On some Ramanujan's equations applied to various sectors of Particle Physics and Cosmology: further possible new mathematical connections. III

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Abstract

In this research thesis, we have analyzed further Ramanujan formulas and described new possible mathematical connections with some sectors of Particle Physics, principally the like-Higgs boson dilaton mass solutions, the n_s spectral index, the Pion mesons mass, and Cosmology

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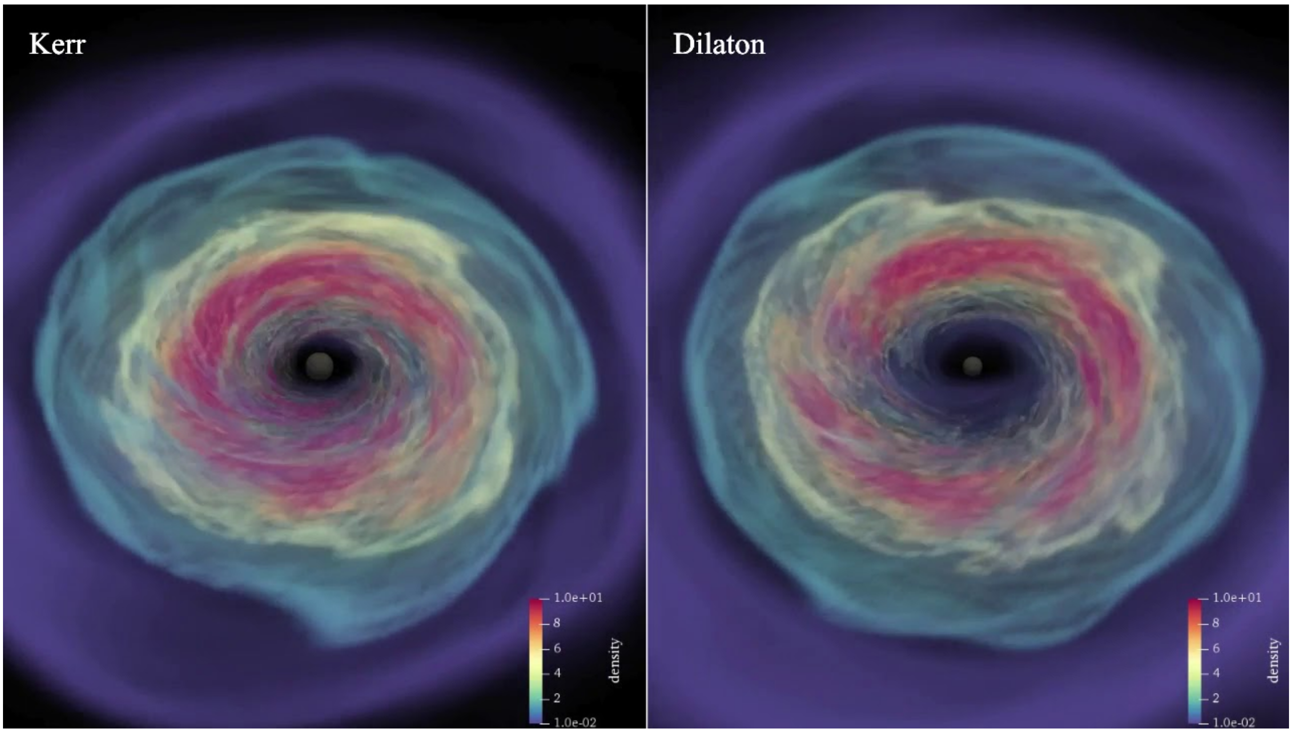
https://www.youtube.com/watch?v=ngbGlchgZ-Q



Fully general-relativistic MHD simulations of the accretion flow onto a Kerr black hole in general relativity (left) and onto a dilaton black hole (right). This movie is part of the Nature paper (Mizuno et al. 2018), that investigates the appearance of a Kerr and a Dilaton black hole as seen by the Event Horizon Telescope. The paper concludes that given the current telescope array this difference is not distinguishable.

https://www.freepressjournal.in/health/ramanujan-formula-explains-black-holes

https://www.mobipicker.com/first-picture-black-hole-finally-snapped-sagittarius-captured-glory/

Example of physical applications of the Ramanujan's mathematics

a) From:

Anomalies in the Space of Coupling Constants and Their Dynamical Applications I

Clay Cordova, Daniel S. Freed, Ho Tat Lam, and Nathan Seiberg

arXiv:1905.09315v3 [hep-th] 30 Oct 2019

We would now like to reinterpret the jump (3.13) in terms of an anomaly involving the fermion mass viewed now as a background field. Analogous to our examples in quantum mechanics, we introduce a new partition function $\tilde{Z}[m, g]$, which depends on an extension of the mass m and metric g into a four-manifold Y with boundary X:

$$\tilde{Z}[m,g] = Z[m,g]\exp\left(-i\int_Y \rho(m)dCS_{\mathrm{grav}}\right) = Z[m,g]\exp\left(-\frac{i}{192\pi}\int_Y \rho(m)\mathrm{Tr}(R\wedge R)\right) , \tag{3.15}$$

where above $\rho(m)$ satisfies the same criteria as in the anomaly in the fermion quantum mechanics theory (3.7). (And as in the discussion there, in the free fermion theory it is natural to take $\rho(m)$ a Heaviside theta-function.) This partition function now retains the

In the precedent paper, from eq. (3.15), converting the value of the electron mass to temperature (Kelvin), bearing in mind that the electron is a fermion, we have obtained:

0.5109989500015 MeV/c^2

convert

0.5109989500015 MeV/k_B (megaelectronvolts per Boltzmann constant) to kelvins

$5.92989657539 \times 10^9$ K (kelvins)

and the formula:

$$Z = \mathrm{tr}(e^{-\beta\hat{H}})$$

From Wikipedia

Quantum mechanical discrete system

For a canonical ensemble that is quantum mechanical and discrete, the canonical partition function is defined as the trace of the Boltzmann factor:

$$Z = \mathrm{tr}(e^{-\beta \hat{H}}),$$

where

β is the thermodynamic beta, defined as $\frac{1}{k_B T}$,
$\hat{H}$ is the Hamiltonian operator.

The dimension of $e^{-\beta \hat{H}}$ is the number of energy eigenstates of the system.

L'operatore hamiltoniano $\hat{H}$ è definito come la somma dell'energia cinetica $\hat{T}$ e dell'energia potenziale $\hat{V} = V(\mathbf{r}, t)$:

$$\hat{H} = \hat{T} + V = \frac{\hat{\mathbf{p}} \cdot \hat{\mathbf{p}}}{2m} + V(\mathbf{r}, t) = -\frac{\hbar^2}{2m}\nabla^2 + V(\mathbf{r}, t)$$

For m = 9.109383701528e-31 (electron mass in kg); $p^2 = (8.5e\text{-}21)^2$; $V = 44 * 10^{-19}$, we obtain:

exp-((((1/(1.38064852e-23 *5.92989657539e+9)*((-(1.054571817e-34)^2)*(8.5e-21)^2))/((2*9.109383701528e-31))+44e-19))))

Input interpretation:

$$\exp\left(-\left(\frac{\frac{1}{1.38064852\times 10^{-23}\times 5.92989657539\times 10^{9}}\left(-(1.054571817\times 10^{-34})^2\,(8.5\times 10^{-21})^2\right)}{2\times 9.109383701528\times 10^{-31}} + 44\times 10^{-19}\right)\right)$$

Result:

0.99999999999999999560000000000000000967999999999999985803...

0.99999999999999999999…..≈ 1 = H

For T = 15.7 MeV = 2.799e-29 kg and V = 44e-19: T + V = $2.799\times 10^{-29} + 44\times 10^{-19}$

$4.40000000002799 \times 10^{-18}$

4.4e-18 = H

exp-((((1/(1.38064852e-23 *5.92989657539e+9)*(4.4e-18)))))

Input interpretation:

$$\exp\left(-\left(\frac{1}{1.38064852\times 10^{-23}\times 5.92989657539\times 10^{9}}\times 4.4\times 10^{-18}\right)\right)$$

Result:

0.9999462584...

