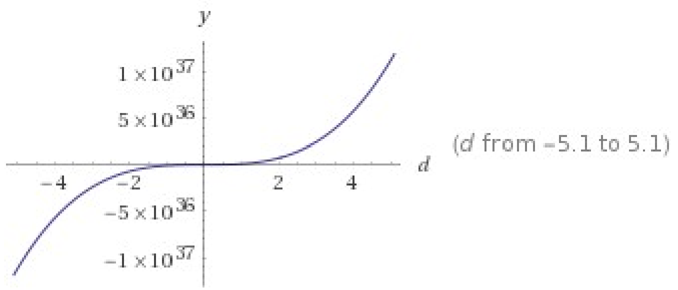
$$8.93724007559\times 10^{34}\,d^3 + 3.750307806408\times 10^{29}\,d$$

$8.93724007559 * 10^{34} + 3.750307806408 * 10^{29} =$ 8,93727757866806408 * 10^{34}

Plots:



-



-

Geometric figure:
- Properties

line

Alternate forms:

$d\,(8.93724007559\times10^{34}\,d^2 + 3.750307806408\times10^{29})$

-

$4.47096367534\times10^{11}\,d\,(1.99895161862\times10^{23}\,d^2 + 8.3881419728\times10^{17})$

-

$d\ \mathrm{Null}\left(\frac{8.93724007559\times10^{34}\,d^2}{\mathrm{Null}} + \frac{3.750307806408\times10^{29}}{\mathrm{Null}}\right)$

Real root:

$d = 0$

-

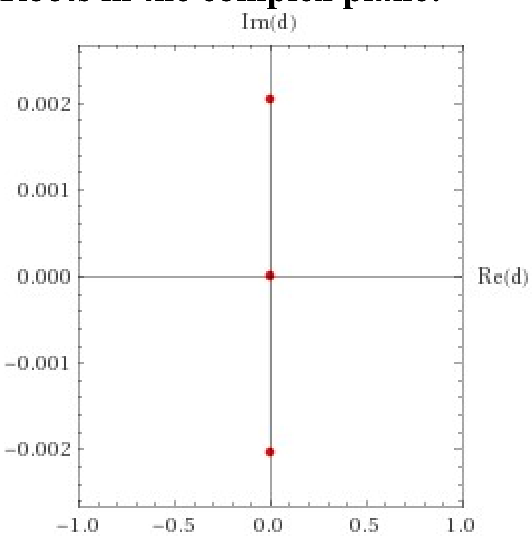
Complex roots:

$d = -0.00204848007860\,i$

-

$d = 0.00204848007860\,i$

Roots in the complex plane:



Polynomial discriminant:

$\Delta = -1.88566333764\times10^{124}$

$\Delta = -1.88566333764*10^{124}$

Property as a function:
Parity

odd

- **Derivative:**

$$\frac{d}{dd}(89\,372\,400\,755\,900\,000\,000\,000\,000\,000\,000\,000\,d^3 + 375\,030\,780\,640\,841\,551\,764\,189\,572\,062\,d) = 268\,117\,202\,267\,700\,000\,000\,000\,000\,000\,000\,000\,d^2 + 375\,030\,780\,640\,841\,551\,764\,189\,572\,062$$

- **Indefinite integral:**

$$\int\left(-\frac{3.799856259684\times 10^{28}\,d\,3.799856259684\times 10^{28}}{9.38073005788799\times 10^{62}} + 3.799856259684\times 10^{28}\,d\,\pi^2 + 8.93724007559\times 10^{34}\,d^3\right)dd = 2.23431001890\times 10^{34}\,d^4 + 1.87515390320\times 10^{29}\,d^2 + \text{constant}$$

Previously we have obtained:

((((((((((2.960912e+118/3.828339e+79)))))) ((((((((2.176509911585e-5))))))))

Input interpretation:

$$\frac{2.960912\times 10^{118}}{3.828339\times 10^{79}}\times 2.176509911585\times 10^{-5}$$

Result:

$$1.683355187545033373481293062082537622713140085034266\ldots\times 10^{34}$$

1.6833551875….*10^{34} = holographic gravitational mass

And

We now proceed to calculate the rest mass of the proton as above, utilizing the new muonic hydrogen measured proton charge radius $r_p = 0.84184\times 10^{-13}\,cm$ and find $\eta = 4.340996\times 10^{40}$, $\eta_\rho = 9.448222\times 10^{35}\,gm$, and $R = 1.130561\times 10^{60}$. Again utilizing equation (24) we obtain

$$m_{p'} = 2\frac{\eta_\rho}{R} = 1.6714213\times 10^{-24}\,gm\ . \tag{25}$$

Now, we observe that:

1/(2Pi) (9.448222e+35 * 8.93727757866806408e+34) grams/cm

Input interpretation:

$\frac{1}{2\pi} \times 9.448222 \times 10^{35} \times 8.9372775786680641 \times 10^{34}$ g/cm (grams per centimeter)

Result:

1.343926×10^{70} g/cm (grams per centimeter)

Unit conversions:

