On the possible mathematical connections between several parameters of Ramanujan's mathematics, some equations concerning the gravitational-waves and black holes , various parameters regarding Particle Physics, ϕ and $\zeta(2)$.

Michele Nardelli[1], **Antonio Nardelli**[2]

Abstract

In this paper, we describe and analyze the possible mathematical connections between several parameters of Ramanujan's mathematics, some equations concerning the gravitational-waves and black holes , various parameters regarding Particle Physics, ϕ and $\zeta(2)$.

From:

[1] M.Nardelli studied at Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

[2] A. Nardelli studies at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Quantum gravity and gravitational-wave astronomy
Gianluca Calcagni, Sachiko Kuroyanagi, Sylvain Marsat, Mairi Sakellariadou, Nicola Tamanini, Gianmassimo Tasinato
arXiv:1907.02489v1 [gr-qc] 4 Jul 2019

We have that:

The Hausdorff dimension $d_{\rm H}$ is the scaling of the volume $\mathcal{V}$ of a D-ball (or a D-cube) with respect to the radius (edge size) ℓ. Assuming a continuum ambient spacetime, the definition is

$$d_{\rm H}(\ell) := \frac{d\ln \mathcal{V}(\ell)}{d\ln \ell}\,. \tag{4.2}$$

4.2 Hausdorff dimension of momentum space

Given a continuous momentum space with measure weight $w(k)$, its Hausdorff dimension is the scaling of the volume $\tilde{\mathcal{V}}(k) = \int_{\rm cube} d^D k'\, w(k')$ of a D-cube (or D-ball) of linear size (respectively, radius) k:

$$d_{\rm H}^k(\ell) := \left.\frac{d\ln \tilde{\mathcal{V}}(k)}{d\ln k}\right|_{k=1/\ell}. \tag{4.3}$$

κ-Minkowski spacetime is the only example we will consider in this paper where there is dimensional flow in $d_{\rm H}^k$. We can calculate $d_{\rm H}^k$ from the Euclidean momentum-space measure $d^4p/\sqrt{p^2+\kappa^2}$, where $p = p(k)$ is a redefinition of momenta. Integrating it, one obtains the momentum 4-volume $\mathcal{V}(p) \propto (p^2-2\kappa^2)\sqrt{p^2+\kappa^2}+2\kappa^4$, where $\kappa^2 - 8\pi/\ell_{\rm Pl}^2$ and the constant term $2\kappa^4$ has been added to recover the ordinary volume $\mathcal{V}(p) \sim p^4 + O(p^6)$ in the large-scale limit $p \to 0$. Thus,

$$d_{\rm II}^k(\ell) = \left.\frac{d\ln \mathcal{V}(p)}{d\ln p}\right|_{p=1/\ell} = \frac{3}{1-(\kappa\ell)^2+2(\kappa\ell)^4[\sqrt{1+(\kappa\ell)^{-2}}-1]}\,. \tag{4.4}$$

Then, $d_{\rm II}^k \simeq 3$ at small scales $\kappa\ell \ll 1$, while $d_{\rm II}^k \simeq 4$ at large scales $\kappa\ell \gg 1$.

From (4.4):

3/(((((((1-(64)^2+2(64)^4*(((sqrt(1+(64)^-2)-1)))))))))

Input:

$$\frac{3}{1-64^2+2\times 64^4\left(\sqrt{1+\frac{1}{64^2}}-1\right)}$$

Result:

$$\frac{3}{33\,554\,432\left(\frac{\sqrt{4097}}{64}-1\right)-4095}$$

Decimal approximation:

3.999837271034806821033403926728885389774399196037856371546...

3.99983727…

Alternate forms:

$$\frac{3\left(33\,558\,527+524\,288\sqrt{4097}\right)}{50\,339\,839}$$

$$\frac{100\,675\,581+1\,572\,864\sqrt{4097}}{50\,339\,839}$$

$$\frac{1\,572\,864\sqrt{4097}}{50\,339\,839}+\frac{24\,573}{12\,287}$$

Minimal polynomial:

$50\,339\,839\,x^2-201\,351\,162\,x-9$

3/(((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1)))))))))

Input:

$$\frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}$$

Result:

$$\frac{3}{2\,199\,023\,255\,552\left(\frac{\sqrt{1\,048\,577}}{1024}-1\right)-1\,048\,575}$$

Decimal approximation:

3.999999364217602406536426371293468746120811875378564102347...

3.99999936421…

Alternate forms:

$$\frac{3\left(2\,199\,024\,304\,127+2\,147\,483\,648\sqrt{1\,048\,577}\right)}{3\,298\,536\,980\,479}$$

$$\frac{6\,291\,453}{3\,145\,727}+\frac{6\,442\,450\,944}{3\,145\,727\sqrt{1\,048\,577}}$$

$$\frac{6\,597\,072\,912\,381+6\,442\,450\,944\sqrt{1\,048\,577}}{3\,298\,536\,980\,479}$$

Minimal polynomial:

$$3\,298\,536\,980\,479\,x^2-13\,194\,145\,824\,762\,x-9$$

3/(((((((1-(0.0864055)^2+2(0.0864055)^4*(((sqrt(1+(0.0864055)^-2)-1)))))))))

Input interpretation:

$$\frac{3}{1-0.0864055^2+2\times0.0864055^4\left(\sqrt{1+\frac{1}{0.0864055^2}}-1\right)}$$

Result:

3.0189663...

3.0189663…

3/(((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1)))))))))

Input interpretation:

$$\frac{3}{1-0.0061571663^2+2\times0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}$$

Result:

3.00011234436...

3.00011234436…

((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))) * ((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1)))))))))))))

Input interpretation:

$$\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times \frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}$$

Result:

12.0004474700...

12.00044747…

From which:

[((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))))*((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1)))))))))))))]^1/5

Input interpretation:

$$\left(\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times \frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}\right)\text{^}(1/5)$$

Result:

1.643764088162...

$1.643764\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

[((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))))*((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1))))))))))))]^3

Input interpretation:

$$\left(\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times \frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}\right)^3$$

Result:

1728.19331426...

1728.19331426…

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

((((6[((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))))*((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1))))))))))))]^1/5))))^1/2

Input interpretation:

$$\sqrt{\left(6\left(\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times \frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}\right)^{(1/5)}\right)}$$

Result:

3.140475207508...

3.1404752… ≈ π

-5^2/10^3+[((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))))*((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1)))))))))))))]^1/5

Input interpretation:

$$-\frac{5^2}{10^3}+\left(\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times\frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}\right)\text{^}(1/5)$$

Result:

1.618764088162...

1.618764…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

3/10^3+5^2/10^3+[((((3/((((((1-(0.0061571663)^2+2(0.0061571663)^4*(((sqrt(1+(0.0061571663)^-2)-1))))))))))))*((((3/((((((1-(1024)^2+2(1024)^4*(((sqrt(1+(1024)^-2)-1)))))))))))))]^1/5

Input interpretation:

$$\frac{3}{10^3}+\frac{5^2}{10^3}+\left(\frac{3}{1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)}\times\frac{3}{1-1024^2+2\times 1024^4\left(\sqrt{1+\frac{1}{1024^2}}-1\right)}\right)\text{^}(1/5)$$

Result:

1.671764088162...

1.671764…. result 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...

Utilizing two Hausdorff dimensions, we obtain:

[((((3/((((((1-(0.69897)^2+2(0.69897)^4*(((sqrt(1+(0.69897)^-2)-1))))))))))))*((((3/((((((1-(2.5849)^2+2(2.5849)^4*(((sqrt(1+(2.5849)^-2)-1)))))))))))))]

Input interpretation:

$$\frac{3}{1-0.69897^2+2\times 0.69897^4\left(\sqrt{1+\frac{1}{0.69897^2}}-1\right)}\times\frac{3}{1-2.5849^2+2\times 2.5849^4\left(\sqrt{1+\frac{1}{2.5849^2}}-1\right)}$$

Result:

13.5266...

13.5266...