0.9999462584… = H ≈ 1

exp(((((((-i/(192Pi))) (((((Tr ((((integrate[1/2*5.92989657539×10^9]x)))))))))))))

Input interpretation:

$$\exp\left(-\frac{i}{192\,\pi}\,\mathrm{Tr}\left[\int\left(\frac{1}{2}\times 5.92989657539\times 10^{9}\right)x\,dx\right]\right)$$

Result:

$$e^{-(i\,\mathrm{Tr}[1.48247414385\times 10^{9}\,x^{2}])/(192\,\pi)}$$

Series expansion of the integral at x = 0:

$$e^{-(i\,\mathrm{Tr}[0])/(192\,\pi)} - 2.45774049999\times 10^{6}\,i\,x^{2}\,e^{-(i\,\mathrm{Tr}[0])/(192\,\pi)}\,\mathrm{Tr}'(0) + x^{4}\,e^{-(i\,\mathrm{Tr}[0])/(192\,\pi)}\left(-3.02024418265\times 10^{12}\,\mathrm{Tr}'(0)^{2} - 1.82176837176\times 10^{15}\,i\,\mathrm{Tr}''(0)\right) + O(x^{5})$$

(Taylor series)

exp(-i*(1.48247414385e+9)/(192Pi))

Input interpretation:

$$\exp\left(-i\times\frac{1.48247414385\times 10^{9}}{192\,\pi}\right)$$

Result:

$-0.952193... + 0.305499...\,i$

Polar coordinates:

$r = 1.00000$ (radius), $\theta = 162.212°$ (angle)

(-0.952193+0.305499)i

Input interpretation:

$(-0.952193 + 0.305499)\,i$

Result:

$-0.646694\,i$

Polar coordinates:

$r = 0.646694$ (radius), $\theta = -90°$ (angle)

0.646694

Note that inserting the Trace within the integral, we obtain the same result. Indeed:

exp(((((((-i/(192Pi))) ((((((((integrate[1/2* Tr(5.92989657539×10^9)]x)))))))))))))

Input interpretation:

$$\exp\left(-\frac{i}{192\pi}\int\left(\frac{1}{2}\operatorname{Tr}\left[5.92989657539\times10^9\right]\right)x\,dx\right)$$

Result:

$$e^{-(i x^2 \operatorname{Tr}[5.92989657539\times10^9])/(768\pi)}$$

Series expansion of the integral at x = 0:

$$1-\frac{i x^2 \operatorname{Tr}\left[5.92989657539\times10^9\right]}{768\pi}-\frac{x^4 \operatorname{Tr}\left[5.92989657539\times10^9\right]^2}{1179648\pi^2}+O(x^5)$$

(Taylor series)

Indefinite integral assuming all variables are real:

$$\frac{(4-4i)\sqrt{6}\,\pi\,\operatorname{erf}\left(\frac{\left(\frac{1}{16}+\frac{i}{16}\right)x\sqrt{\operatorname{Tr}\left[5.92989657539\times10^9\right]}}{\sqrt{6\pi}}\right)}{\sqrt{\operatorname{Tr}\left[5.92989657539\times10^9\right]}}+\text{constant}$$

exp-((((i*(5.92989657539e+9))/(768Pi))))

Input interpretation:

$$\exp\left(-\frac{i\times5.92989657539\times10^9}{768\pi}\right)$$

Result:

$-0.952194\ldots +$
$0.305495\ldots i$

Polar coordinates:

$r = 1.00000$ (radius), $\theta = 162.212°$ (angle)

(-0.952194 +0.305495)i

Input interpretation:

$(-0.952194 + 0.305495)\,i$

Result:

$-0.646699\,i$

Polar coordinates:

$r = 0.646699$ (radius), $\theta = -90°$ (angle)

0.646699 (or 0.646665 multiplying the equation by 0.9999462584… = H)

We note that:

(0.646699 * 21 + Pi)

Input interpretation:

$0.646699 \times 21 + \pi$

Result:

16.7223...

16.7223.... result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

And that:

8 (0.646699 * 21 + Pi)

Input interpretation:

$8\,(0.646699 \times 21 + \pi)$

Result:

133.778...

133.778…. result near to the rest mass of Pion meson 134.9766

We note that 8 and 21 are Fibonacci numbers

From this expression, we obtain also:

(((-0.952194 +0.305495)i))^1/64

Input interpretation:

$$\sqrt[64]{(-0.952194 + 0.305495)\, i}$$

Result:

$0.99291347\ldots -$
$0.024374657\ldots\, i$

Polar coordinates:

$r = 0.993213$ (radius), $\theta = -1.40625°$ (angle)

0.993213 result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

We have also the following result:

Input interpretation:

$-\pi\, i + 2\, i \log_{0.993213}(-(-0.952194 + 0.305495))$

Result:

$124.866\ldots\, i$

Polar coordinates:

$r = 124.866$ (radius), $\theta = 90°$ (angle)

124.866 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$-i\pi + 2\, i \log_{0.993213}(-(-0.952194 + 0.305495)) = -i\pi + \frac{2\, i \log(0.646699)}{\log(0.993213)}$$

Series representations:

$$-i\pi + 2i\log_{0.993213}(-(-0.952194 + 0.305495)) = -i\pi - \frac{2i\sum_{k=1}^{\infty}\frac{(-1)^k(-0.353301)^k}{k}}{\log(0.993213)}$$

$$-i\pi + 2i\log_{0.993213}(-(-0.952194 + 0.305495)) = \\ -i\pi - 293.681\,i\log(0.646699) - 2i\log(0.646699)\sum_{k=0}^{\infty}(-0.006787)^k\,G(k)$$

$$\text{for}\left(G(0) = 0 \text{ and } G(k) = \frac{(-1)^{1+k}\,k}{2(1+k)(2+k)} + \sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

b) From:

Anomalies in the Space of Coupling Constants and Their Dynamical Applications II

Clay Cordova, Daniel S. Freed, Ho Tat Lam, and Nathan Seiberg

arXiv:1905.13361v3

Now we discuss the T-symmetry at $\theta = \pi$. In order to preserve the T-symmetry in $SU(N_f) \times U(1)$ backgrounds (as opposed to more general $U(N_f)/\mathbb{Z}_N$ backgrounds), s and t have to be integers. Under the T-symmetry, the partition function transforms by

$$Z[\theta, A, \tilde{C}] \to Z[\theta, A, \tilde{C}] \exp\left(2\pi i \int \left((1-2p)\frac{\mathcal{P}(w_2^{(N)})}{2N} - s\frac{\mathrm{Tr}(F_A \wedge F_A)}{8\pi^2} - t\frac{\widetilde{F} \wedge \widetilde{F}}{8\pi^2 K^2}\right)\right). \tag{4.25}$$

Using the results in section 4.1.1, the transformations can be made non-anomalous with an appropriate choice of s and t if

$$1 - 2p = 0 \text{ mod } L. \tag{4.26}$$

This equation has integer solutions for p if L is odd. Therefore, we conclude that the theory at $\theta = \pi$ has a mixed anomaly involving the time-reversal symmetry and the $U(N_f)/\mathbb{Z}_N$ zero-form symmetry only when $L = \gcd(N, N_f)$ is even. In that case, the theory at $\theta = \pi$ cannot be trivially gapped.

If $L = \gcd(N, N_f)$ is odd, the counterterms that preserve the T-symmetry at $\theta = 0$ and $\theta = \pi$ are different. In particular, we need to have $p = 0$ mod L at $\theta = 0$ and $p = (L+1)/2$ mod L at $\theta = \pi$. As with our various examples above, even though there is no anomaly for odd L, the fact that we need different counterterms at $\theta = 0$ and at $\theta = \pi$ can allow us to conclude that in that case the theory cannot be trivially gapped between $\theta = 0$ and $\theta = \pi$. There is an exception when $L = 1$. There we can choose $p = 0$ mod L and find a continuous conterterm that preserves the T-symmetry at $\theta = 0, \pi$

$$i\theta \int \left(\frac{J}{NN_f}\frac{\widetilde{F} \wedge \widetilde{F}}{8\pi^2} + NJ\frac{\mathrm{Tr}(F_A \wedge F_A)}{8\pi^2}\right) \tag{4.27}$$

with an integer J satisfying $JN_f = 1$ mod N.

We have that:

Quantum mechanical discrete system

For a canonical ensemble that is quantum mechanical and discrete, the canonical partition function is defined as the trace of the Boltzmann factor:

$$\boldsymbol{Z} = \mathbf{tr}(\mathrm{e}^{-\beta\hat{H}}),$$

where

$\boldsymbol{\beta}$ is the thermodynamic beta, defined as $\frac{1}{k_B T}$,

$\hat{\boldsymbol{H}}$ is the Hamiltonian operator.

and:

$$\hat{H} = \hat{T} + V = \frac{\hat{\mathbf{p}} \cdot \hat{\mathbf{p}}}{2m} + V(\mathbf{r}, t) = -\frac{\hbar^2}{2m}\nabla^2 + V(\mathbf{r}, t)$$

For T = 15.7 MeV = 2.799e-29 kg and V = 44e-19: T + V = $2.799\times10^{-29}+44\times10^{-19}$

$4.40000000002799\times10^{-18}$

4.4e-18 = H

exp-((((1/(1.38064852e-23 *5.92989657539e+9)*(4.4e-18)))))

Input interpretation:

$$\exp\left(-\left(\frac{1}{1.38064852\times10^{-23}\times5.92989657539\times10^{9}}\times4.4\times10^{-18}\right)\right)$$

Result:

0.9999462584...

0.9999462584…

Note that:

((((exp-((((1/(1.38064852e-23 *5.92989657539e+9)*(4.4e-18)))))))))^16

Input interpretation:

$$\exp^{16}\left(-\left(\frac{1}{1.38064852\times10^{-23}\times5.92989657539\times10^{9}}\times4.4\times10^{-18}\right)\right)$$

Result:

0.999140481...