1.343926×10^{67} kg/cm (kilograms per centimeter)

1.343926×10^{72} g/m (grams per meter)

1.343926×10^{72} mg/mm (milligrams per millimeter)

1.343926×10^{73} mg/cm (milligrams per centimeter)

1.130561e+60 / 0.84184e-13 cm

Input interpretation:

$\frac{1.130561 \times 10^{60}}{0.84184 \times 10^{-13}}$ cm (centimeters)

Result:

1.343×10^{73} cm (centimeters)

$1.343 * 10^{73}$ cm

Unit conversions:

1.343×10^{68} km (kilometers)

1.343×10^{71} meters

1.42×10^{55} ly (light years)

8.345×10^{67} miles

Comparison as diameter:

$\approx 1.5 \times 10^{44} \times$ diameter of the observable universe ($\approx$ 93 billion ly)

Interpretations:

length

diameter

Corresponding quantities:

Light travel time t in vacuum from $t = x/c$:

1.42×10^{55} years

Light travel time t in an optical fiber $t = 1.48x/c$:

2.102×10^{55} years

Wavelength λ from $\lambda = 2\pi\bar{\lambda}$:

8.438×10^{71} meters

Angular wavelength $\bar{\lambda}$ from $\bar{\lambda} = \lambda/(2\pi)$:

2.137×10^{70} meters

1e+70+ (((1/(4Pi) (9.448222e+35 * 8.93727757866806408e+34))))

Input interpretation:

$$1 \times 10^{70} + \frac{1}{4\pi}(9.448222 \times 10^{35} \times 8.93727757866806408 \times 10^{34})$$

Result:

$1.671963172424582000020267476695615319697645845494179 9... \times 10^{70}$

1.6719631724…*10^{70}

Comparison:

$\approx 1.7\times10^{-10} \times$ the number of atoms in the visible universe ($\approx 10^{80}$)

1/10^3((((1*10^73 + (1/2) (((1.130561e+60 / 0.84184e-13)))))))

Input interpretation:

$$\frac{1}{10^3}\left(1 \times 10^{73} + \frac{1}{2} \times \frac{1.130561 \times 10^{60}}{0.84184 \times 10^{-13}}\right)$$

Result:

$1.6714821106148436757578637270740283189204599448826380... \times 10^{70}$

1.6714821106…*10^{70}

We note also that:

From Δ = -1.88566333764*10^{124} and 1.155920281359… * 10^{123} = η = surface entropy, we obtain:

(-0.05*2) * -1.88566333764*10^124) / (1.155920281359 * 10^123)

Input interpretation:

$$(-0.05\times 2)\left(-\frac{1.88566333764\times 10^{124}}{1.155920281359\times 10^{123}}\right)$$

Result:

1.631309155180710955351881023903130835731721217176491501522...

1.63130915518…

This result is a golden number very near to the value 1.629 (see Fig. Appendix A)

-13/10^3+(-0.05*2) * -1.88566333764*10^124) / (1.155920281359 * 10^123)

Input interpretation:

$$-\frac{13}{10^3}+(-0.05\times 2)\left(-\frac{1.88566333764\times 10^{124}}{1.155920281359\times 10^{123}}\right)$$

Result:

1.618309155180710955351881023903130835731721217176491501522...

1.61830915518…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

We remember that:

1.6833551875….*10^{34} = holographic gravitational mass

From the result 1.63130915518…,, we obtain:

-e^-1 * 1/(((((-1.88566333764*10^124)* (1.155920281359 * 10^123)))))

Input interpretation:

$$-\frac{-\frac{1}{(1.88566333764\times 10^{124})(1.155920281359\times 10^{123})}}{e}$$

Result:

$1.68777083150... \times 10^{-248}$

1.68777… * 10^{-248}

- **Alternative representation:**

$$-\frac{1}{e\left(-\left(1.885663337640000\times 10^{124}\right)\left(1.1559202813590000\times 10^{123}\right)\right)} = -\frac{1}{\exp(z)\left(-\left(1.885663337640000\times 10^{124}\right)\left(1.1559202813590000\times 10^{123}\right)\right)} \text{ for } z = 1$$

- **Series representations:**

$$-\frac{1}{e\left(-\left(1.885663337640000\times 10^{124}\right)\left(1.1559202813590000\times 10^{123}\right)\right)} = 4.587836781880341\times 10^{-248}\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}$$

-

$$-\frac{1}{e\left(-\left(1.885663337640000\times 10^{124}\right)\left(1.1559202813590000\times 10^{123}\right)\right)} = \frac{4.587836781880341\times 10^{-248}}{\sum_{k=0}^{\infty}\frac{1}{k!}}$$

-

$$-\frac{1}{e\left(-\left(1.885663337640000\times 10^{124}\right)\left(1.1559202813590000\times 10^{123}\right)\right)} = \frac{9.17567356376068\times 10^{-248}}{\sum_{k=0}^{\infty}\frac{1+k}{k!}}$$