From which:

[((((3/((((((1-(0.69897)^2+2(0.69897)^4*(((sqrt(1+(0.69897)^-2)-1)))))))))))))*((((3/((((((1-(2.5849)^2+2(2.5849)^4*(((sqrt(1+(2.5849)^-2)-1)))))))))))))]^1/5.43656

Where 5.43656 ≈ 2e

Input interpretation:

$$\left(\frac{3}{1-0.69897^2+2\times 0.69897^4\left(\sqrt{1+\frac{1}{0.69897^2}}-1\right)}\times\frac{3}{1-2.5849^2+2\times 2.5849^4\left(\sqrt{1+\frac{1}{2.5849^2}}-1\right)}\right)\text{^}(1/5.43656)$$

Result:

1.614622147857173203889998854565359943472724235962921116539...

1.614622147.... result that is a good approximation to the value of the golden ratio 1.618033988749...

34/10^4+[((((3/((((((1-(0.69897)^2+2(0.69897)^4*(((sqrt(1+(0.69897)^-2)-1)))))))))))))*((((3/((((((1-(2.5849)^2+2(2.5849)^4*(((sqrt(1+(2.5849)^-2)-1)))))))))))))]^1/5.43656

Input interpretation:

$$\frac{34}{10^4}+\left(\frac{3}{1-0.69897^2+2\times 0.69897^4\left(\sqrt{1+\frac{1}{0.69897^2}}-1\right)}\times \frac{3}{1-2.5849^2+2\times 2.5849^4\left(\sqrt{1+\frac{1}{2.5849^2}}-1\right)}\right)\text{^}(1/5.43656)$$

Result:

1.6180221478571732038899988545653599434727242359629211165 39...

1.618022147.... result that is a very good approximation to the value of the golden ratio 1.618033988749...

Now, from

$$\Gamma(\ell)=2-\frac{d_{\rm H}^k(\ell)}{d_{\rm S}(\ell)}=2-\frac{3}{2}\frac{2(\kappa\ell)^2+1}{[4(\kappa\ell)^2+3]\{1-(\kappa\ell)^2+2(\kappa\ell)^4[\sqrt{1+(\kappa\ell)^{-2}}-1]\}}\,, \qquad (4.14)$$

and $\Gamma\simeq\Gamma_{\rm UV}=3/2$ at short scales ($\kappa\ell\ll 1$). At large (near-IR) scales $\kappa\ell\gg 1$,

$$\Gamma_{\rm meso}\simeq 1+\frac{5}{12(\kappa\ell)^2}=1+\frac{5}{96\pi}\frac{\ell_{\rm Pl}^2}{\ell^2}\,. \qquad (4.15)$$

For κℓ = 16, we obtain from (4.14):

2-3/2 * (((2*(16)^2+1))) / (((((4*(16)^2+3)(1-(16^2)+2(16)^4 * (((sqrt(1+(16)^-2)-1)))))

Input:

$$2-\frac{3}{2}\times\frac{2\times 16^2+1}{(4\times 16^2+3)\left(1-16^2+2\times 16^4\left(\sqrt{1+\frac{1}{16^2}}-1\right)\right)}$$

Result:

$$2-\frac{1539}{2054\left(131\,072\left(\frac{\sqrt{257}}{16}-1\right)-255\right)}$$

Decimal approximation:

1.00162211288559307659145663523736037094185005363375632738 4...

1.0016221128… Hausdorff dimension

Alternate forms:

$$\frac{607\,652\,599-12\,607\,488\sqrt{257}}{404\,882\,426}$$

$$\frac{2\,364\,407}{1\,575\,418}-\frac{6\,303\,744\sqrt{257}}{202\,441\,213}$$

$$2-\frac{1539}{2054\left(8192\sqrt{257}-131\,327\right)}$$

Minimal polynomial:

$$831\,628\,503\,004\,x^2-2\,496\,236\,876\,692\,x+1\,665\,957\,372\,847$$

And:

[(((((((2-3/2 * (((2*(16)^2+1))) / (((((4*(16)^2+3)(1-(16^2)+2(16)^4 * (((sqrt(1+(16)^-2)-1)))))))))))))))]^297

Input:

$$\left(2-\frac{3}{2}\times\frac{2\times16^2+1}{\left(4\times16^2+3\right)\left(1-16^2+2\times16^4\left(\sqrt{1+\frac{1}{16^2}}-1\right)\right)}\right)^{297}$$

Exact result:

$$\left(2-\frac{1539}{2054\left(131\,072\left(\frac{\sqrt{257}}{16}-1\right)-255\right)}\right)^{297}$$

Decimal approximation:

1.618301606745140893225074657661018072017728042560213361458...

1.618301606…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Note that, with regard the exponent 297:

partitions (17)

Input interpretation:

partitions	integer	17

Number of partitions:

297

297

2-3/2 * (((2*(0.0061571663)^2+1))) / (((((4*(0.0061571663)^2+3)(1-(0.0061571663^2)+2(0.0061571663)^4 * (((sqrt(1+(0.0061571663)^-2)-1)))))

Input interpretation:

$$2-\frac{3}{2}\times(2\times 0.0061571663^2+1)\Big/\left((4\times 0.0061571663^2+3)\left(1-0.0061571663^2+2\times 0.0061571663^4\left(\sqrt{1+\frac{1}{0.0061571663^2}}-1\right)\right)\right)$$

Result:

1.49996863921...

1.49996863921... Hausdorff dimension

The sum of the two results is also a Hausdorff dimension:

1.0016221128 + (((((((2-3/2 * (((2*(0.0061571663)^2+1))) / (((((4*(0.0061571663)^2+3)(1-(0.0061571663^2)+2(0.0061571663)^4 * (((sqrt(1+(0.0061571663)^-2)-1))))))))))))

Input interpretation:

$$1.0016221128 + \left(2 - \frac{3}{2} \times (2 \times 0.0061571663^2 + 1) \Big/ \left((4 \times 0.0061571663^2 + 3)\left(1 - 0.0061571663^2 + 2 \times 0.0061571663^4 \left(\sqrt{1 + \frac{1}{0.0061571663^2}} - 1\right)\right)\right)\right)$$

Result:

2.5015907520...

2.501590752...

For

$\ell/\ell_{Pl} = 0.50$, we obtain $(\ell_{Pl}/\ell)^2 = 1 / 0.50^2 = 4$. Thence, from (4.15), we obtain:

1+5/(96Pi) * 4

Input:

$$1 + \frac{5}{96\,\pi} \times 4$$

Result:

$$1 + \frac{5}{24\,\pi}$$

Decimal approximation:

1.066314559621623056570368234738547650847691519058523520311...

1.0663145596…

Property:

$1 + \frac{5}{24\,\pi}$ is a transcendental number

Alternate form:

$$\frac{24\pi+5}{24\pi}$$

Alternative representations:

$$1+\frac{4\times 5}{96\pi}=1+\frac{20}{17280^\circ}$$

$$1+\frac{4\times 5}{96\pi}=1+-\frac{20}{96\,i\log(-1)}$$

$$1+\frac{4\times 5}{96\pi}=1+\frac{20}{96\cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$1+\frac{4\times 5}{96\pi}=1+\frac{5}{96\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$1+\frac{4\times 5}{96\pi}=1+\frac{5}{96\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

$$1+\frac{4\times 5}{96\pi}=1+\frac{5}{24\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$1+\frac{4\times 5}{96\pi}=1+\frac{5}{96\int_0^1\sqrt{1-t^2}\,dt}$$

$$1+\frac{4\times 5}{96\,\pi}=1+\frac{5}{48\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$1+\frac{4\times 5}{96\,\pi}=1+\frac{5}{48\int_0^{1}\frac{1}{\sqrt{1-t^2}}\,dt}$$

(((1+5/(96Pi) * 4)))^8

Input:

$$\left(1+\frac{5}{96\,\pi}\times 4\right)^8$$

Exact result:

$$\left(1+\frac{5}{24\,\pi}\right)^8$$

Decimal approximation:

1.671408911454921313093225102461653768837976137403890741570...

1.67140891…. result 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...