0.999140481.... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

From (4.25), we have:

$$Z[\theta, A, \tilde{C}] \to Z[\theta, A, \tilde{C}] \exp\left(2\pi i \int \left((1-2p)\frac{\mathcal{P}(w_2^{(N)})}{2N} - s\frac{\mathrm{Tr}(F_A \wedge F_A)}{8\pi^2} - t\frac{\widetilde{F} \wedge \widetilde{F}}{8\pi^2 K^2}\right)\right) .$$

0.9999462584*exp(2Pi*i*integrate[((1-4)2^6)/(2*6)-5*Tr(5.92989657539×10^9)*1/(8Pi^2)-8*(5.92989657539×10^9)*1/(8Pi^2*64^2)]x

Input interpretation:

$$0.9999462584 \exp\left(2\pi i \int\left(\frac{(1-4)\times 2^6}{2\times 6} - 5\,\mathrm{Tr}\left[5.92989657539\times 10^9\right]\times\frac{1}{8\pi^2} - 8\times 5.92989657539\times 10^9\times\frac{1}{8\pi^2\times 64^2}\right)x\,dx\right)$$

i is the imaginary unit

Result:

$$0.999946 \exp\left(2 i \pi\left(-\frac{5x^2\,\mathrm{Tr}\left[5.92989657539\times 10^9\right]}{16\pi^2} - 73\,350.7905145\,x^2\right)\right)$$

Series expansion of the integral at x = 0:

$$0.999946 + x^2\left((-0.198933\,i)\,\mathrm{Tr}\left[5.92989657539\times 10^9\right] - 460\,852.\,i\right) + x^4\left(-0.0197882\,\mathrm{Tr}\left[5.92989657539\times 10^9\right]^2 - 91\,683.6\,\mathrm{Tr}\left[5.92989657539\times 10^9\right] - 1.06198\times 10^{11}\right) + O(x^5)$$

(Taylor series)

Indefinite integral assuming all variables are real:

$$\left((1.40489 - 1.40489\,i)\,\mathrm{erf}\left((0.315391565253 + 0.315391565253\,i)\,x\sqrt{1.00000000000\,\mathrm{Tr}\left[5.92989657539\times 10^9\right] + 2.31661851163\times 10^6}\right)\right) \Big/ \left(\sqrt{1.00000000000\,\mathrm{Tr}\left[5.92989657539\times 10^9\right] + 2.31661851163\times 10^6}\right) + \text{constant}$$

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

0.9999462584*exp(2Pi*i*integrate[((1-4)2^6)/(2*6)-5*(5.92989657539×10^9)*1/(8Pi^2)-8*(5.92989657539×10^9)*1/(8Pi^2*64^2)]x

Input interpretation:

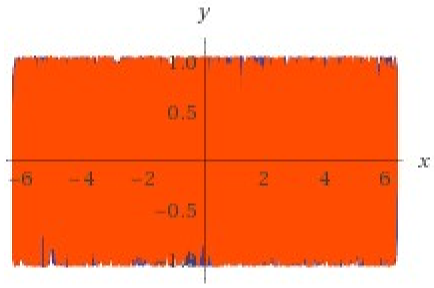
$$0.9999462584 \exp\left(2\pi i \int\left(\frac{(1-4)\times 2^6}{2\times 6} - 5\times 5.92989657539\times 10^9\times\frac{1}{8\pi^2} - 8\times 5.92989657539\times 10^9\times\frac{1}{8\pi^2\times 64^2}\right)x\,dx\right)$$

i is the imaginary unit

Result:

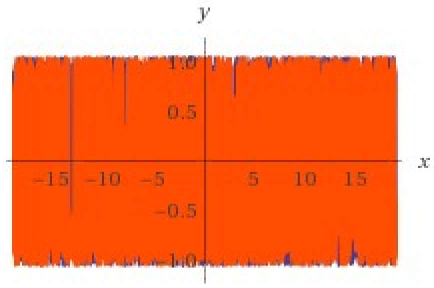
$$0.999946\, e^{-1.18017631661\times 10^9\, i\, x^2}$$

Plots:



(x from -6.3 to 6.3)

— real part
— imaginary part



(x from -18.8 to 18.8)

— real part
— imaginary part

Alternate form assuming x is real:

$$0.999946 \cos(1.18017631661\times 10^9\, x^2) - (0.999946\, i) \sin(1.18017631661\times 10^9\, x^2)$$

Series expansion of the integral at x = 0:

$$0.999946 - (1.18011\times 10^9\, i)\, x^2 - 6.96371\times 10^{17}\, x^4 + O(x^5)$$

(Taylor series)

Indefinite integral assuming all variables are real:

$$(0.0000182403 - 0.0000182403\, i)\, \text{erf}((24\,291.7302451 + 24\,291.7302451\, i)\, x) + \text{constant}$$

erf(x) is the error function

For x = 1, we obtain:

0.999946 cos(1.18017631661×10^9) - (0.999946 i) sin(1.18017631661×10^9)

Input interpretation:

$0.999946 \cos(1.18017631661 \times 10^9) - (0.999946\, i) \sin(1.18017631661 \times 10^9)$

i is the imaginary unit

Result:

$-0.998531\ldots + 0.0531730\ldots\, i$

Polar coordinates:

$r = 0.999946$ (radius), $\theta = 176.952°$ (angle)

0.999946

We have also:

0.9999462584*exp(2Pi*i*integrateTr[((1-4)2^6)/(2*6)-5*(5.92989657539×10^9)*1/(8Pi^2)-8*(5.92989657539×10^9)*1/(8Pi^2*64^2)]x

Input interpretation:

$$0.9999462584 \exp\left(2 \pi i \int \mathrm{Tr}\left[\frac{(1-4) \times 2^6}{2 \times 6} - 5 \times 5.92989657539 \times 10^9 \times \frac{1}{8 \pi^2} - 8 \times 5.92989657539 \times 10^9 \times \frac{1}{8 \pi^2 \times 64^2}\right] x\, dx\right)$$

i is the imaginary unit

Result:

$0.999946\, e^{i \pi x^2 \mathrm{Tr}[-3.75661789016 \times 10^8]}$

Series expansion of the integral at x = 0:

$$0.999946 + (3.14142\, i) x^2 \mathrm{Tr}[-3.75661789016 \times 10^8] - 4.93454 x^4 \mathrm{Tr}[-3.75661789016 \times 10^8]^2 + O(x^5)$$

(Taylor series)

Big-O notation »

Indefinite integral assuming all variables are real:

$$\frac{(0.353534 - 0.353534\, i) \operatorname{erfi}\left(\sqrt[4]{-1} \sqrt{\pi}\, x \sqrt{\mathrm{Tr}[-3.75661789016 \times 10^8]}\right)}{\sqrt{\mathrm{Tr}[-3.75661789016 \times 10^8]}} + \text{constant}$$

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

0.999946 exp(i*Pi*(-3.75661789016e+8))

Input interpretation:

$0.999946 \exp(i \pi (-3.75661789016 \times 10^8))$

i is the imaginary unit

Result:

$-0.998683... +$
$0.0502416... i$

Polar coordinates:

$r = 0.999946$ (radius), $\theta = 177.12°$ (angle)

0.999946

((((0.999946 exp(i*Pi*(-3.75661789016e+8))))))^16

Input interpretation:

$(0.999946 \exp(i \pi (-3.75661789016 \times 10^8)))^{16}$

i is the imaginary unit

Result:

$0.693054... -$
$0.719687... i$

Polar coordinates:

$r = 0.999136$ (radius), $\theta = -46.08°$ (angle)

0.999136 result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

2sqrt(((log base 0.999136 ((((0.999946 exp(i*Pi*(-3.75661789016e+8)))))))))+Pi+(golden ratio)^3

Input interpretation:

$$2\sqrt{\log_{0.999136}(0.999946\exp(i\pi(-3.75661789016\times 10^8)))}+\pi+\phi^3$$

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

i is the imaginary unit

ϕ is the golden ratio

Result:

91.9524... −
84.5732... i

Polar coordinates:

$r = 124.931$ (radius), $\theta = -42.6063°$ (angle)

124.931 result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

29sqrt(((log base 0.999136 ((((0.999946 exp(i*Pi*(-3.75661789016e+8)))))))))+Pi+(golden ratio)^3

Input interpretation:

$$29\sqrt{\log_{0.999136}(0.999946\exp(i\pi(-3.75661789016\times 10^8)))}+\pi+\phi^3$$

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

i is the imaginary unit

ϕ is the golden ratio

Result:

1233.71... −
1226.31... i

Polar coordinates:

$r = 1739.51$ (radius), $\theta = -44.8277°$ (angle)

1739.51 result in the range of the mass of candidate “glueball” $f_0(1710)$ (“glueball” =1760 ± 15 MeV).