$n!$ is the factorial function

sqrt(((((((((((((1.63130915518)) (((((((-((2*5)/(3^3)) * 1/(((((-1.88566333764*10^124)* (1.155920281359 * 10^123)))))))))))))))))))))

Input interpretation:

$$\sqrt{1.63130915518\left(-\frac{2\times 5}{3^3}\left(-\frac{1}{(1.88566333764\times 10^{124})(1.155920281359\times 10^{123})}\right)\right)}$$

Result:

$$1.66490797708\ldots\times 10^{-124}$$

1.66490797708... * 10^{-124} is a sub-multiple very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

5/(5+13) * 1/sqrt(((((((((((((1.63130915518)) ((((((((-((2*5)/(3^3)) * 1/(((((-1.88566333764*10^124)* (1.155920281359 * 10^123))))))))))))))))))))))

Input interpretation:

$$\frac{5}{5+13}\times\frac{1}{\sqrt{1.63130915518\left(-\frac{2\times 5}{3^3}\left(-\frac{1}{(1.88566333764\times 10^{124})(1.155920281359\times 10^{123})}\right)\right)}}$$

Result:

$$1.66842721401\ldots\times 10^{123}$$

1.66842721401...*10^{123}

-(5*10^123/10^2)+ [5/(5+13) * 1/sqrt(((((((1.63130915518)) ((((((((-((2*5)/(3^3)) * 1/(((((-1.88566333764*10^124)* (1.155920281359 * 10^123))))))))))))))))))]

Input interpretation:

$$-\frac{5\times 10^{123}}{10^2}+\frac{5}{5+13}\times\frac{1}{\sqrt{1.63130915518\left(-\frac{2\times 5}{3^3}\left(-\frac{1}{(1.88566333764\times 10^{124})(1.155920281359\times 10^{123})}\right)\right)}}$$

Result:

$1.61842721401... \times 10^{123}$

1.61842721401...*10^{123}

This result is a multiple very closed to the value of the golden ratio 1,618033988749...

From the two previous values 2,462524222e+122 and 1,0769893764e+122, we obtain:

1/(2,462524222e+122) = 4,0608737614277160194365795765155e-123

1/(1,0769893764e+122) = 9,2851426570487756948685905347803e-123

We remember that:

$$\rho_u = \rho_R = \frac{M_R}{V_U} = \frac{Rm_\ell}{V_U} = 2.26\times10^{-30}\ \mathrm{g/cm^3} = 0.265\rho_{crit} \qquad (15)$$

where $V_U = 1.08\times10^{85}\ \mathrm{cm}^3$ and was found by taking r_U as the Hubble radius $r_H = c/H_o = 1.37\times10^{28}\ \mathrm{cm}$. Thus, when the vacuum energy density of the Universe is considered in terms of the proton density and the protons PSU packing (*i.e.* its volume entropy, *R*) we find the density scales by a factor of 10^{122}. As well, it should be noted that this value for the mass-energy density is found to be equivalent to the dark matter density, $\rho_d = 0.268\rho_{crit}$.

These findings are in agreement with those of Ali and Das [47] who, in an attempt to resolve the current problems of cosmology, interpret one of the quantum correction terms in the second order Friedman equation as dark energy. From the quantum corrected Raychaudhuri equations they find the first correction term $\Lambda_Q = 1/L_0^2$ where L_0 is identified as the current linear dimension of our observable universe, such that $\lambda_Q = 10^{-123}$ in planck units.

The inverse of density scales factor 10^{122} is equal to $10^{-123} = \lambda_Q$

Thence, the inverse of value 2.462524222e+122, provides for λ_Q the following result 4.0608737614277160194365795765155 * 10^{-123}

From:

Following the holographic principle of ‘t hooft [24], based on the Bekenstein-Hawking formulae for the entropy of a black hole [25] [26], Haramein [15] [16] defines the holographic bit of information as an oscillating Planck spherical unit (PSU), given as

$$PSU = \frac{4}{3}\pi r_\ell^3 \qquad \text{Eqn. 4}$$

where $r_\ell = \frac{\ell}{2}$ and ℓ is the Planck length.

For $r_\ell = 1/2 * 1.616252 * 10^{-35}$ = 8.08126 × 10^-36, we obtain:

4/3*Pi*(8.08126 × 10^-36)^3

Input interpretation:

$$\frac{4}{3}\pi\left(8.08126\times 10^{-36}\right)^3$$

Result:

$$2.2106798269436412395446800787504752069347112300965 62\ldots \times 10^{-105}$$

$2.21067982694... * 10^{-105} = V$

Or $V_U = 1.08407079646\ldots\ldots * 10^{85}$

Note that 1.08407... is very near to the Ramanujan mock theta function 1.0864055

From $4.0608737614277160194365795765155 * 10^{-123}$ multiplied by $2.21067982694... * 10^{-105}$, we obtain:

4.0608737614277160194365795765155 * 10^-123 4/3*Pi*(8.08126 × 10^-36)^3

Input interpretation:

$$\frac{4.0608737614277160194365795765155\left(\frac{4}{3}\pi\left(8.08126\times 10^{-36}\right)^3\right)}{10^{123}}$$