Property:

$\left(1+\frac{5}{24\,\pi}\right)^8$ is a transcendental number

Alternate forms:

$$\frac{(5+24\,\pi)^8}{110\,075\,314\,176\,\pi^8}$$

$$1+\frac{390\,625}{110\,075\,314\,176\,\pi^8}+\frac{78\,125}{573\,308\,928\,\pi^7}+\frac{109\,375}{47\,775\,744\,\pi^6}+\frac{21\,875}{995\,328\,\pi^5}+\frac{21\,875}{165\,888\,\pi^4}+\frac{875}{1728\,\pi^3}+\frac{175}{144\,\pi^2}+\frac{5}{3\,\pi}$$

Alternative representations:

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{20}{17280^\circ}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+-\frac{20}{96\,i\log(-1)}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{20}{96\cos^{-1}(-1)}\right)^8$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{96\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{24\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2\,k}+\frac{2}{1+4\,k}+\frac{1}{3+4\,k}\right)}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{96\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2\,k}\left(5^{1+2\,k}-4\times 239^{1+2\,k}\right)}{1+2\,k}}\right)^8$$

Integral representations:

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{48\int_0^{\infty}\frac{1}{1+t^2}\,dt}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{96\int_0^1\sqrt{1-t^2}\,dt}\right)^8$$

$$\left(1+\frac{4\times 5}{96\,\pi}\right)^8=\left(1+\frac{5}{48\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}\right)^8$$

Multiplying the equation by 10^{-24}, we obtain an excellent approximation to the holographic proton mass. The result 1.67140891... * 10^{-24} is practically equal to the value of the formula:

$$m_{p'}=2\times\frac{\eta}{R}m_P=1.6714213\times 10^{-24}\ \text{gm}$$

that is the holographic proton mass (N. Haramein)

Indeed:

Input:

$$\frac{1}{10^{24}}\left(1+\frac{5}{96\,\pi}\times 4\right)^8$$

Exact result:

$$\frac{\left(1+\frac{5}{24\,\pi}\right)^8}{1\,000\,000\,000\,000\,000\,000\,000\,000}$$

Decimal approximation:

$1.671408911454921313093225102461653768837976137403890 7\ldots\times 10^{-24}$

1.67140891... * 10^{-24}

Property:

$\frac{\left(1+\frac{5}{24\,\pi}\right)^8}{1\,000\,000\,000\,000\,000\,000\,000\,000}$ is a transcendental number

For

$\ell/\ell_{Pl} = 0.10$, we obtain $(\ell_{Pl}/\ell)^2 = 1 / 0.10^2 = 100$. Thence:

1+5/(96Pi) * 100

Input:

$$1 + \frac{5}{96\,\pi} \times 100$$

Result:

$$1 + \frac{125}{24\,\pi}$$

Decimal approximation:

2.65786399054057641425920586846369127119228797646308800778 8...

2.65786399…

Property:

$1 + \frac{125}{24\,\pi}$ is a transcendental number

Alternate form:

$$\frac{24\,\pi + 125}{24\,\pi}$$

Alternative representations:

$$1 + \frac{100 \times 5}{96\,\pi} = 1 + \frac{500}{17280^\circ}$$

$$1 + \frac{100 \times 5}{96\,\pi} = 1 + -\frac{500}{96\,i\log(-1)}$$

$$1 + \frac{100 \times 5}{96\,\pi} = 1 + \frac{500}{96\cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

From the above expression subtracting 1, we obtain:

5/(96Pi) * 100

Input:

$$\frac{5}{96\,\pi} \times 100$$

Result:

$$\frac{125}{24\,\pi}$$

Decimal approximation:

1.657863990540576414259205868463691271192287976463088007788...

1.65786399…. result 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...

Property:

$\frac{125}{24\,\pi}$ is a transcendental number

Alternative representations:

$$\frac{100 \times 5}{96\,\pi} = \frac{500}{17280^\circ}$$

$$\frac{100 \times 5}{96\,\pi} = -\frac{500}{96\,i\log(-1)}$$

$$\frac{100 \times 5}{96\,\pi} = \frac{500}{96\cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

We have also that:

13/10^3+sqrt(((1+5/(96Pi) * 100)))

Input:

$$\frac{13}{10^3} + \sqrt{1 + \frac{5}{96\,\pi} \times 100}$$

Exact result:

$$\frac{13}{1000} + \sqrt{1 + \frac{125}{24\,\pi}}$$

Decimal approximation:

1.643295675802575517050021741576288464353598185002028160802...

$1.643295675\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Property:

$\frac{13}{1000} + \sqrt{1 + \frac{125}{24\,\pi}}$ is a transcendental number

Alternate forms:

$$\frac{39 + 250\sqrt{\frac{6(125+24\,\pi)}{\pi}}}{3000}$$

$$\frac{13}{1000}+\frac{1}{2}\sqrt{\frac{125+24\pi}{6\pi}}$$

$$\frac{13\sqrt{6}+500\sqrt{\frac{125+24\pi}{\pi}}}{1000\sqrt{6}}$$

Series representations:

$$\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\pi}}=\frac{13}{1000}+\sqrt{\frac{125}{24\pi}}\sum_{k=0}^{\infty}\left(\frac{24}{125}\right)^k\left(\frac{1}{\pi}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\pi}}=\frac{13}{1000}+\sqrt{\frac{125}{24\pi}}\sum_{k=0}^{\infty}\frac{\left(-\frac{24}{125}\right)^k\left(\frac{1}{\pi}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\pi}}=\frac{13}{1000}+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{125}{24\pi}-z_0\right)^k z_0^{-k}}{k!}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

And:

1/10^3-13/10^3+sqrt(((1+5/(96Pi) * 100)))

Input:

$$\frac{1}{10^3}-\frac{13}{10^3}+\sqrt{1+\frac{5}{96\pi}\times 100}$$

Exact result:

$$\sqrt{1+\frac{125}{24\pi}}-\frac{3}{250}$$

Decimal approximation:

1.618295675802575517050021741576288464353598185002028160802...

1.618295675…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Property:

$$-\frac{3}{250}+\sqrt{1+\frac{125}{24\,\pi}}$$ is a transcendental number

Alternate forms:

$$\frac{125\sqrt{\frac{6(125+24\,\pi)}{\pi}}-18}{1500}$$

$$\frac{1}{2}\sqrt{\frac{125+24\,\pi}{6\,\pi}}-\frac{3}{250}$$

$$\frac{125\sqrt{\frac{125+24\,\pi}{\pi}}-3\sqrt{6}}{250\sqrt{6}}$$

Series representations:

$$\frac{1}{10^3}-\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\,\pi}}=-\frac{3}{250}+\sqrt{\frac{125}{24\,\pi}}\sum_{k=0}^{\infty}\left(\frac{24}{125}\right)^k\left(\frac{1}{\pi}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{1}{10^3}-\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\,\pi}}=-\frac{3}{250}+\sqrt{\frac{125}{24\,\pi}}\sum_{k=0}^{\infty}\frac{\left(-\frac{24}{125}\right)^k\left(\frac{1}{\pi}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{1}{10^3}-\frac{13}{10^3}+\sqrt{1+\frac{100\times 5}{96\,\pi}}=-\frac{3}{250}+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{125}{24\,\pi}-z_0\right)^k z_0^{-k}}{k!}$$

for not $((z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0))$

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

$n!$ is the factorial function

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

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

Now, we have that:

$$\Gamma_{\rm meso} \simeq 1 + \frac{5\pi}{2}\frac{\ell_{\rm Pl}^2}{\ell^2}\,, \qquad (4.17)$$

For

$\ell/\ell_{Pl} = 0.50$, we obtain $(\ell_{Pl}/\ell)^2 = 1 / 0.50^2 = 4$. Thence, from (4.17), we obtain:

1+(((5Pi)/2)) * 4

Input:

$$1 + \frac{5\,\pi}{2} \times 4$$

Result:

$1 + 10\,\pi$

Decimal approximation:

32.415926535897932384626433832795028841971693993751058209 74...

32.415926…

Alternative representations:

$$1 + \frac{4\,(5\,\pi)}{2} = 1 + 1800^\circ$$

$$1 + \frac{4\,(5\,\pi)}{2} = 1 - 10\,i\,\log(-1)$$

$$1 + \frac{4\,(5\,\pi)}{2} = 1 + 10\,\cos^{-1}(-1)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$1+\frac{4\,(5\,\pi)}{2}=1+40\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}$$

$$1+\frac{4\,(5\,\pi)}{2}=1+\sum_{k=0}^{\infty}\frac{8\,(-1)^k\left(956\times 5^{-2\,k}-5\times 239^{-2\,k}\right)}{239\,(1+2\,k)}$$

$$1+\frac{4\,(5\,\pi)}{2}=1+10\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2\,k}+\frac{2}{1+4\,k}+\frac{1}{3+4\,k}\right)$$

Integral representations:

$$1+\frac{4\,(5\,\pi)}{2}=1+40\int_0^1\sqrt{1-t^2}\;dt$$

$$1+\frac{4\,(5\,\pi)}{2}=1+20\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$1+\frac{4\,(5\,\pi)}{2}=1+20\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

We have also that:

(((1+(((5Pi)/2)) * 4)))^1/7

Input:

$$\sqrt[7]{1+\frac{5\,\pi}{2}\times 4}$$

Exact result:

$$\sqrt[7]{1+10\,\pi}$$

Decimal approximation:

1.643700299190975129853433739854611993145355184383910096957...