[29sqrt(((log base 0.999136 ((((0.999946 exp(i*Pi*(-3.75661789016e+8))))))))+Pi+(golden ratio)^3]^1/15

Input interpretation:

$$\sqrt[15]{29\sqrt{\log_{0.999136}(0.999946\exp(i\pi(-3.75661789016\times 10^{8})))}+\pi+\phi^{3}}$$

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

i is the imaginary unit

ϕ is the golden ratio

Result:

1.64224... −
0.0857361... i

Polar coordinates:

$r = 1.64448$ (radius), $\theta = -2.98851°$ (angle)

$1.64448 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

-(21+5)/10^3+[29sqrt(((log base 0.999136 ((((0.999946 exp(i*Pi*(-3.75661789016e+8))))))))+Pi+(golden ratio)^3]^1/15

Input interpretation:

$$-\frac{21+5}{10^3}+\sqrt[15]{29\sqrt{\log_{0.999136}(0.999946\exp(i\pi(-3.75661789016\times 10^{8})))}+\pi+\phi^{3}}$$

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

i is the imaginary unit

ϕ is the golden ratio

Result:

1.61624... −
0.0857361... i

Polar coordinates:

$r = 1.61852$ (radius), $\theta = -3.0365°$ (angle)

1.61852 result that is a very good approximation to the value of the golden ratio 1,618033988749...

Now, we have that:

From:

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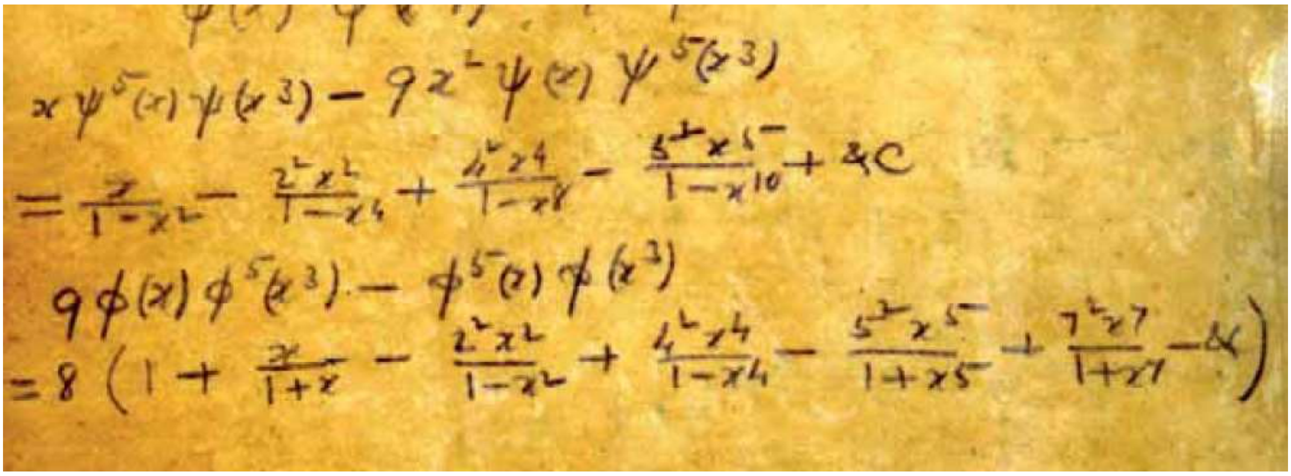

$$x\psi^5(x)\psi(x^3) - 9x^2\psi(x)\psi^5(x^3)$$
$$= \frac{x}{1-x^2} - \frac{2^2x^2}{1-x^4} + \frac{4^2x^4}{1-x^8} - \frac{5^2x^5}{1-x^{10}} + \&c$$
$$9\phi(x)\phi^5(x^3) - \phi^5(x)\phi(x^3)$$
$$= 8\left(1 + \frac{x}{1+x} - \frac{2^2x^2}{1-x^2} + \frac{4^2x^4}{1-x^4} - \frac{5^2x^5}{1+x^5} + \frac{7^2x^7}{1+x^7} - \&c\right)$$

For x = 2

2/(1-2^2)-(2^2*2^2)/(1-2^4)+(4^2*2^4)/(1-2^8)-(5^2-2^5)/(1-2^10)

Input:

$$\frac{2}{1-2^2} - \frac{2^2 \times 2^2}{1-2^4} + \frac{4^2 \times 2^4}{1-2^8} - \frac{5^2-2^5}{1-2^{10}}$$

Exact result:

$$-\frac{17\,703}{28\,985}$$

Decimal approximation:

−0.61076418837329653268932206313610488183543212006210108676...

-0.61076418837329...

-1/(((2/(1-2^2)-(2^2*2^2)/(1-2^4)+(4^2*2^4)/(1-2^8)-(5^2-2^5)/(1-2^10))))

Input:

$$-\frac{1}{\frac{2}{1-2^2} - \frac{2^2 \times 2^2}{1-2^4} + \frac{4^2 \times 2^4}{1-2^8} - \frac{5^2-2^5}{1-2^{10}}}$$

Exact result:

$$\frac{28985}{17703}$$

Decimal approximation:

1.637293114161441563576794893520872168559001299214822346494...

1.637293114.... ≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

-11/(((2/(1-2^2)-(2^2*2^2)/(1-2^4)+(4^2*2^4)/(1-2^8)-(5^2-2^5)/(1-2^10))))-golden ratio

Input:

$$-\frac{11}{\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}}-\phi$$

ϕ is the golden ratio

Exact result:

$$\frac{318835}{17703}-\phi$$

Decimal approximation:

16.39219026702596235114015699436395573642870511155728294930...

16.392190267... result near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

(((-2/(1-2^2)-(2^2*2^2)/(1-2^4)+(4^2*2^4)/(1-2^8)-(5^2-2^5)/(1-2^10))))^1/64

Input:

$$\sqrt[64]{-\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}}$$

Result:

$$\sqrt[64]{\frac{62831}{86955}}$$

Decimal approximation:

0.994935646033109425465860045799179079969595205859448832772...

0.994935646…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

Alternate form:

$$\frac{\sqrt[64]{62831}\ 86955^{63/64}}{86955}$$

2*log base 0.994935646033109425 ((((((-2/(1-2^2)-(2^2*2^2)/(1-2^4)+(4^2*2^4)/(1-2^8)-(5^2-2^5)/(1-2^10)))))))-Pi+1/(golden ratio)

Input interpretation:

$$2\log_{0.994935646033109425}\left(-\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764413351601...

125.4764413351601…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$2\log_{0.99493564603310942500000}\left(-\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}\right)-\pi+\frac{1}{\phi}=$$
$$-\pi+\frac{1}{\phi}+\frac{2\log\left(\frac{-2}{-3}-\frac{16}{1-2^4}+\frac{2^4\times 4^2}{1-2^8}-\frac{-2^5+5^2}{1-2^{10}}\right)}{\log(0.99493564603310942500000)}$$

Series representations:

$$2\log_{0.99493564603310942500000}\left(-\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-\frac{2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{24124}{86955}\right)^k}{k}}{\log(0.99493564603310942500000)}$$

$$2\log_{0.99493564603310942500000}\left(-\frac{2}{1-2^2}-\frac{2^2\times 2^2}{1-2^4}+\frac{4^2\times 2^4}{1-2^8}-\frac{5^2-2^5}{1-2^{10}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-1.0000000000000000000\,\pi-393.91710355861344240\log\left(\frac{62831}{86955}\right)-$$
$$2\log\left(\frac{62831}{86955}\right)\sum_{k=0}^{\infty}(-0.0050643539668905750000)^k\,G(k)$$
$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

8(((1+2/(1+2)-(2^2*2^2)/(1-2^2)+(4^2*2^4)/(1-2^4)-(5^2*2^5)/(1+2^5)+(7^2*2^7)/(1+2^7)))

Input:

$$8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)$$

Exact result:

$$\frac{812296}{7095}$$

Decimal approximation:

114.4885130373502466525722339675828047921071176885130373502...

114.488513037....

(((1/(2Pi)*8(((1+2/(1+2)-(2^2*2^2)/(1-2^2)+(4^2*2^4)/(1-2^4)-(5^2*2^5)/(1+2^5)+(7^2*2^7)/(1+2^7)))))))-golden ratio

Input:

$$\frac{1}{2\pi}\times 8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)-\phi$$

ϕ is the golden ratio

Result:

$$\frac{406\,148}{7095\,\pi}-\phi$$

Decimal approximation:

16.603378788385300876069015061679453668487362757669897672 31...