Result:

$$8.9772917041529967112935877499379080890799517451012 90\ldots \times 10^{-228}$$

$8.9772917... * 10^{-228} = M_1$

While, from $4.0608737614277160194365795765155 * 10^{-123}$ multiplied by $1.08407079646\ldots\ldots * 10^{85}$, we obtain:

(4.0608737614277160194365795765155 * 10^-123) * (1.08407079646 *10^85)

Input interpretation:

$$\frac{4.0608737614277160194365795765155}{10^{123}} (1.08407079646 \times 10^{85})$$

Result:

$$4.4022746528744601319093136619713275965351\ 3 \times 10^{-38}$$

$4.4022746528\ldots * 10^{-38} = M_2$

We have that:

-(-55/10^3 - 1/55 * ln(((((1/(((4.0608737614277160194365795765155 * 10^-123) * (1.08407079646 *10^85))))))))

Input interpretation:

$$-\left(-\frac{55}{10^3} - \frac{1}{55} \log\left(\frac{1}{\frac{4.0608737614277160194365795765155}{10^{123}} (1.08407079646 \times 10^{85})}\right)\right)$$

log(x) is the natural logarithm

Result:

1.6189293119976...

1.6189293…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$-\left(-\frac{55}{10^3} - \frac{1}{55} \log\left(\frac{1}{\frac{4.06087376142771601943657957651550000 (1.084070796460000 \times 10^{85})}{10^{123}}}\right)\right) = \frac{1}{55} \log_e\left(\frac{1}{\frac{4.402274652874460 \times 10^{85}}{10^{123}}}\right) + \frac{55}{10^3}$$

-

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\left(1.084070796460000\times 10^{85}\right)}{10^{123}}}\right)\right)=$$
$$\frac{1}{55}\log(a)\log_a\left(\frac{1}{\frac{4.402274652874460\times 10^{85}}{10^{123}}}\right)+\frac{55}{10^3}$$

-

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\left(1.084070796460000\times 10^{85}\right)}{10^{123}}}\right)\right)=$$
$$-\frac{1}{55}\text{Li}_1\left(1-\frac{1}{\frac{4.402274652874460\times 10^{85}}{10^{123}}}\right)+\frac{55}{10^3}$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations:

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\left(1.084070796460000\times 10^{85}\right)}{10^{123}}}\right)\right)=$$
$$\frac{11}{200}+\frac{\log\left(2.271552955804452\times 10^{37}\right)}{55}-\frac{1}{55}\sum_{k=1}^{\infty}\frac{(-1)^k e^{-86.0161121598683205 k}}{k}$$

-

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\left(1.084070796460000\times 10^{85}\right)}{10^{123}}}\right)\right)=$$
$$\frac{11}{200}+\frac{2}{55}i\pi\left\lfloor\frac{\arg\left(2.271552955804452\times 10^{37}-x\right)}{2\pi}\right\rfloor+\frac{\log(x)}{55}-$$
$$\frac{1}{55}\sum_{k=1}^{\infty}\frac{(-1)^k\left(2.271552955804452\times 10^{37}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

-

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\,(1.084070796460000\times10^{85})}{10^{123}}}\right)\right)=$$

$$\frac{11}{200}+\frac{1}{55}\left\lfloor\frac{\arg(2.271552955804452\times10^{37}-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+$$
$$\frac{\log(z_0)}{55}+\frac{1}{55}\left\lfloor\frac{\arg(2.271552955804452\times10^{37}-z_0)}{2\pi}\right\rfloor\log(z_0)-$$
$$\frac{1}{55}\sum_{k=1}^{\infty}\frac{(-1)^k\,(2.271552955804452\times10^{37}-z_0)^k\,z_0^{-k}}{k}$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representations:

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\,(1.084070796460000\times10^{85})}{10^{123}}}\right)\right)=$$
$$\frac{11}{200}+\frac{1}{55}\int_1^{2.271552955804452\times10^{37}}\frac{1}{t}\,dt$$

-

$$-\left(-\frac{55}{10^3}-\frac{1}{55}\log\left(\frac{1}{\frac{4.0608737614277160194365795765155000\,(1.084070796460000\times10^{85})}{10^{123}}}\right)\right)=$$
$$\frac{11}{200}+\frac{1}{110\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-86.0161121598683205\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

From the following value 4.402275e-38, considered as mass, we obtain:

Mass = 4.402275e-38

Radius = 6.536724e-65

Temperature = 2.787657e+60

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.402275e-38)* sqrt[[-((((2.787657e+60 * 4*Pi*(6.536724e-65)^3-(6.536724e-65)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.402275\times 10^{-38}}\sqrt{-\frac{2.787657\times 10^{60}\times 4\pi(6.536724\times 10^{-65})^3-(6.536724\times 10^{-65})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249332550714510593366585424738412108885778787171605538...