$1.64370029\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Property:

$\sqrt[7]{1+10\,\pi}$ is a transcendental number

All 7th roots of 1 + 10 π:

$\sqrt[7]{1+10\,\pi}\ e^{0} \approx 1.64370$ (real, principal root)

$\sqrt[7]{1+10\,\pi}\ e^{(2\,i\,\pi)/7} \approx 1.0248 + 1.2851\,i$

$\sqrt[7]{1+10\,\pi}\ e^{(4\,i\,\pi)/7} \approx -0.3658 + 1.60249\,i$

$\sqrt[7]{1+10\,\pi}\ e^{(6\,i\,\pi)/7} \approx -1.4809 + 0.7132\,i$

$\sqrt[7]{1+10\,\pi}\ e^{-(6\,i\,\pi)/7} \approx -1.4809 - 0.7132\,i$

Alternative representations:

$$\sqrt[7]{1+\frac{4\,(5\,\pi)}{2}} = \sqrt[7]{1+1800^\circ}$$

$$\sqrt[7]{1+\frac{4\,(5\,\pi)}{2}} = \sqrt[7]{1-10\,i\log(-1)}$$

$$\sqrt[7]{1+\frac{4\,(5\,\pi)}{2}} = \sqrt[7]{1+10\cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+40\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+\sum_{k=0}^{\infty}\frac{8(-1)^k\left(956\times 5^{-2k}-5\times 239^{-2k}\right)}{239(1+2k)}}$$

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+10\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+40\int_0^1\sqrt{1-t^2}\,dt}$$

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+20\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\sqrt[7]{1+\frac{4(5\pi)}{2}} = \sqrt[7]{1+20\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

1+(((5Pi)/2)) * 100

Where $100 = 1/0.10^2$

Input:

$$1 + \frac{5\,\pi}{2} \times 100$$

Result:

$$1 + 250\,\pi$$

Decimal approximation:

786.398163397448309615660845819875721049292349843776455243 7...

786.3981633…. result very near to the rest mass of Omega meson 782.65

Alternative representations:

$$1 + \frac{100\,(5\,\pi)}{2} = 1 + 45\,000^\circ$$

$$1 + \frac{100\,(5\,\pi)}{2} = 1 - 250\,i\,\log(-1)$$

$$1 + \frac{100\,(5\,\pi)}{2} = 1 + 250\,\cos^{-1}(-1)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$1 + \frac{100\,(5\,\pi)}{2} = 1 + 1000\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}$$

$$1+\frac{100\,(5\,\pi)}{2}=1+\sum_{k=0}^{\infty}\frac{200\,(-1)^k\left(956\times5^{-2\,k}-5\times239^{-2\,k}\right)}{239\,(1+2\,k)}$$

$$1+\frac{100\,(5\,\pi)}{2}=1+250\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2\,k}+\frac{2}{1+4\,k}+\frac{1}{3+4\,k}\right)$$

Integral representations:

$$1+\frac{100\,(5\,\pi)}{2}=1+1000\int_0^1\sqrt{1-t^2}\;dt$$

$$1+\frac{100\,(5\,\pi)}{2}=1+500\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$1+\frac{100\,(5\,\pi)}{2}=1+500\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

Now, we obtain:

1+1/2(((1+(((5Pi)/2)) * 0.04)))

Where 0.04 = $1/5^2$

Input:

$$1+\frac{1}{2}\left(1+\frac{5\,\pi}{2}\times0.04\right)$$

Result:

1.657080...

1.65708…. result 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:

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1+\frac{1}{2}(1+18^\circ)$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1+\frac{1}{2}(1-0.1\,i\log(-1))$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1+\frac{1}{2}\left(1+0.1\cos^{-1}(-1)\right)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

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

Series representations:

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.5+0.2\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.4+0.1\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.5+0.05\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

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

Integral representations:

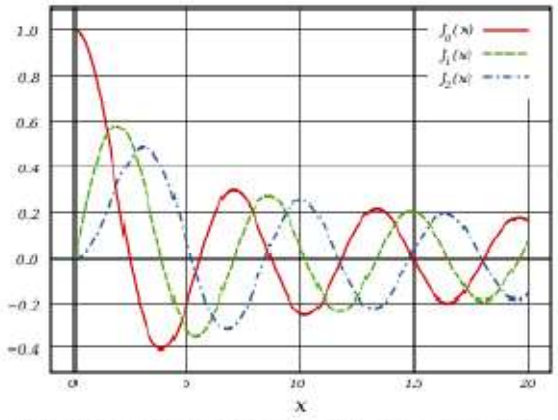
$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.5+0.1\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.5+0.2\int_0^{1}\sqrt{1-t^2}\,dt$$

$$1+\frac{1}{2}\left(1+\frac{1}{2}(5\pi)\,0.04\right)=1.5+0.1\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

Bessel Function - Wikipedia

$$J_\alpha(x)=\sum_{m=0}^{\infty}\frac{(-1)^m}{m!\Gamma(m+\alpha+1)}\left(\frac{x}{2}\right)^{2m+\alpha},$$



Plot of Bessel function of the first kind, $J_\alpha(x)$, for integer orders $\alpha = 0, 1, 2$

For x = 3, α = 1 and m = 2

((((1/ (((2! * gamma (4)))))) * (3/2)^5

Input:

$$\frac{1}{2!\,\Gamma(4)}\left(\frac{3}{2}\right)^5$$

$n!$ is the factorial function

$\Gamma(x)$ is the gamma function

Exact result:

$$\frac{81}{128}$$

Decimal form:

0.6328125

0.6328125

Alternative representations:

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{\left(\frac{3}{2}\right)^5}{6\,(1)_2}$$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{\left(\frac{3}{2}\right)^5}{6\times 1!!\times 2!!}$$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{\left(\frac{3}{2}\right)^5}{6\,e^{\log\Gamma(3)}}$$

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

$n!!$ is the double factorial function

$\log\Gamma(x)$ is the logarithm of the gamma function

Series representations:

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{243}{32\,\Gamma(4)\sum_{k=0}^{\infty}\frac{(2-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}} \quad \text{for } ((n_0 \notin \mathbb{Z} \text{ or } n_0 \geq 0) \text{ and } n_0 \to 2)$$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{243}{32\left(\sum_{k=0}^{\infty}\frac{(2-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{(4-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}$$

for $((n_0 \notin \mathbb{Z} \text{ or } n_0 \geq 0) \text{ and } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0) \text{ and } n_0 \to 2)$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{243\sum_{k=0}^{\infty}(4-z_0)^k\sum_{j=0}^{k}\frac{(-1)^j\,\pi^{-j+k}\sin\left(\frac{1}{2}\pi\left(-j+k+2z_0\right)\right)\Gamma^{(j)}(1-z_0)}{j!\,(-j+k)!}}{32\,\pi\sum_{k=0}^{\infty}\frac{(2-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}$$

for $((n_0 \notin \mathbb{Z} \text{ or } n_0 \geq 0) \text{ and } n_0 \to 2)$

$\mathbb{Z}$ is the set of integers

Integral representations:

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = \frac{243}{32\,\Gamma(4)\int_0^{\infty} e^{-t}\,t^2\,dt}$$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = -\frac{243\,i}{64\,(2-e^{-\infty}\,(\infty+2\,\infty+2))\,\pi}\oint_L \frac{e^t}{t^4}\,dt$$

$$\frac{\left(\frac{3}{2}\right)^5}{2!\,\Gamma(4)} = -\frac{243\,i}{128\,\pi}\oint_L \frac{e^t}{t^4}\,dt$$

i is the imaginary unit

$\log(x)$ is the natural logarithm

We have that

$$\int \frac{d\Omega_{D-1}}{(2\pi)^{D-1}}\,e^{i\mathbf{k}\cdot(\mathbf{x}-\mathbf{x}')} = \frac{1}{2^{D-2}\pi^{\frac{D}{2}}\Gamma\left(\frac{D}{2}-1\right)}\int_0^{\pi} d\theta(\sin\theta)^{D-3}e^{ikr\cos\theta}$$
$$= \frac{1}{(2\pi)^{\frac{D-1}{2}}}\frac{1}{(kr)^{\frac{D-3}{2}}}J_{\frac{D-3}{2}}(kr)\,, \qquad (A.3)$$

for D = 4, J = 0.6328125 and $kr \gg 1 = 64$, we obtain:

((((1/(2Pi)^1.5 * 1/(64)^0.5 * 64*0.6328125))))

Input interpretation:

$$\frac{1}{(2\pi)^{1.5}} \times \frac{1}{\sqrt{64}} \times 64 \times 0.6328125$$

Result:

0.321437...