16.60337878… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$$-\phi+\frac{406\,148}{7095\,\pi}$$ is a transcendental number

Alternate forms:

$$\frac{812\,296-7095\,\pi-7095\sqrt{5}\,\pi}{14\,190\,\pi}$$

$$-\frac{7095\,\pi\,\phi-406\,148}{7095\,\pi}$$

$$\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{406\,148}{7095\,\pi}$$

Alternative representations:

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=$$
$$2\cos(216°)+\frac{8\left(\frac{5}{3}--\frac{16}{3}+\frac{2^4\times 4^2}{1-2^4}-\frac{2^5\times 5^2}{1+2^5}+\frac{2^7\times 7^2}{1+2^7}\right)}{2\pi}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=$$
$$2\cos(216°)+\frac{8\left(\frac{5}{3}--\frac{16}{3}+\frac{2^4\times 4^2}{1-2^4}-\frac{2^5\times 5^2}{1+2^5}+\frac{2^7\times 7^2}{1+2^7}\right)}{360°}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=$$
$$-2\cos\left(\frac{\pi}{5}\right)+\frac{8\left(\frac{5}{3}--\frac{16}{3}+\frac{2^4\times 4^2}{1-2^4}-\frac{2^5\times 5^2}{1+2^5}+\frac{2^7\times 7^2}{1+2^7}\right)}{2\pi}$$

Series representations:

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=-\phi+\frac{101537}{7095\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=$$
$$-\phi+\frac{101537}{7095\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=$$
$$-\phi+\frac{406148}{7095\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations:

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}{2\pi}-\phi=-\phi+\frac{101537}{7095\int_0^1\sqrt{1-t^2}\,dt}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times2^2}{1-2^2}+\frac{4^2\times2^4}{1-2^4}-\frac{5^2\times2^5}{1+2^5}+\frac{7^2\times2^7}{1+2^7}\right)}{2\pi}-\phi=-\phi+\frac{203074}{7095\int_0^\infty\frac{1}{1+t^2}\,dt}$$

$$\frac{8\left(1+\frac{2}{1+2}-\frac{2^2\times2^2}{1-2^2}+\frac{4^2\times2^4}{1-2^4}-\frac{5^2\times2^5}{1+2^5}+\frac{7^2\times2^7}{1+2^7}\right)}{2\pi}-\phi=-\phi+\frac{203074}{7095\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

1/((((8(((1+2/(1+2)-(2^2*2^2)/(1-2^2)+(4^2*2^4)/(1-2^4)-(5^2*2^5)/(1+2^5)+(7^2*2^7)/(1+2^7))))))))^1/512

Input:

$$\frac{1}{\sqrt[512]{8\left(1+\frac{2}{1+2}-\frac{2^2\times2^2}{1-2^2}+\frac{4^2\times2^4}{1-2^4}-\frac{5^2\times2^5}{1+2^5}+\frac{7^2\times2^7}{1+2^7}\right)}}$$

Result:

$$\frac{\sqrt[512]{\frac{7095}{101537}}}{2^{3/512}}$$

Decimal approximation:

0.990783990900450725908360112656904823984836399453344387546...

0.9907839909… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243}=\boldsymbol{\phi}$

Alternate form:

$$\frac{\sqrt[512]{7095}\ 2^{509/512} \times 101537^{511/512}}{203074}$$

1/4*log base 0.99078399090045 (((((1/((((8(((1+2/(1+2)-(2^2*2^2)/(1-2^2)+(4^2*2^4)/(1-2^4)-(5^2*2^5)/(1+2^5)+(7^2*2^7)/(1+2^7)))))))))))))-Pi+1/golden ratio

Input interpretation:

$$\frac{1}{4}\log_{0.99078399090045}\left(\frac{1}{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.476441335...

125.47644… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\frac{1}{4}\log_{0.990783990900450000}\left(\frac{1}{8\left(1+\frac{2}{1+2}-\frac{2^2\times 2^2}{1-2^2}+\frac{4^2\times 2^4}{1-2^4}-\frac{5^2\times 2^5}{1+2^5}+\frac{7^2\times 2^7}{1+2^7}\right)}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{8\left(\frac{5}{3}--\frac{16}{3}+\frac{2^4\times 4^2}{1-2^4}-\frac{2^5\times 5^2}{1+2^5}+\frac{2^7\times 7^2}{1+2^7}\right)}\right)}{4\log(0.990783990900450000)}$$

Series representations:

$$\frac{1}{4}\log_{0.990783990900450000}\left(\frac{1}{8\left(1+\frac{2}{1+2}-\frac{2^2\times2^2}{1-2^2}+\frac{4^2\times2^4}{1-2^4}-\frac{5^2\times2^5}{1+2^5}+\frac{7^2\times2^7}{1+2^7}\right)}\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{805\,201}{812\,296}\right)^k}{k}}{4\log(0.990783990900450000)}$$

$$\frac{1}{4}\log_{0.990783990900450000}\left(\frac{1}{8\left(1+\frac{2}{1+2}-\frac{2^2\times2^2}{1-2^2}+\frac{4^2\times2^4}{1-2^4}-\frac{5^2\times2^5}{1+2^5}+\frac{7^2\times2^7}{1+2^7}\right)}\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-1.000000000000000\,\pi-27.00170932716495\log\left(\frac{7095}{812\,296}\right)-$$
$$\frac{1}{4}\log\left(\frac{7095}{812\,296}\right)\sum_{k=0}^{\infty}(-0.009216009099550000)^k\,G(k)$$
$$\text{for }\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

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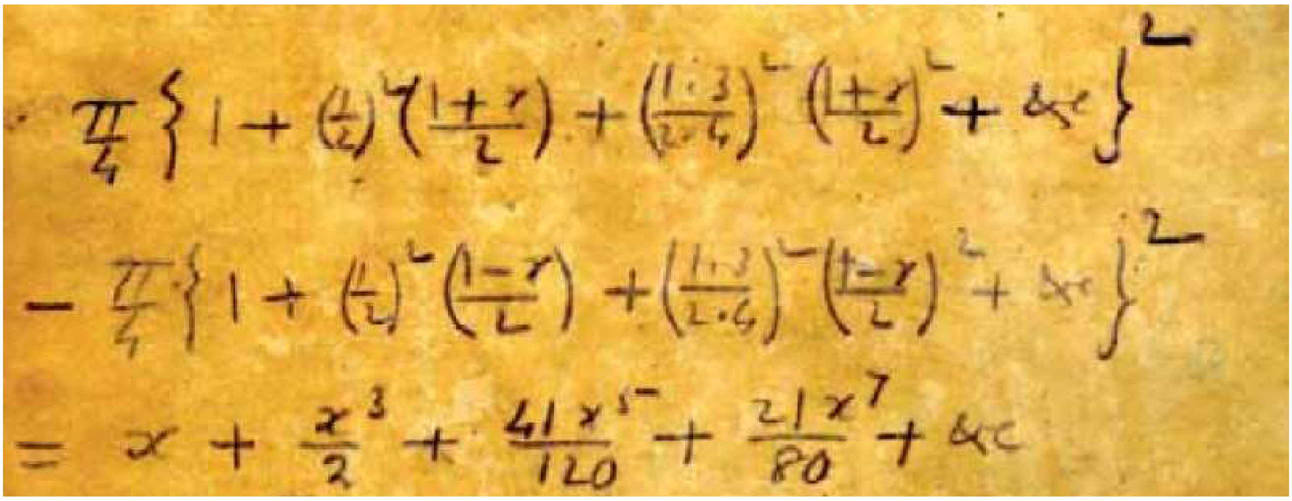

For x = 2

2+2^3/2+(41*2^5)/120+(21*2^7)/80

Input:

$$2+\frac{2^3}{2}+\frac{1}{120}\left(41\times2^5\right)+\frac{1}{80}\left(21\times2^7\right)$$

Exact result:

$$\frac{758}{15}$$

Decimal approximation:

50.533333333333333333333333333333333333333333333333333333...

50.533333...

1/((2+2^3/2+(41*2^5)/120+(21*2^7)/80))^1/256

Input:

$$\frac{1}{\sqrt[256]{2+\frac{2^3}{2}+\frac{1}{120}(41\times 2^5)+\frac{1}{80}(21\times 2^7)}}$$

Result:

$$\sqrt[256]{\frac{15}{758}}$$

Decimal approximation:

0.9847940106958273745827988930193466088284957005007281743 23...

0.98479401…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

Alternate form:

$$\frac{1}{758}\sqrt[256]{15\ 758^{255/256}}$$

1/2 log base 0.98479401069582 ((((1/((2+2^3/2+(41*2^5)/120+(21*2^7)/80))))))-Pi+1/(golden ratio)

Input interpretation:

$$\frac{1}{2}\log_{0.9847940106958 2}\left(\frac{1}{2+\frac{2^3}{2}+\frac{1}{120}\left(41\times 2^5\right)+\frac{1}{80}\left(21\times 2^7\right)}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.476441335...