1.61824933…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.402275e-38)* sqrt[[-((((2.787657e+60 * 4*Pi*(6.536724e-65)^3-(6.536724e-65)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.402275\times 10^{-38}}\sqrt{-\frac{2.787657\times 10^{60}\times 4\pi(6.536724\times 10^{-65})^3-(6.536724\times 10^{-65})^2}{6.67\times 10^{-11}}}\right)}\right)$$

Result:

0.617951745682960681615094759440890883303282036471814587345...

0.61795174…

The difference between 1.61824933… and the conjugate 0.61795174… +1, provides: 0.00029759. this result tend to 0 (condition of very high symmetry: black hole ↔ white hole)

From:

SCALE UNIFICATION – A UNIVERSAL SCALING LAW FOR ORGANIZED MATTER

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Proceedings of The Unified Theories Conference (2008)

If we consider the atomic resolution in our scaling law we find that it is the only one that does not obey the Schwarzschild condition. However, within the context of a polarizable vacuum where the quantum vacuum energy density is typically given as $\rho_v = 5.157\times10^{93}\, gm/cm^3$ we can calculate the contribution of the vacuum energy necessary to produce a Schwarzschild-type condition for the nucleon radius. For a proton with a radius of $1.321\, Fermi$ and a volume, V_p of $9.665\times10^{-39}\, cm^3$, the quantity of vacuum energy available in the volume of a proton R_ρ is, $R_\rho = \rho_v \times V_p$, then

$$R_\rho = 5.157\times10^{93}\, gm/cm^3 \times 9.665\times10^{-39}\, cm^3 = \sim 4.984\times10^{55}\, gm/\, proton\ volume. \quad (4)$$

One can calculate a similar result utilizing the proton volume V_p and dividing it by the Planck volume ℓ^3 equal to $4.220\times10^{-99}\, cm^3$ extrapolated from the Planck length $1.616\times10^{-33}\, cm$. This yields $2.290\times10^{60}\ \ell^3$ Planck volumes contained in a proton. A Planck's mass being $2.176\times10^{-5}\, gm$, it follows that the vacuum energy equivalent in a proton's volume is

$$R_\rho = 2.176\times10^{-5}\, gm \times 2.290\times10^{60}\, \ell^3 = \sim 4.983\times10^{55}\ gm/\, proton\ volume. \quad (5)$$

Then we can calculate the proportion of vacuum energy available in the proton volume R_ρ to yield a mass M necessary for a nucleon to obey the Schwarzschild condition $R_s = \frac{2GM}{c^2}$ at the typical proton radius of $1.321\, Fermi$, then

$$1.321\times10^{-13}\, cm = \frac{2\times6.674\times10^{-8}\, cm^3/(gm\, s^2)\times M}{8.988\times10^{20}\, cm^2/s^2} \quad (6)$$

where M equals the required mass,

$$M = \frac{8.988\times10^{20}\, cm^2/s^2 \times 1.321\times10^{-13}\, cm}{2\times6.674\times10^{-8}\, cm^3/(gm\, s^2)} = \sim 8.898\times10^{14}\, gm \quad (7)$$

provided from the vacuum density. It follows that only a very small proportion of the mass/energy available in the vacuum is necessary for a nucleon to reach the Schwarzschild condition since this ratio is

$$\frac{R_\rho}{M} = \frac{4.984\times10^{55}\ gm}{8.898\times10^{14}\, gm} = \sim 5.601\times10^{40}. \quad (8)$$

It is interesting to note that this ratio is approximately the ratio of the gravitational force to the "strong force" estimated to be 10^{40} times stronger than gravity. It then fallows that only 1.785×10^{-39} % of the vacuum mass/energy available in the proton volume is needed to form a *"Schwarzschild proton."* This contribution from the vacuum maybe the result of a small amount of the vacuum energy becoming coherent and polarized near and at the boundary of the spinning proton. A proton of such mass would produce a gravitational force acting on another proton situated at a diameter distance of

$$F = \frac{GM^2}{r^2} = \frac{6.674\times10^{-8}\, cm^3/(gm\, s^2)\times(8.898\times10^{14}\, gm)^2}{(2\times1.321\times10^{-13}\, cm)^2} = 7.570\times10^{47}\, dynes. \quad (9)$$

We have, from M = 4.984e+52 kg:

Mass = 4.984000e+52

Radius = 7.400500e+25

Temperature = 2.462286e-30

and from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.984000e+52)* sqrt[[-((((2.462286e-30 * 4*Pi*(7.400500e+25)^3-(7.400500e+25)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.984000\times 10^{52}}\sqrt{-\frac{2.462286\times 10^{-30}\times 4\pi(7.400500\times 10^{25})^3-(7.400500\times 10^{25})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249240283837854529127153992941619312312315261323382116...

1.61824924…

And:

1/sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.984000e+52)* sqrt[[-((((2.462286e-30 * 4*Pi*(7.400500e+25)^3-(7.400500e+25)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1/\left(\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.984000\times 10^{52}}\sqrt{-\frac{2.462286\times 10^{-30}\times 4\pi(7.400500\times 10^{25})^3-(7.400500\times 10^{25})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.61795178091639449328722525243810711598131836357932864247 9...