0.321437…

Series representations:

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{0.223733}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^{1.5}}$$

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{0.632813}{\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^{1.5}}$$

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{1.78986}{\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{1.5}}$$

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

Integral representations:

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{0.632813}{\left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^{1.5}}$$

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{0.223733}{\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^{1.5}}$$

$$\frac{64 \times 0.632813}{(2\pi)^{1.5}\sqrt{64}} = \frac{0.632813}{\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^{1.5}}$$

From which:

(55/10 - 3/10)*((((1/(2Pi)^1.5 * 1/(64)^0.5 * 64*0.6328125))))

Input interpretation:

$$\left(\frac{55}{10} - \frac{3}{10}\right)\left(\frac{1}{(2\pi)^{1.5}} \times \frac{1}{\sqrt{64}} \times 64 \times 0.6328125\right)$$

Result:

1.671469965968893529610219002404293230581793898605834726437...

1.671469…. result 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...

Series representations:

$$\frac{\left(\frac{55}{10} - \frac{3}{10}\right)(64 \times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}} = \frac{1.16341}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^{1.5}}$$

$$\frac{\left(\frac{55}{10} - \frac{3}{10}\right)(64 \times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}} = \frac{3.29063}{\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^{1.5}}$$

$$\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=\frac{9.30729}{\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{1.5}}$$

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

Integral representations:

$$\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=\frac{3.29063}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^{1.5}}$$

$$\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=\frac{1.16341}{\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^{1.5}}$$

$$\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=\frac{3.29063}{\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^{1.5}}$$

-(21/10^3+5/10^3) + (55/10 - 3/10)*((((1/(2Pi)^1.5 * 1/(64)^0.5 * 64*0.6328125))))

Input interpretation:

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\left(\frac{55}{10}-\frac{3}{10}\right)\left(\frac{1}{(2\pi)^{1.5}}\times\frac{1}{\sqrt{64}}\times 64\times 0.6328125\right)$$

Result:

1.64546996596889352961021900240429323058179389860583472643 7...

$1.6454699\ldots \approx \zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

Series representations:

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{1.16341}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^{1.5}}$$

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{3.29063}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^{1.5}}$$

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{9.30729}{\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^{1.5}}$$

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

Integral representations:

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{3.29063}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^{1.5}}$$

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{1.16341}{\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^{1.5}}$$

$$-\left(\frac{21}{10^3}+\frac{5}{10^3}\right)+\frac{\left(\frac{55}{10}-\frac{3}{10}\right)(64\times 0.632813)}{\sqrt{64}\ (2\pi)^{1.5}}=-\frac{13}{500}+\frac{3.29063}{\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^{1.5}}$$

-248/10^4+1+2((((1/(2Pi)^1.5 * 1/(64)^0.5 * 64*0.6328125))))

Input interpretation:

$$-\frac{248}{10^4}+1+2\left(\frac{1}{(2\,\pi)^{1.5}}\times\frac{1}{\sqrt{64}}\times 64\times 0.6328125\right)$$

Result:

1.618073063834189819080853462463189704069920730233013356322...

1.61807306…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\;(2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{0.447466}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^{1.5}}$$

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\;(2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{1.26563}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}\right)^{1.5}}$$

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\;(2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{3.57973}{\left(\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^{1.5}}$$

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

Integral representations:

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\;(2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{1.26563}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^{1.5}}$$

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\ (2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{0.447466}{\left(\int_0^1\sqrt{1-t^2}\ dt\right)^{1.5}}$$

$$-\frac{248}{10^4}+1+\frac{2\,(64\times 0.632813)}{\sqrt{64}\ (2\,\pi)^{1.5}}=\frac{1219}{1250}+\frac{1.26563}{\left(\int_0^\infty\frac{\sin(t)}{t}\ dt\right)^{1.5}}$$

From:

Gravitational Wave Anisotropies from Primordial Black Holes
N. Bartolo, D. Bertacca, V. De Luca, G. Franciolini, S.Matarrese, M. Peloso, A. Ricciardone, A. Riotto, G. Tasinato
arXiv:1909.12619v1 [astro-ph.CO] 27 Sep 2019

Following the results obtained in [46], one can express the PBH mass fraction in the presence of non-Gaussianity. It reads (see also [59])

$$\bar{\beta} \equiv \frac{\rho_{\rm PBH}(\eta_{\rm in})}{\rho_c(\eta_{\rm in})} = \begin{cases} \sqrt{\dfrac{2}{\pi\sigma_s^2}}\left[\displaystyle\int_{\zeta_+}^{\infty} d\zeta \exp\left(-\frac{\zeta^2}{2\sigma_s^2}\right) + \int_{-\infty}^{\zeta_-} d\zeta \exp\left(-\frac{\zeta^2}{2\sigma_s^2}\right)\right] & \text{for} \quad f_{\rm NL} > 0, \\ \sqrt{\dfrac{2}{\pi\sigma_s^2}}\left[\displaystyle\int_{\zeta_+}^{\infty} d\zeta \exp\left(-\frac{\zeta^2}{2\sigma_s^2}\right) - \int_{\zeta_-}^{\infty} d\zeta \exp\left(-\frac{\zeta^2}{2\sigma_s^2}\right)\right] & \text{for} \quad f_{\rm NL} < 0, \end{cases} \tag{4.2}$$

where [46]

$$\zeta_\pm = \frac{-5 \pm \sqrt{25 + 60\zeta_c f_{\rm NL} + 36 f_{\rm NL}^2 \sigma_s^2}}{6 f_{\rm NL}} \tag{4.3}$$

and ζ_c is the threshold for collapse of PBH in the presence of non-Gaussianity recently calculated in Ref. [60], and σ_s^2 is the variance of the short modes.

The corresponding mass fraction perturbation with respect to the average value $\bar{\beta}$ at leading order in the long modes is

$$\delta_\beta \equiv \frac{\beta - \bar{\beta}}{\bar{\beta}} = \left(\frac{25 + 30\zeta_c f_{\rm NL} + 36 f_{\rm NL}^2\sigma_s^2 - 5\sqrt{25 + 60\zeta_c f_{\rm NL} + 36 f_{\rm NL}^2\sigma_s^2}}{3 f_{\rm NL}\sigma_s^2\sqrt{25 + 60\zeta_c f_{\rm NL} + 36 f_{\rm NL}^2\sigma_s^2}}\right)\zeta_L \equiv b\,\zeta_L. \tag{4.4}$$

One can express the relative abundance of the isocurvature modes in terms of the bias b induced by the long mode as

$$\beta_{\rm iso} \equiv \frac{\mathcal{P}_{\rm iso}}{\mathcal{P}_{\rm iso} + \mathcal{P}_{\zeta_L}} = \frac{b^2 f_{\rm PBH}^2}{b^2 f_{\rm PBH}^2 + 1}, \tag{4.5}$$

where we used the fact that local non-Gaussianity induces the bias $\mathcal{P}_{\rm iso} = b^2 f_{\rm PBH}^2 \mathcal{P}_{\zeta_L}$, where $f_{\rm PBH}$ is the fraction of dark matter in PBH. Once written in terms of b and $f_{\rm PBH}$, the bounds (4.1) become

$$-0.0327 < b f_{\rm PBH} < 0.0308. \tag{4.6}$$

We take the value 0.0322, where 322 is a Lucas number.