125.476441335… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\frac{1}{2}\log_{0.9847940106958 20000}\left(\frac{1}{2+\frac{2^3}{2}+\frac{41\times 2^5}{120}+\frac{21\times 2^7}{80}}\right)-\pi+\frac{1}{\phi}=$$
$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{6+\frac{21\times 2^7}{80}+\frac{41\times 2^5}{120}}\right)}{2\log(0.9847940106958 20000)}$$

Series representations:

$$\frac{1}{2}\log_{0.9847940106958 20000}\left(\frac{1}{2+\frac{2^3}{2}+\frac{41\times 2^5}{120}+\frac{21\times 2^7}{80}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{743}{758}\right)^k}{k}}{2\log(0.9847940106958 20000)}$$

$$\frac{1}{2}\log_{0.9847940106958 20000}\left(\frac{1}{2+\frac{2^3}{2}+\frac{41\times 2^5}{120}+\frac{21\times 2^7}{80}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-1.0000000000000000\,\pi-32.63178032997525\log\left(\frac{15}{758}\right)-$$
$$\frac{1}{2}\log\left(\frac{15}{758}\right)\sum_{k=0}^{\infty}(-0.015205989304180000)^k\,G(k)$$
$$\text{for }\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

1/3 (2+2^3/2+(41*2^5)/120+(21*2^7)/80)

Input:

$$\frac{1}{3}\left(2+\frac{2^3}{2}+\frac{1}{120}\left(41\times 2^5\right)+\frac{1}{80}\left(21\times 2^7\right)\right)$$

Exact result:

$$\frac{758}{45}$$

Decimal approximation:

16.84444444444444444444444444444444444444444444444444444...

16.844444... result practically equal to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

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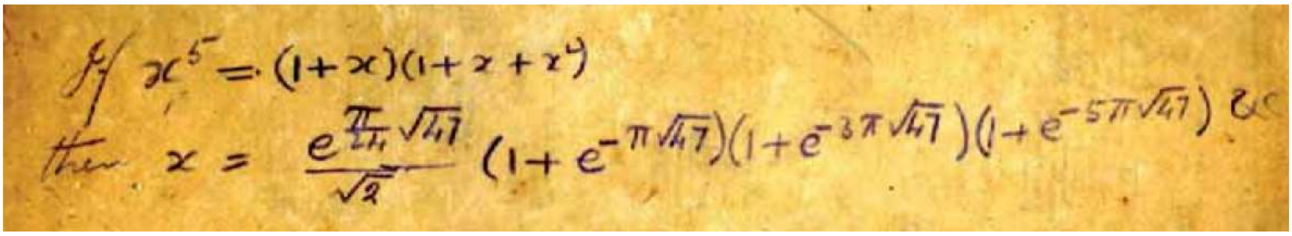
If $x^5 = (1+x)(1+x+x^4)$ then $x = \frac{e^{\frac{\pi}{24}\sqrt{47}}}{\sqrt{2}}(1+e^{-\pi\sqrt{47}})(1+e^{-3\pi\sqrt{47}})(1+e^{-5\pi\sqrt{47}})$ &c

exp((Pi*sqrt47)/24)*1/sqrt(2)*(1+exp(-Pi*sqrt(47))*(1+exp(-3Pi*sqrt(47))*(1+exp(-5Pi*sqrt(47))

Input:

$$\exp\left(\frac{1}{24}\left(\pi\sqrt{47}\right)\right)\times\frac{1}{\sqrt{2}}\left(1+\exp\left(-\pi\sqrt{47}\right)\left(1+\exp\left(-3\pi\sqrt{47}\right)\left(1+\exp\left(-5\pi\sqrt{47}\right)\right)\right)\right)$$

Exact result:

$$\frac{e^{\left(\sqrt{47}\,\pi\right)/24}\left(1+e^{-\sqrt{47}\,\pi}\left(1+e^{-3\sqrt{47}\,\pi}\left(1+e^{-5\sqrt{47}\,\pi}\right)\right)\right)}{\sqrt{2}}$$

Decimal approximation:

1.734691345692469553024170512712556412308560219553988212826...

1.734691345…

Alternate forms:

$$\frac{e^{-(215\sqrt{47}\,\pi)/24}\left(1+e^{5\sqrt{47}\,\pi}+e^{8\sqrt{47}\,\pi}+e^{9\sqrt{47}\,\pi}\right)}{\sqrt{2}}$$

$$\frac{1}{2}\,e^{-(215\sqrt{47}\,\pi)/24}\left(1+e^{5\sqrt{47}\,\pi}+e^{8\sqrt{47}\,\pi}+e^{9\sqrt{47}\,\pi}\right)\sqrt{2}$$

$$e^{(\sqrt{47}\,\pi)/24}\left(\frac{1}{\sqrt{2}}+e^{-\sqrt{47}\,\pi}\left(\frac{1}{\sqrt{2}}+e^{-3\sqrt{47}\,\pi}\left(\frac{1}{\sqrt{2}}+\frac{e^{-5\sqrt{47}\,\pi}}{\sqrt{2}}\right)\right)\right)$$

Series representations:

$$\frac{\exp\left(\frac{\pi\sqrt{47}}{24}\right)\left(1+\exp\left(-\pi\sqrt{47}\right)\left(1+\exp\left(-3\pi\sqrt{47}\right)\left(1+\exp\left(-5\pi\sqrt{47}\right)\right)\right)\right)}{\sqrt{2}}=$$

$$\left(\left(\left(1+\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)+\right.\right.\right.$$
$$\exp\left(-3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)$$
$$\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)+$$
$$\exp\left(-5\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)$$
$$\exp\left(-3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)$$
$$\left.\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\right)$$
$$\left.\exp\left(\frac{1}{24}\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/$$
$$\left(\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)$$

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

$$\frac{\exp\left(\frac{\pi\sqrt{47}}{24}\right)\left(1+\exp\left(-\pi\sqrt{47}\right)\left(1+\exp\left(-3\pi\sqrt{47}\right)\left(1+\exp\left(-5\pi\sqrt{47}\right)\right)\right)\right)}{\sqrt{2}} =$$

$$\Bigg(\Bigg(\Bigg(1+\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)+$$

$$\exp\left(-3\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)+$$

$$\exp\left(-5\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\exp\left(-3\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg)$$

$$\exp\left(\frac{1}{24}\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg)\Bigg/$$

$$\left(\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$
\frac{\exp\left(\frac{\pi\sqrt{47}}{24}\right)\left(1+\exp\left(-\pi\sqrt{47}\right)\left(1+\exp\left(-3\pi\sqrt{47}\right)\left(1+\exp\left(-5\pi\sqrt{47}\right)\right)\right)\right)}{\sqrt{2}} =
$$

$$
\begin{aligned}
&\Bigg(\Bigg(1+\exp\Bigg(-\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} \\
&\qquad z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg)+ \\
&\quad \exp\Bigg(-3\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \\
&\qquad \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg) \exp\Bigg(-\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} \\
&\qquad z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg)+ \\
&\quad \exp\Bigg(-5\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \\
&\qquad \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg) \\
&\quad \exp\Bigg(-3\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \\
&\qquad \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg) \exp\Bigg(-\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} \\
&\qquad z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg)\Bigg) \\
&\quad \exp\Bigg(\frac{1}{24}\,\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor \arg(47-z_0)/(2\pi)\rfloor)} \\
&\qquad \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k\, z_0^{-k}}{k!}\Bigg) \\
&\quad \left(\frac{1}{z_0}\right)^{-1/2\,\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{-1/2-1/2\,\lfloor \arg(2-z_0)/(2\pi)\rfloor}\Bigg) \Bigg/ \\
&\left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)
\end{aligned}
$$

10(((((e^((Pi*sqrt47)/24)))*1/sqrt(2)*(1+(e^(-Pi*sqrt(47)))*(1+(e^(-3Pi*sqrt(47))*(1+(e^(-5Pi*sqrt(47))))))))))-1/golden ratio

Input:

$$10\left(e^{1/24\left(\pi\sqrt{47}\right)}\times\frac{1}{\sqrt{2}}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)\right)-\frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$5\sqrt{2}\,e^{\left(\sqrt{47}\,\pi\right)/24}\left(1+e^{-\sqrt{47}\,\pi}\left(1+e^{-3\sqrt{47}\,\pi}\left(1+e^{-5\sqrt{47}\,\pi}\right)\right)\right)-\frac{1}{\phi}$$

Decimal approximation:

16.728879468174800682037118292759926005365293015734119266612...