0.61795178…

Now, we have, from M = 8.898e+14 g:

Input interpretation:

convert 8.898×10^{14} grams to kilograms

Result:

8.898×10^{11} kg (kilograms)

$8.898 * 10^{11}$ kg

Mass = 8.898e+11

Radius = 1.321221e-15

Temperature = 1.379190e+11

and from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(8.898e+11)* sqrt[[-((((1.379190e+11 * 4*Pi*(1.321221e-15)^3-(1.321221e-15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{8.898 \times 10^{11}} \sqrt{-\frac{1.379190 \times 10^{11} \times 4 \pi \left(1.321221 \times 10^{-15}\right)^3 - \left(1.321221 \times 10^{-15}\right)^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.6182491710012898478078135487719285936639979799673251178 69...

1.6182491710…

And:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(8.898e+11)* sqrt[[-((((1.379190e+11 * 4*Pi*(1.321221e-15)^3-(1.321221e-15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{8.898\times10^{11}}\sqrt{-\frac{1.379190\times10^{11}\times4\pi\left(1.321221\times10^{-15}\right)^3-\left(1.321221\times10^{-15}\right)^2}{6.67\times10^{-11}}}}}}$$

Result:

0.617951807372934496140041959011144033012021638431264847567...

0.617951807…

Now, from eq.(8), we obtain:

(4.984e+55 / 8.898e+14)^1/(24*8)

Input interpretation:

$$\sqrt[24\times8]{\frac{4.984\times10^{55}}{8.898\times10^{14}}}$$

Result:

1.63016158359790 39...

1.63016158359.... result very near to the value 1.629 (see Fig. Appendix A)

And:

-12/10^3+(4.984e+55 / 8.898e+14)^1/(24*8)

Input interpretation:

$$-\frac{12}{10^3}+\sqrt[24\times8]{\frac{4.984\times10^{55}}{8.898\times10^{14}}}$$

Result:

1.6181615835979039...

1.61816158...

This result is a very good approximation to the value of the golden ratio 1,618033988749...

We have also:

(55+34)+14 ln(4.984000e+52)

Input interpretation:

$(55 + 34) + 14 \log(4.984000 \times 10^{52})$

$\log(x)$ is the natural logarithm

Result:

1787.76921...

1787.76921... result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Note that the result 1787.76... is the sum of 1729, that is the Hardy-Ramanujan number, 55 and 3 that are a Fibonacci's numbers

And:

(((((55+34)+14 ln(4.984000e+52)))))^1/15

Input interpretation:

$\sqrt[15]{(55 + 34) + 14 \log(4.984000 \times 10^{52})}$

$\log(x)$ is the natural logarithm

Result:

1.647482323...

1.647482323... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

sqrt((((((((6*(((((55+34)+14 ln(4.984000e+52)))))^1/15))))))))

Input interpretation:

$$\sqrt{6\sqrt[15]{(55+34)+14\log(4.984000\times10^{52})}}$$

log(x) is the natural logarithm

Result:

3.144025117...

3.144025117... ≈ π

From eq. (9), we obtain:

Input interpretation:

convert 7.57×10^{47} dynes to kilograms-force

Result:

7.719×10^{41} kgf (kilograms-force)

$7.719 * 10^{41}$

1/8 ln (7.719×10^41)

Input interpretation:

$$\frac{1}{8}\log(7.719\times10^{41})$$

log(x) is the natural logarithm

Result:

12.056209204340448731685444632845261657121075...

12.056209… result is very near to the black hole entropy 12.1904

(34+13)+18* ln (7.719×10^41)

Input interpretation:

$$(34+13)+18\log(7.719\times10^{41})$$

log(x) is the natural logarithm

Result:

1783.0941254250246173627040271297176786254348...

1783.094125… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Note that the result 1783 is the sum of 1728, that is the Hardy-Ramanujan number less 1 and 55, that is a Fibonacci's number

(((((34+13)+18* ln (7.719×10^41)))))^1/15

Input interpretation:

$$\sqrt[15]{(34+13)+18\log(7.719\times10^{41})}$$

log(x) is the natural logarithm

Result:

1.6471947570781057120821939124890169749291428 9...

$1.647194757\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

-(21/10^3+8/10^3)+(((((34+13)+18* ln (7.719×10^41)))))^1/15

Input interpretation:

$$-\left(\frac{21}{10^3}+\frac{8}{10^3}\right)+\sqrt[15]{(34+13)+18\log(7.719\times10^{41})}$$

log(x) is the natural logarithm

Result:

1.6181947570781057120821939124890169749291428 9...

1.618194757…

This result is a very good approximation to the value of the golden ratio 1,618033988749...

Now, we take the value 7.719000e+41 considered as mass, and obtain:

Mass = 7.719000e+41

Radius = 1.146157e+15

Temperature = 1.589847e-19

and from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(7.719e+41)* sqrt[[-((((1.589847e-19 * 4*Pi*(1.146157e+15)^3-(1.146157e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{7.719\times 10^{41}}\sqrt{-\frac{1.589847\times 10^{-19}\times 4\pi(1.146157\times 10^{15})^3-(1.146157\times 10^{15})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618249163832418639846819704320002133178656608282390642527...