From (4.5), we obtain:

0,0322 × 0,0322 = 0,00103684; 0,00103684 ÷ 1,00103684 = 0,0010357660763;

Thence:

$$\beta_{\rm iso} \equiv \frac{\mathcal{P}_{\rm iso}}{\mathcal{P}_{\rm iso} + \mathcal{P}_{\zeta_L}} = \frac{b^2 f_{\rm PBH}^2}{b^2 f_{\rm PBH}^2 + 1},$$

$$= 0.0010357660763$$

Now, we have:

1/0.0010357660763 = 965,4689633887

(29/10^3+7/10^3+2/10^3)+(1/0.0010357660763)^1/14

Where 2, 7 and 29 are Lucas numbers

Input interpretation:

$$\left(\frac{29}{10^3}+\frac{7}{10^3}+\frac{2}{10^3}\right)+\sqrt[14]{\frac{1}{0.0010357660763}}$$

Result:

1.67178759446...

1.671787594…. result 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...

(11/10^3)+(1/0.0010357660763)^1/14

Where 11 is a Lucas number

Input interpretation:

$$\frac{11}{10^3}+\sqrt[14]{\frac{1}{0.0010357660763}}$$

Result:

1.64478759446...

1.644787594…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

-(18/10^3-3/10^3)+(1/0.0010357660763)^1/14

Where 18 and 3 are Lucas numbers

Input interpretation:

$$-\left(\frac{18}{10^3}-\frac{3}{10^3}\right)+\sqrt[14]{\frac{1}{0.0010357660763}}$$

Result:

1.61878759446...

1.618787594…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

(1/0.0010357660763)- sqrt(729)

Input interpretation:

$$\frac{1}{0.0010357660763} - \sqrt{729}$$

Result:

938.468963390107508196636233084167095345908849206437366691 7...

938.46896339…. result practically equal to the proton mass in GeV 938.272046

1/(1 + 0.0010357660763)

Input interpretation:

$$\frac{1}{1 + 0.0010357660763}$$

Result:

0.998965305625032929323736058690033797175984640368456497227...

0.9989653056….

0.9989653056… ≈ 0.9991104684 (Rogers-Ramanujan continued fraction)

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+...}}}} \approx 0.9991104684$$

Now, we have that:

$$\sqrt{\frac{\ell\,(\ell+1)}{2\pi}\,C_{\ell,I+S}\,(k)} \simeq \frac{3}{5}\left|1+\tilde{f}_{\rm NL}\,(k)\right|\,\mathcal{P}_{\zeta_L}^{1/2} \simeq 2.8\cdot 10^{-4}\left|\frac{1+\tilde{f}_{\rm NL}\,(k)}{10}\right|\left(\frac{\mathcal{P}_{\zeta_L}}{2.2\cdot 10^{-9}}\right)^{1/2} \tag{3.21}$$

$$-11.1 \leq f_{\rm NL} \leq 9.3$$

$F_{NL} = 0.035$; $-11 < 0.035 < 9$;

From

$$\beta_{\rm iso} \equiv \frac{\mathcal{P}_{\rm iso}}{\mathcal{P}_{\rm iso}+\mathcal{P}_{\zeta_L}} = \frac{b^2 f_{\rm PBH}^2}{b^2 f_{\rm PBH}^2+1},$$

we have that

$\mathcal{P}_{\zeta_L}$ is equal to 1

Thence, we have:

((((2.8e-4 * ((1+0.035)/10)*(1/2.2e-9)^(1/2))))

Input interpretation:

$$2.8\times 10^{-4}\times\frac{1+0.035}{10}\sqrt{\frac{1}{2.2\times 10^{-9}}}$$

Result:

0.617855675998559038596872548593266512779303898553964285052...

0.61785567599.... result that is a very good approximation to the value of the golden ratio conjugate 0.618033988749...

And:

1/ ((((2.8e-4 * ((1+0.035)/10)*(1/2.2e-9)^(1/2))))

Input interpretation:

$$\frac{1}{2.8\times 10^{-4}\times\frac{1+0.035}{10}\sqrt{\frac{1}{2.2\times 10^{-9}}}}$$

Result:

1.6185009523200240008853105981864963011001478100109513987 59...

1.61850095232.... result that is a very good approximation to the value of the golden ratio 1.618033988749...

We observe that

$$\sqrt{\frac{e\pi}{2}}=\sum_{n=0}^{\infty}\frac{1}{(2n+1)!!}+\frac{1}{1+\frac{1}{1+\frac{2}{1+\frac{3}{1+\frac{4}{1+\frac{}{1+...}}}}}}\approx 2.0663656771$$

And:

6*(0.21/2.0663656771)

Input interpretation:

$$6\times\frac{0.21}{2.0663656771}$$

Result:

0.6097662257768054174964499559147269965075631191628836216 30...

0.6097662257

This result is very near to the value of the above expression 0.61785567...

We have that, for $q_1 = 1/12$ and $q_2 = 1/24$:

$$\mathcal{B}_\Gamma(k, q_1, q_2, q_3) = \frac{162}{625} f_{\rm NL} \left[1 + \tilde{f}_{\rm NL}(k)\right]^2 \left[1 + 3\tilde{f}_{\rm NL}(k)\right] \left[\frac{2\pi^2}{q_1^3}\mathcal{P}_{\zeta_L}(q_1)\frac{2\pi^2}{q_2^3}\mathcal{P}_{\zeta_L}(q_2) + 2\,\text{perm.}\right]. \tag{3.26}$$

(1+0.035)^2 * (1+3*0.035) * ((((2Pi^2)/(0.083333)^3))*0.083333 * (2Pi^2)/(0.0416666)^3*0.0416666+2))

Input interpretation:

$$\frac{162}{625} \times 0.035 \left((1 + 0.035)^2 (1 + 3 \times 0.035)\left(\frac{2\pi^2}{0.083333^3} \times 0.083333 \times \frac{2\pi^2}{0.0416666^3} \times 0.0416666 + 2\right)\right)$$

Result:

347052.652281517487668112843668275844082159984297348171098 7...

347052.652281517….

Alternative representations:

$$\frac{1}{625}\left(0.035\left((1 + 0.035)^2 (1 + 3 \times 0.035)\left(\frac{0.083333\,(2\pi^2)\,(2\pi^2)\,0.0416666}{0.083333^3 \times 0.0416666^3} + 2\right)\right)\right)162 = \frac{1}{625} \times 6.26535 \times 1.035^2\left(2 + \frac{0.0138888\,((180\,^\circ)^2)^2}{0.0416666^3 \times 0.083333^3}\right)$$

$$\frac{1}{625}\left(0.035\left((1 + 0.035)^2 (1 + 3 \times 0.035)\left(\frac{0.083333\,(2\pi^2)\,(2\pi^2)\,0.0416666}{0.083333^3 \times 0.0416666^3} + 2\right)\right)\right)162 = \frac{1}{625} \times 6.26535 \times 1.035^2\left(2 + \frac{0.499997\,\zeta(2)^2}{0.0416666^3 \times 0.083333^3}\right)$$

$$\frac{1}{625}\left(0.035\left((1 + 0.035)^2 (1 + 3 \times 0.035)\left(\frac{0.083333\,(2\pi^2)\,(2\pi^2)\,0.0416666}{0.083333^3 \times 0.0416666^3} + 2\right)\right)\right)162 = \frac{1}{625} \times 6.26535 \times 1.035^2\left(2 + \frac{0.0138888\,((-i\log(-1))^2)^2}{0.0416666^3 \times 0.083333^3}\right)$$

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

$\log(x)$ is the natural logarithm

i is the imaginary unit

Series representations:

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0214771+912\,086.\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^4$$

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0107386\left(2+5.30848\times 10^6\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}\right)^4\right)$$

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0214771+3562.84\left(\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^4$$

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

Integral representations:

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0214771+57\,005.4\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4$$

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0214771 + 912086.\left(\int_0^1 \sqrt{1-t^2}\;dt\right)^4$$

$$\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162 = 0.0214771 + 57005.4\left(\int_0^\infty \frac{\sin(t)}{t}\;dt\right)^4$$

We note that:

(((((((162/625 * 0.035 (1+0.035)^2 * (1+3*0.035) *
((((2Pi^2)/(0.083333)^3))*0.083333 *
(2Pi^2)/(0.0416666)^3*0.0416666+2)))))))^1/26

Input interpretation:

$$\left(\frac{162}{625}\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{2\,\pi^2}{0.083333^3}\times 0.083333\times\frac{2\,\pi^2}{0.0416666^3}\times 0.0416666+2\right)\right)\right)\,\hat{}\,(1/26)$$

Result:

1.633398413881852153724410443331262350065956119998189539821...