16.728879468… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternate forms:

$$5\sqrt{2}\,e^{-\left(215\sqrt{47}\,\pi\right)/24}\left(1+e^{5\sqrt{47}\,\pi}+e^{8\sqrt{47}\,\pi}+e^{9\sqrt{47}\,\pi}\right)-\frac{1}{\phi}$$

$$\frac{5\sqrt{2}\,e^{\left(\sqrt{47}\,\pi\right)/24}\left(1+e^{-\sqrt{47}\,\pi}\left(1+e^{-3\sqrt{47}\,\pi}\left(1+e^{-5\sqrt{47}\,\pi}\right)\right)\right)\phi-1}{\phi}$$

$$5\,e^{-\left(215\sqrt{47}\,\pi\right)/24}\left(1+e^{5\sqrt{47}\,\pi}+e^{8\sqrt{47}\,\pi}+e^{9\sqrt{47}\,\pi}\right)\sqrt{2}-\frac{\sqrt{5}}{2}+\frac{1}{2}$$

Series representations:

$$\frac{10\, e^{\left(\pi \sqrt{47}\right)/24} \left(1+e^{-\pi \sqrt{47}} \left(1+e^{-3\pi \sqrt{47}} \left(1+e^{-5\pi \sqrt{47}}\right)\right)\right)}{\sqrt{2}} - \frac{1}{\phi} =$$

$$\left(\exp\left(-\frac{215}{24}\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\right.$$
$$\left(10\,\phi + 10 \exp\left(5\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi + \right.$$
$$10 \exp\left(8\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi +$$
$$10 \exp\left(9\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi -$$
$$\exp\left(\frac{215}{24}\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)$$
$$\left.\left.\sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)\right) \Big/$$
$$\left(\phi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right) \text{ for not } ((z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\frac{10\, e^{(\pi\sqrt{47})/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}-\frac{1}{\phi}=$$

$$\left(\exp\left(-\frac{215}{24}\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left(10\phi+10\exp\left(5\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\phi+\right.$$
$$10\exp\left(8\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\phi+$$
$$10\exp\left(9\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\phi-$$
$$\exp\left(\frac{215}{24}\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$
$$\left.\left.\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/$$
$$\left(\phi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{10\, e^{\left(\pi\sqrt{47}\right)/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}-\frac{1}{\phi}=$$

$$\left(\exp\left(-\frac{215}{24}\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1/2-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(10\,\phi+10\exp\left(5\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi+10\exp\left(8\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi+10\exp\left(9\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\phi-\exp\left(\frac{215}{24}\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (47-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)\right) \Big/ \left(\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)$$

1/(((((e^((Pi*sqrt47)/24)))*1/sqrt(2)*(1+(e^(-Pi*sqrt(47)))*(1+(e^(-3Pi*sqrt(47))*(1+(e^(-5Pi*sqrt(47)))))))))^1/64

Input:

$$\frac{1}{\sqrt[64]{e^{1/24\left(\pi\sqrt{47}\right)}\times\frac{1}{\sqrt{2}}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}}$$

Exact result:

$$\frac{\sqrt[128]{2}\, e^{-(\sqrt{47}\,\pi)/1536}}{\sqrt[64]{1+e^{-\sqrt{47}\,\pi}\left(1+e^{-3\sqrt{47}\,\pi}\left(1+e^{-5\sqrt{47}\,\pi}\right)\right)}}$$

Decimal approximation:

0.9914302207876444380330602933564978931755735502190042211 19...

0.9914302207876…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

Alternate forms:

$$\frac{\sqrt[128]{2}\, e^{-(\sqrt{47}\,\pi)/1536}}{\sqrt[64]{1+e^{-9\sqrt{47}\,\pi}+e^{-4\sqrt{47}\,\pi}+e^{-\sqrt{47}\,\pi}}}$$

$$\frac{\sqrt[128]{2}\, e^{(215\sqrt{47}\,\pi)/1536}}{\sqrt[64]{1+e^{5\sqrt{47}\,\pi}+e^{8\sqrt{47}\,\pi}+e^{9\sqrt{47}\,\pi}}}$$

Series representations:

$$\frac{1}{\sqrt[64]{\frac{e^{\left(\pi\sqrt{47}\right)/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}} = \left(\exp\left(-\frac{1}{24}\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\sqrt{z_0}\left(\left(\exp\left(\frac{1}{24}\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\left(1+\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\left(1+\exp\left(-3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\left(1+\exp\left(-5\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\right)\right)\right)\right)\Big/\left(\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\right)^{63/64}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\Big/\left(1+\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\left(1+\exp\left(-3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\left(1+\exp\left(-5\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}\right)\right)\right)\right)$$

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

$$\frac{1}{\sqrt[64]{\frac{e^{\left(\pi\sqrt{47}\right)/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}} =$$

$$\left(\exp\left(-\frac{1}{24}\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left(\left(\exp\left(\frac{1}{24}\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.\right.$$
$$\left(1+\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left(1+\exp\left(-3\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left.\left.\left.\left.\left.\left(1+\exp\left(-5\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)\right)\right)\right)\Big/$$
$$\left.\left(\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)^{63/64}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$
$$\left(1+\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left(1+\exp\left(-3\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right.$$
$$\left.\left.\left(1+\exp\left(-5\pi\exp\left(i\pi\left\lfloor\frac{\arg(47-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(47-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)\right) \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{1}{\sqrt[64]{\frac{e^{\left(\pi\sqrt{47}\right)/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}} =$$

$$\left(e^{-\frac{1}{24}\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\right.$$

$$\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$

$$\left(\left(e^{\frac{1}{24}\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\left(1+\right.\right.\right.$$

$$e^{-\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}$$

$$\left(1+\right.$$

$$e^{-3\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}$$

$$\left(1+\right.$$

$$\left.\left.\left.\left.e^{-5\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\right)\right)\right)\right)$$

$$\left.\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1/2-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\right)\Big/$$

$$\left.\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^{63/64}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\Big/$$

$$\left(1+e^{-\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\right.$$

$$\left(1+e^{-3\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\right.$$

$$\left(1+\right.$$

$$\left.\left.\left.e^{-5\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(47-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(47-z_0)^k z_0^{-k}}{k!}}\right)\right)\right)$$

2*log base 0.99143022078764 (((1/(((((e^((Pi*sqrt47)/24)))*1/sqrt(2)*(1+(e^(-Pi*sqrt(47)))*(1+(e^(-3Pi*sqrt(47))*(1+(e^(-5Pi*sqrt(47)))))))))))))-Pi+1/golden ratio

Input interpretation:

$$2 \log_{0.99143022078764}\left(\frac{1}{e^{1/24\left(\pi \sqrt{47}\right)} \times \frac{1}{\sqrt{2}}\left(1+e^{-\pi \sqrt{47}}\left(1+e^{-3 \pi \sqrt{47}}\left(1+e^{-5 \pi \sqrt{47}}\right)\right)\right)}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.476441335...

125.476441335… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$2 \log_{0.99143022078764000}\left(\frac{1}{\frac{e^{\left(\pi \sqrt{47}\right)/24}\left(1+e^{-\pi \sqrt{47}}\left(1+e^{-3 \pi \sqrt{47}}\left(1+e^{-5 \pi \sqrt{47}}\right)\right)\right)}{\sqrt{2}}}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{2 \log\left(\frac{1}{\frac{\left(1+\left(1+\left(1+e^{-5 \pi \sqrt{47}}\right) e^{-3 \pi \sqrt{47}}\right) e^{-\pi \sqrt{47}}\right) e^{\left(\pi \sqrt{47}\right)/24}}{\sqrt{2}}}\right)}{\log(0.99143022078764000)}$$

Series representations:

$$2\log_{0.991430220787640000}\left(\frac{1}{\frac{e^{(\pi\sqrt{47})/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi-\frac{2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{e^{(215\pi\sqrt{47})/24}\sqrt{2}}{1+e^{5\pi\sqrt{47}}+e^{8\pi\sqrt{47}}+e^{9\pi\sqrt{47}}}\right)^k}{k}}{\log(0.991430220787640000)}$$

$$2\log_{0.991430220787640000}\left(\frac{1}{\frac{e^{(\pi\sqrt{47})/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi-\frac{2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{e^{-(\pi\sqrt{47})/24}\sqrt{2}}{1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)}\right)^k}{k}}{\log(0.991430220787640000)}$$

$$2\log_{0.991430220787640000}\left(\frac{1}{\frac{e^{(\pi\sqrt{47})/24}\left(1+e^{-\pi\sqrt{47}}\left(1+e^{-3\pi\sqrt{47}}\left(1+e^{-5\pi\sqrt{47}}\right)\right)\right)}{\sqrt{2}}}\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1.000000000000000}{\phi}-1.000000000000000\,\pi+\log\left(\frac{e^{(215\pi\sqrt{47})/24}\sqrt{2}}{1+e^{5\pi\sqrt{47}}+e^{8\pi\sqrt{47}}+e^{9\pi\sqrt{47}}}\right)\left(-232.3782411938274-2.000000000000000\sum_{k=0}^{\infty}(-0.008569779212360000)^k\,G(k)\right)$$

$$\text{for}\left(G(0)=0\text{ and }\frac{(-1)^k\,k}{2(1+k)(2+k)}+G(k)=\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