1.6182491638…

And:

1/ sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(7.719e+41)* sqrt[[-((((1.589847e-19 * 4*Pi*(1.146157e+15)^3-(1.146157e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{7.719\times 10^{41}}\sqrt{-\frac{1.589847\times 10^{-19}\times 4\pi(1.146157\times 10^{15})^3-(1.146157\times 10^{15})^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.617951810110471470540140257574715826687769655292638022453...

0.61795181…

Appendix A

Also if, in two previous Ramanujan-Nardelli formulas, taken randomly, we insert the value of mass in metric tons units instead of kg, we obtain ALWAYS 1.6182492... putting in place of 1 in the numerator of the fraction in the square root, 10^3. Indeed:

sqrt[[[[10^3/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.603497e-30)* sqrt[[-((((7.653293e+49* 4*Pi*(2.380955e-54)^3-(2.380955e-54)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(10^3 / \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{1.603497 \times 10^{-30}} \sqrt{-\frac{7.653293 \times 10^{49} \times 4 \pi (2.380955 \times 10^{-54})^3 - (2.380955 \times 10^{-54})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618249228523522462172095182591974226962275989532032246905...

1.6182492…

And:

sqrt[[[[10^3/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1836153)* sqrt[[-((((6.683557e+13 * 4*Pi*(2.726414e-18)^3-(2.726414e-18)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{10^3}{\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{1836153} \sqrt{-\frac{6.683557 \times 10^{13} \times 4 \pi (2.726414 \times 10^{-18})^3 - (2.726414 \times 10^{-18})^2}{6.67 \times 10^{-11}}}}}$$

Result:

1.618249412781809428209084250490766868721362704658676564931...

1.6182494…

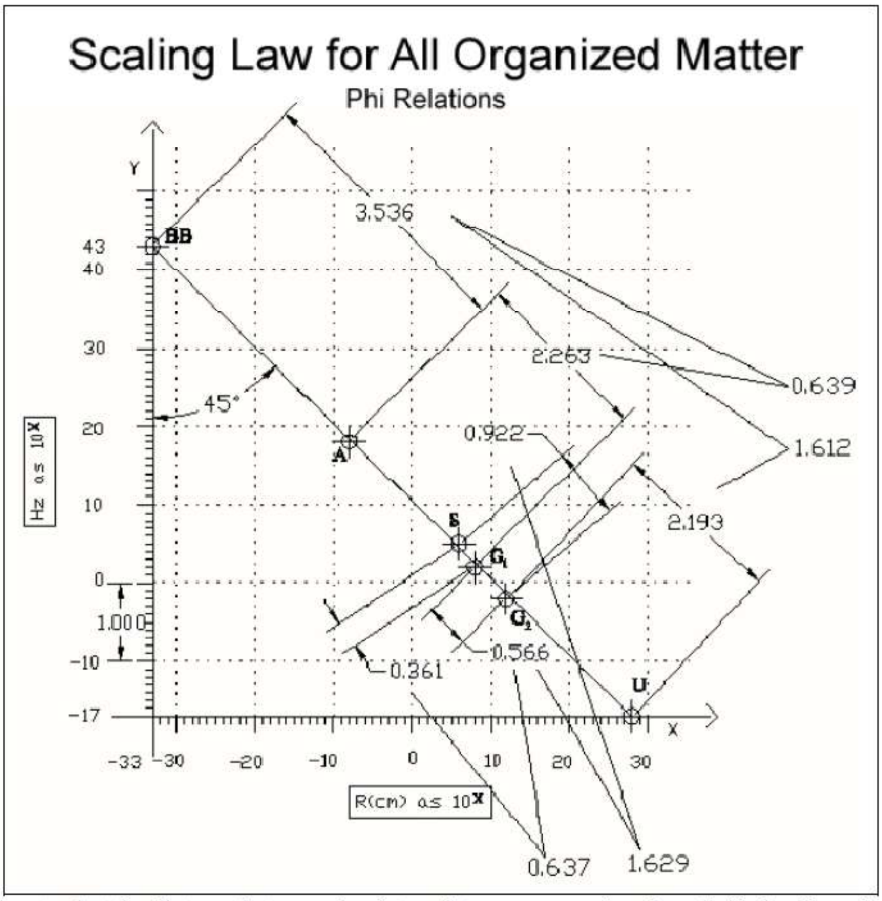

Figure 2b. We note that the distance between the data points on our graph, when divided with each other as in Figure 2b, yields a very close approximation to the familiar Φ(phi) ratio given by $(1+\sqrt{5})/2 = \sim 1.618$ and its inverse $(1-\sqrt{5})/2 = \sim 0.618$. It is both appropriate and significant that the so called "golden ratio" is reflected in our scaling law (which maps energy dynamics at all scales), since it is prominently found everywhere in nature and has marked the evolution of cosmological mechanics and modern physics [18], from Kepler's solar system modeling [20] to aperiodic Penrose tilings [21], including recent work on the thermodynamic phase transition of black holes showing a change of state from negative specific heat to positive specific heat at $(1-\sqrt{5})/2 = \sim 0.618$ [22].