$1.6333984138.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ ...$

(34/10^3+4/10^3)+(((((((162/625 * 0.035 (1+0.035)^2 * (1+3*0.035) *
((((2Pi^2)/(0.083333)^3))*0.083333 *
(2Pi^2)/(0.0416666)^3*0.0416666+2)))))))^1/26

Input interpretation:

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{162}{625}\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{2\,\pi^2}{0.083333^3}\times 0.083333\times\frac{2\,\pi^2}{0.0416666^3}\times 0.0416666+2\right)\right)\right)\text{^}\,(1/26)$$

Result:

1.671398413881852153724410443331262350065956119998189539821...

1.6713984138…. result 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:

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}\,(1/26)=\frac{38}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.0138888\,((180\,^\circ)^2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}\,(1/26)=\frac{38}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.499997\,\zeta(2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}\,(1/26)=\frac{38}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.0138888\,(\cos^{-1}(-1)^2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

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

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

Series representations:

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}\,(1/26)=0.038+0.839977\sqrt[26]{2+8.49356\times 10^7\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^4}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}\,(1/26)=0.038+0.839977\sqrt[26]{2+5.30848\times 10^6\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}\right)^4}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}(1/26)=0.038+0.839977\sqrt[26]{2+331\,780.\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^4}\quad\text{for}\quad(x\in\mathbb{R}\text{ and }x>0)$$

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

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

Integral representations:

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}(1/26)=0.038+0.839977\sqrt[26]{2+5.30848\times 10^6\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}(1/26)=0.038+0.839977\sqrt[26]{2+8.49356\times 10^7\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^4}$$

$$\left(\frac{34}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}(1/26)=0.038+0.839977\sqrt[26]{2+5.30848\times 10^6\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^4}$$

-(11/10^3+4/10^3)+(((((((162/625 * 0.035 (1+0.035)^2 * (1+3*0.035) * ((((2Pi^2)/(0.083333)^3))*0.083333 * (2Pi^2)/(0.0416666)^3*0.0416666+2)))))))^1/26

Input interpretation:

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{162}{625}\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{2\,\pi^2}{0.083333^3}\times 0.083333\times\frac{2\,\pi^2}{0.0416666^3}\times 0.0416666+2\right)\right)\right)\text{^}(1/26)$$

Result:

1.6183984138818521537244104433312623500659561199981895398 21...

1.6183984138.... result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternative representations:

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\text{^}(1/26)=-\frac{15}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.0138888\,((180\,^\circ)^2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)\right)$$
$$162\Big)\,\hat{}\,(1/26)=-\frac{15}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.499997\,\zeta(2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)\right)$$
$$162\Big)\,\hat{}\,(1/26)=-\frac{15}{10^3}+\sqrt[26]{\frac{1}{625}\times 6.26535\times 1.035^2\left(2+\frac{0.0138888\,(\cos^{-1}(-1)^2)^2}{0.0416666^3\times 0.083333^3}\right)}$$

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

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

Series representations:

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)\right)$$
$$162\Big)\,\hat{}\,(1/26)=-0.015+0.839977\sqrt[26]{2+8.49356\times 10^7\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^4}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2(1+3\times 0.035)\left(\frac{0.083333(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\hat{}\,(1/26)=$$

$$-0.015+0.839977\sqrt[26]{2+5.30848\times 10^6\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^4}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2(1+3\times 0.035)\left(\frac{0.083333(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\hat{}\,(1/26)=$$

$$-0.015+0.839977\sqrt[26]{2+331780.\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^4}\quad \text{for}$$

$(x\in\mathbb{R}$ and $x>0)$

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

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

Integral representations:

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2(1+3\times 0.035)\left(\frac{0.083333(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)162\right)\hat{}\,(1/26)=-0.015+0.839977\sqrt[26]{2+5.30848\times 10^6\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)\right)$$
$$162\Big)\,\hat{}\,(1/26)=-0.015+0.839977\sqrt[26]{2+8.49356\times 10^7\left(\int_0^1\sqrt{1-t^2}\;dt\right)^4}$$

$$-\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\left(\frac{1}{625}\left(0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)\right)$$
$$162\Big)\,\hat{}\,(1/26)=-0.015+0.839977\sqrt[26]{2+5.30848\times 10^6\left(\int_0^\infty\frac{\sin(t)}{t}\;dt\right)^4}$$

We note that:

1+(275/10^3)/(((((((162/625 * 0.035 (1+0.035)^2 * (1+3*0.035) * ((((2Pi^2)/(0.083333)^3))*0.083333 * (2Pi^2)/(0.0416666)^3*0.0416666+2))))))))

Input interpretation:

$$1+\frac{275}{10^3}\Big/\left(\frac{162}{625}\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{2\,\pi^2}{0.083333^3}\times 0.083333\times\frac{2\,\pi^2}{0.0416666^3}\times 0.0416666+2\right)\right)\right)$$

Result:

1.000000792386971233774668280945892972458884826215770812316...

1.00000079238697…

Alternative representations:

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$

$$=1+\frac{275}{\frac{1}{625}\times 10^3\left(6.26535\times 1.035^2\left(2+\frac{0.0138888\,((180^\circ)^2)^2}{0.0416666^3\times 0.083333^3}\right)\right)}$$

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$

$$=1+\frac{275}{\frac{1}{625}\times 10^3\left(6.26535\times 1.035^2\left(2+\frac{0.499997\,\zeta(2)^2}{0.0416666^3\times 0.083333^3}\right)\right)}$$

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$

$$=1+\frac{275}{\frac{1}{625}\times 10^3\left(6.26535\times 1.035^2\left(2+\frac{0.0138888\,(\cos^{-1}(-1)^2)^2}{0.0416666^3\times 0.083333^3}\right)\right)}$$

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

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

Series representations:

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\,\pi^2)\,(2\,\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$

$$=1+\frac{25.6086}{2+8.49356\times 10^7\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^4}$$

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$
$$=1+\frac{25.6086}{2+5.30848\times 10^6\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^4}$$

$$1+275\Big/\left(\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\pi^2)\,(2\pi^2)\,0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3\right)=$$
$$1+\frac{25.6086}{2+331\,780.\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^4}\quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

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

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

Integral representations:

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$
$$=1+\frac{25.6086}{2+5.30848\times 10^6\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4}$$

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$
$$=1+\frac{25.6086}{2+8.49356\times 10^7\left(\int_0^1\sqrt{1-t^2}\,dt\right)^4}$$

$$1+\frac{275}{\frac{1}{625}\left(162\times 0.035\left((1+0.035)^2\,(1+3\times 0.035)\left(\frac{0.083333\,(2\pi^2)(2\pi^2)0.0416666}{0.083333^3\times 0.0416666^3}+2\right)\right)\right)10^3}$$

$$=1+\frac{25.6086}{2+5.30848\times 10^6\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^4}$$

We observe that the result 1.0000007923869712.... is practically equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{2\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{(\varphi-1)^5\sqrt[4]{5^3}}-1}}-\varphi}=1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\frac{e^{-6\pi\sqrt{5}}}{1+\frac{e^{-8\pi\sqrt{5}}}{1+\ldots}}}}\approx 1.0000007913$$

that link *e*, φ and π

From:

An exact solution for a rotating black hole in modified gravity
Francesco Filippini, Gianmassimo Tasinato
arXiv:1709.02147v2 [hep-th] 8 Apr 2018

for

$$q=\frac{Q^2}{M^2}\,(1-\beta^2)\,.$$

and $\beta^2 > 1 = 3$; M = 13.12806e+39 we obtain Q:

(((-5*(13.12806e+39)^2 / -2)))^1/2

Input interpretation:

$$\sqrt{-5\left(-\frac{1}{2}\,(13.12806\times 10^{39})^2\right)}$$

Result:

$2.07573... \times 10^{40}$

$2.07573 * 10^{40} = Q$

Now, we have that:

Our findings might be relevant for studying extraction of rotational energy from the disformed black hole – a broad topic that goes outside the scope of the present paper, but that we can start to qualitatively touch here. For large values of $|\beta|$, the size of the ergoregion can be greater than for Kerr black holes: at the equator, the radial size of the ergosphere is

$$r_{erg} = M\left(1+\sqrt{1+\frac{Q^2}{M^2}\left(\beta^2-1\right)}\right), \tag{59}$$

From:

$$r_{erg} = M\left(1+\sqrt{1+\frac{Q^2}{M^2}\left(\beta^2-1\right)}\right),$$

We obtain:

13.12806e+39*((((((1+sqrt((((1+ (((-5*(13.12806e+39)^2 / -2))) / (13.12806e+39)^2 * 2))))))))))

Input interpretation:

$$13.12806 \times 10^{39}\left(1+\sqrt{1+\frac{-5\left(-\frac{1}{2}\left(13.12806 \times 10^{39}\right)^2\right)}{\left(13.12806 \times 10^{39}\right)^2} \times 2}\right)$$

Result:

$4.52851... \times 10^{40}$

$4.52851 * 10^{40}$

The ratio between the radial size of the ergosphere and Q is:

(((((13.12806e+39*((((((1+sqrt((((1+ (((-5*(13.12806e+39)^2 / -2))) / (13.12806e+39)^2 * 2)))))))))))))) / (((-5*(13.12806e+39)^2 / -2)))^1/2

Input interpretation:

$$\frac{13.12806\times 10^{39}\left(1+\sqrt{1+\frac{-5\left(-\frac{1}{2}\left(13.12806\times 10^{39}\right)^2\right)}{\left(13.12806\times 10^{39}\right)^2}\times 2}\right)}{\sqrt{-5\left(-\frac{1}{2}\left(13.12806\times 10^{39}\right)^2\right)}}$$

Result:

2.181648870516642620471484868799503551077079709981679696006...

2.181648870516....

This result is near to the value of the following Rogers-Ramanujan continued fraction:

$$\sqrt{\frac{e\pi}{2}}=\sum_{n=0}^{\infty}\frac{1}{(2n+1)!!}+\cfrac{1}{1+\cfrac{1}{1+\cfrac{2}{1+\cfrac{3}{1+\cfrac{4}{1+\ddots}}}}}\approx 2.0663656771$$

Furthermore:

76*(((((13.12806e+39*(((((((1+sqrt((((1+ (((-5*(13.12806e+39)^2 / -2))) / (13.12806e+39)^2 * 2)))))))))))))) / ((((10^2(((-5*(13.12806e+39)^2 / -2)))^1/2))))

Input interpretation:

$$76\times\frac{13.12806\times 10^{39}\left(1+\sqrt{1+\frac{-5\left(-\frac{1}{2}\left(13.12806\times 10^{39}\right)^2\right)}{\left(13.12806\times 10^{39}\right)^2}\times 2}\right)}{10^2\sqrt{-5\left(-\frac{1}{2}\left(13.12806\times 10^{39}\right)^2\right)}}$$

Result:

1.658053141592648391558328500287622698818580579586076568964...

1.65805314159.... result 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...

This result is very near to the value of the following Rogers-Ramanujan continued fraction adding 1:

$$\sqrt{\frac{e\pi}{2}}erfc\left(\frac{\sqrt{2}}{2}\right) \approx 0.6556795424$$

1+((((sqrt(((e*Pi))/2)))))erfc((sqrt(2)/2))

Input:

$$1+\sqrt{\frac{e\,\pi}{2}}\ \text{erfc}\left(\frac{\sqrt{2}}{2}\right)$$

erfc(x) is the complementary error function

Exact result:

$$\sqrt{\frac{e\,\pi}{2}}\ \text{erfc}\left(\frac{1}{\sqrt{2}}\right)+1$$

Decimal approximation:

1.655679542418798471543871230730811283399282332870462028053...

1.65567954241…. result 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...

Alternate forms:

$$\frac{1}{2}\left(\sqrt{2\,e\,\pi}\ \text{erfc}\left(\frac{1}{\sqrt{2}}\right)+2\right)$$

$$\sqrt{\frac{e\,\pi}{2}}\left(1-\text{erf}\left(\frac{1}{\sqrt{2}}\right)\right)+1$$

$$\frac{\sqrt{e\,\pi}\ \operatorname{erfc}\left(\frac{1}{\sqrt{2}}\right)+\sqrt{2}}{\sqrt{2}}$$

$\operatorname{erf}(x)$ is the error function

Alternative representations:

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\left(1-\operatorname{erf}\left(\frac{\sqrt{2}}{2}\right)\right)\sqrt{\frac{e\,\pi}{2}}$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\left(1+i\operatorname{erfi}\left(\frac{i\sqrt{2}}{2}\right)\right)\sqrt{\frac{e\,\pi}{2}}$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\operatorname{erf}\left(\frac{\sqrt{2}}{2},\infty\right)\sqrt{\frac{e\,\pi}{2}}$$

$\operatorname{erfi}(x)$ is the imaginary error function

i is the imaginary unit

$\operatorname{erf}(x_0, x_1)$ is the generalized error function

Series representations:

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\sqrt{\frac{e\,\pi}{2}}-\sqrt{2\,e}\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{-1/2-k}}{(1+2\,k)\,k!}$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\sqrt{\frac{e\,\pi}{2}}-\sqrt{\frac{e}{2}}\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{-1/2-3\,k}\,H_{1+2\,k}\left(\frac{1}{\sqrt{2}}\right)}{(1+2\,k)\,k!}$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=$$
$$1+\sqrt{\frac{e\,\pi}{2}}-\sqrt{\frac{e\,\pi}{2}}\ \sum_{k=1}^{\infty}\frac{{}_2\tilde{F}_2\left(\frac{1}{2},\,1;\,1-\frac{k}{2},\,\frac{3-k}{2};\,-z_0^2\right)\left(\sqrt{2}-2\,z_0\right)^k\,z_0^{1-k}}{k!}$$

$n!$ is the factorial function

$H_n(x)$ is the nth Hermite polynomial in x

${}_p\tilde{F}_q(a_1,\,\ldots,\,a_p;\,b_1,\,\ldots,\,b_q;\,z)$
is the regularized generalized hypergeometric function

Integral representations:

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\sqrt{2\,e}\ \int_{\frac{1}{\sqrt{2}}}^{\infty}e^{-t^2}\,dt$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\sqrt{\frac{e\,\pi}{2}}-\sqrt{\frac{2\,e}{\pi}}\ \int_0^{\infty}\frac{e^{-t^2}\,\sin\left(\sqrt{2}\,t\right)}{t}\,dt$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1-\frac{i\,\sqrt{\frac{e}{2}}}{2\,\pi}\ \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^s\,\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)}{\Gamma(1+s)}\,ds\quad\text{for } 0<\gamma$$

$$1+\sqrt{\frac{e\,\pi}{2}}\ \operatorname{erfc}\left(\frac{\sqrt{2}}{2}\right)=1+\sqrt{\frac{e\,\pi}{2}}+\frac{i\,\sqrt{\frac{e}{2}}}{2\,\pi}\ \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^s\,\Gamma(-s)\,\Gamma\left(\frac{1}{2}+s\right)}{\Gamma(1-s)}\,ds\quad\text{for } \gamma>-\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

From the radial size of the ergosphere, we have:

Mass = 3.049807e+67

Radius = 4.528510e+40

Temperature = 4.023872e-45

with the Ramanujan-Nardelli mock formula, we can to obtain the golden ratio and the conjugate:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.049807e+67)* sqrt[[-((((4.023872e-45 * 4*Pi*(4.528510e+40)^3-(4.528510e+40)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{3.049807 \times 10^{67}} \sqrt{-\frac{4.023872 \times 10^{-45} \times 4\,\pi\,(4.528510 \times 10^{40})^3 - (4.528510 \times 10^{40})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618249342788194455684601963869943960186586040670247509006...

1.61824934278…

And:

1/ sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.049807e+67)* sqrt[[-((((4.023872e-45 * 4*Pi*(4.528510e+40)^3-(4.528510e+40)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$1 \Big/ \left(\sqrt{\left(1 \Big/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{3.049807 \times 10^{67}} \sqrt{-\frac{4.023872 \times 10^{-45} \times 4\,\pi\,(4.528510 \times 10^{40})^3 - (4.528510 \times 10^{40})^2}{6.67 \times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951741773631979177026251376601211835133572091753559467...

0.6179517417….

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