From:

https://arxiv.org/abs/0708.3386

m	L_0	d	S	S_{BH}	m	L_0	d	S	S_{BH}
3	1	196883	12.1904	12.5664	6	1	42987519	17.5764	17.7715
	2	21296876	16.8741	17.7715		2	40448921875	24.4233	25.1327
	3	842609326	20.5520	21.7656		3	8463511703277	29.7668	30.7812
4	2/3	139503	11.8458	11.8477	7	2/3	7402775	15.8174	15.6730
	5/3	69193488	18.0524	18.7328		5/3	33934039437	24.2477	24.7812
	8/3	6928824200	22.6589	23.6954		8/3	16953652012291	30.4615	31.3460
5	1/3	20619	9.9340	9.3664	8	1/3	278511	12.5372	11.8477
	4/3	86645620	18.2773	18.7328		4/3	13996384631	23.3621	23.6954
	7/3	24157197490	23.9078	24.7812		7/3	19400406113385	30.5963	31.3460

Table 1: Degeneracies, microscopic entropies and semiclassical entropies for the first few values of m and L_0.

RAMANUJAN-NARDELLI MOCK GENERAL FORMULA THAT FROM THE MASS, TEMPERATURE AND RADIUS OF A QUANTUM OR SUPERMASSIVE BLACK HOLE PROVIDES AN EXCELLENT APPROXIMATION TO ϕ, $1/\phi$, AND ζ(2)

$$\sqrt{\frac{1}{\frac{1.962364415\times 10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times 1.9632648}\times\frac{1}{M}\right)\sqrt{-\frac{T\times 4\pi r^3 - r^2}{6.67\times 10^{-11}}}}} \Rightarrow$$

$$\Rightarrow \quad 6.23179\times 10^{-14}\sqrt{\frac{M}{\sqrt{r^2-4\pi r^3 T}}} \Rightarrow$$

$$\Rightarrow \mathbf{1.6182492} \cong \boldsymbol{\phi} = \frac{\sqrt{5}+1}{2} = \mathbf{1.61803398}\ldots$$

EXAMPLE:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.170074\times 10^{-19}}\sqrt{-\frac{3.871213\times 10^{41}\times 4\pi(4.707089\times 10^{-46})^3-(4.707089\times 10^{-46})^2}{6.67\times 10^{-11}}}\right)\right)} \quad (1)$$

$\approx$ **1.6182492….**

With $1.897512108 \times \mathbf{10}^{19}$ as mock:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.897512108\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{7.161\times 10^{39}}\sqrt{-\frac{1.713732\times 10^{-17}\times 4\pi(1.063302\times 10^{13})^3-(1.063302\times 10^{13})^2}{6.67\times 10^{-11}}}\right)\right)} \quad (2)$$

$\approx$ **1.64567...**

Inverse formula

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{M}\sqrt{-\frac{T\times4\pi r^3-r^2}{6.67\times10^{-11}}}}}}$$

$$\frac{1.60458\times10^{13}}{\sqrt{\frac{M}{\sqrt{r^2-4\pi r^3 T}}}}$$

≈ 0.6179517….

This means primarily that as the reciprocal (or counterpart) of the golden ratio exists, there is also the counterpart of a black hole (white hole). Therefore it is mathematically possible to prove the symmetry between them. Furthermore, it is important highlight that the Ramanujan-Nardelli mock formula is ALWAYS valid and not only for the physical parameters of quantum black holes, but also for those of supermassive black holes as SMBH87. Indeed, provides ALWAYS the above excellent approximation to ϕ and $1/\phi$

Conclusion

We observe principally that the values of the black hole masses, from which we get radius, temperature and entropies that, by a formula that we have developed, provide ALWAYS results that, in our opinion, are interesting and significant, because are very closed to the mathematical constant Phi (golden ratio), the reciprocal and ζ(2). Furthermore, we have obtained new interesting mathematical connections between some formulas of our theory and various formulas of Haramein's Theory.

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*Physical Review & Research International
3(4): 270-292, 2013 - **Quantum Gravity and the Holographic Mass** - Nassim Haramein*Director of Research, Hawaii Institute for Unified Physics, P.O. Box 1440, Kilauea, HI -96754. Author's contribution - This work was carried out by author NH. Author NH read and approved the final manuscript. Received 21st February 2013 - Accepted 17th April 2013 - Published 27th April 2013*

The electron and the holographic mass solution
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*Journal of High Energy Physics, Gravitation and Cosmology, 2019, 5, 412-424
http://www.scirp.org/journal/jhepgc - ISSN Online: 2380-4335 - ISSN Print: 2380-4327 - DOI: 10.4236/jhepgc.2019.52023 Mar. 13, 2019 412 Journal of High Energy Physics, Gravitation and Cosmology*
Resolving the Vacuum Catastrophe: A Generalized Holographic Approach*
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