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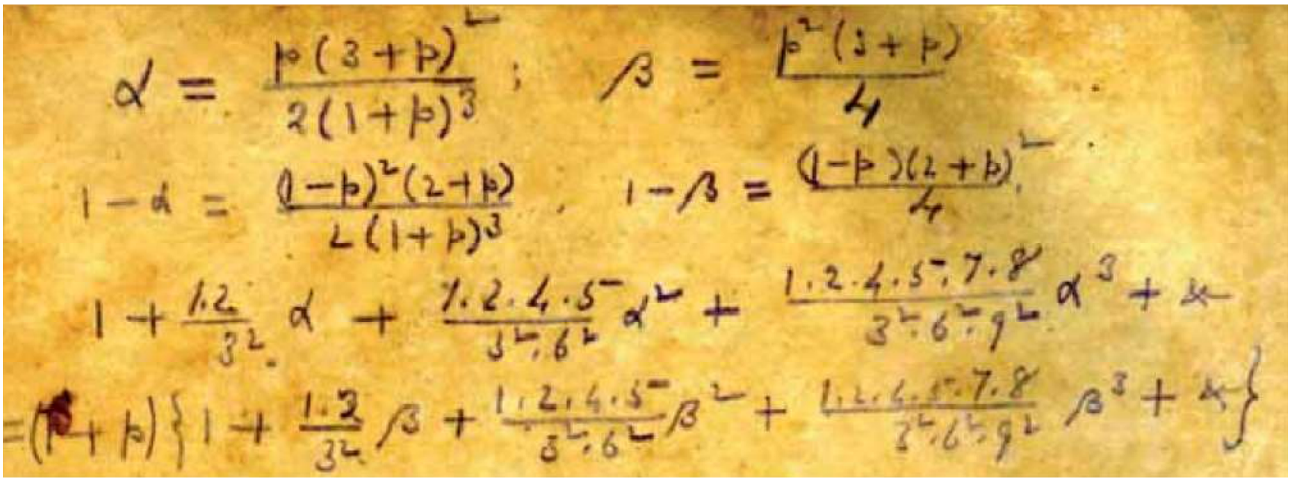

$$\alpha = \frac{p(3+p)^2}{2(1+p)^3}\ ; \quad \beta = \frac{p^2(3+p)}{4}$$

$$1-\alpha = \frac{(1-p)^2(2+p)}{2(1+p)^3}\ ; \quad 1-\beta = \frac{(1-p)(2+p)^2}{4}$$

$$1 + \frac{1.2}{3^2}\alpha + \frac{1.2.4.5}{3^2.6^2}\alpha^2 + \frac{1.2.4.5.7.8}{3^2.6^2.9^2}\alpha^3 + \&c$$

$$= (1+p)\left\{1 + \frac{1.2}{3^2}\beta + \frac{1.2.4.5}{3^2.6^2}\beta^2 + \frac{1.2.4.5.7.8}{3^2.6^2.9^2}\beta^3 + \&c\right\}$$

For p = 2, we obtain:

(1+2)*[((1+(1*2)/9))*(2^2(3+2))/4+((1*2*4*5)/(3^2*6^2))*(((2^2(3+2))/4))^2+((1*2*4*5*7*8)/(3^2*6^2*9^2))*(((2^2(3+2))/4))^3]

Input:

$$(1+2)\left(\left(1+\frac{1\times 2}{9}\right)\left(\frac{1}{4}\left(2^2(3+2)\right)\right)+\frac{2\times 4\times 5}{3^2\times 6^2}\left(\frac{1}{4}\left(2^2(3+2)\right)\right)^2+\frac{2\times 4\times 5\times 7\times 8}{3^2\times 6^2\times 9^2}\left(\frac{1}{4}\left(2^2(3+2)\right)\right)^3\right)$$

Exact result:

$$\frac{130\,345}{2187}$$

Decimal approximation:

59.59990855052583447645176040237768632830361225422953818015...

59.59990855052...

1/3(((((1+2)*[((1+(1*2)/9))*(2^2(3+2))/4+((1*2*4*5)/(3^2*6^2))*(((2^2(3+2))/4))^2+((1*2*4*5*7*8)/(3^2*6^2*9^2))*(((2^2(3+2))/4))^3]))))-Pi

Input:

$$\frac{1}{3}\left((1+2)\left(\left(1+\frac{1\times 2}{9}\right)\left(\frac{1}{4}\left(2^2(3+2)\right)\right)+\frac{2\times 4\times 5}{3^2\times 6^2}\left(\frac{1}{4}\left(2^2(3+2)\right)\right)^2+\frac{2\times 4\times 5\times 7\times 8}{3^2\times 6^2\times 9^2}\left(\frac{1}{4}\left(2^2(3+2)\right)\right)^3\right)\right)-\pi$$

Result:

$$\frac{130345}{6561} - \pi$$

Decimal approximation:

16.725043529918818253687943417513059225237368018701406905 74...

16.7250435299… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$\frac{130345}{6561} - \pi$ is a transcendental number

Alternate form:

$$\frac{130345 - 6561\pi}{6561}$$

Alternative representations:

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2)) + \frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2} + \frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right) - \pi = -180° + \frac{20}{4}\left(1+\frac{2}{9}\right) + \frac{40\left(\frac{20}{4}\right)^2}{9\times6^2} + \frac{2240\left(\frac{20}{4}\right)^3}{9\times6^2\times9^2}$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2)) + \frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2} + \frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right) - \pi = i\log(-1) + \frac{20}{4}\left(1+\frac{2}{9}\right) + \frac{40\left(\frac{20}{4}\right)^2}{9\times6^2} + \frac{2240\left(\frac{20}{4}\right)^3}{9\times6^2\times9^2}$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2)) + \frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2} + \frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right) - \pi = -\cos^{-1}(-1) + \frac{20}{4}\left(1+\frac{2}{9}\right) + \frac{40\left(\frac{20}{4}\right)^2}{9\times6^2} + \frac{2240\left(\frac{20}{4}\right)^3}{9\times6^2\times9^2}$$

Series representations:

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2(3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2(3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)-\pi=\frac{130345}{6561}-4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2(3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2(3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)-\pi=\frac{130345}{6561}+\sum_{k=0}^{\infty}\frac{4(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2(3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2(3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)-\pi=\frac{130345}{6561}-\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2(3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2(3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)-\pi=\frac{130345}{6561}-4\int_0^1\sqrt{1-t^2}\,dt$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2(3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2(3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)-\pi=\frac{130345}{6561}-2\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$\frac{1}{3}(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2}+\frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right)-\pi=\frac{130345}{6561}-2\int_0^\infty\frac{1}{1+t^2}\,dt$$

1/(((((1+2)*[((1+(1*2)/9))*(2^2(3+2))/4+((1*2*4*5)/(3^2*6^2))*(((2^2(3+2))/4))^2 +((1*2*4*5*7*8)/(3^2*6^2*9^2))*(((2^2(3+2))/4))^3]))))^1/256

Input:

$$\frac{1}{\sqrt[256]{(1+2)\left(\left(1+\frac{1\times2}{9}\right)\left(\frac{1}{4}(2^2(3+2))\right)+\frac{2\times4\times5}{3^2\times6^2}\left(\frac{1}{4}(2^2(3+2))\right)^2+\frac{2\times4\times5\times7\times8}{3^2\times6^2\times9^2}\left(\frac{1}{4}(2^2(3+2))\right)^3\right)}}$$

Result:

$$\frac{3^{7/256}}{\sqrt[256]{130345}}$$

Decimal approximation:

0.984159404514063093750083424490358781242790263226643060006...

0.9841594045… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243}=\boldsymbol{\phi}$

Alternate form:

$$\frac{3^{7/256} \times 130\,345^{255/256}}{130\,345}$$

1/2*log base 0.984159404514063 (((1/(((((1+2)*[((1+(1*2)/9))*(2^2(3+2))/4+((1*2*4*5)/(3^2*6^2))*(((2^2(3+2))/4))^2+((1*2*4*5*7*8)/(3^2*6^2*9^2))*(((2^2(3+2))/4))^3])))))))-Pi+1/golden ratio

Input interpretation:

$$\frac{1}{2} \log_{0.984159404514063}\left(1 \Big/ \left((1+2)\left(\left(1+\frac{1\times 2}{9}\right)\left(\frac{1}{4}\left(2^2 (3+2)\right)\right)+\frac{2\times 4\times 5}{3^2\times 6^2}\left(\frac{1}{4}\left(2^2 (3+2)\right)\right)^2+\frac{2\times 4\times 5\times 7\times 8}{3^2\times 6^2\times 9^2}\left(\frac{1}{4}\left(2^2 (3+2)\right)\right)^3\right)\right)\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764413352...

125.4764413352… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\frac{1}{2} \log_{0.98415940451406300000}\left(\frac{1}{(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)\left(2^2 (3+2)\right)+\frac{(2\times 4\times 5)\left(\frac{1}{4}\times 2^2 (3+2)\right)^2}{3^2\times 6^2}+\frac{(2\times 4\times 5\times 7\times 8)\left(\frac{1}{4}\times 2^2 (3+2)\right)^3}{3^2\times 6^2\times 9^2}\right)}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{3\left(\frac{20}{4}\left(1+\frac{2}{9}\right)+\frac{40\left(\frac{20}{4}\right)^2}{9\times 6^2}+\frac{2240\left(\frac{20}{4}\right)^3}{9\times 6^2\times 9^2}\right)}\right)}{2\log(0.98415940451406300000)}$$

Series representations:

$$\frac{1}{2}\log_{0.9841594045140630000}\left(\frac{1}{(1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2}+\frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right)}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{128158}{130345}\right)^k}{k}}{2\log(0.9841594045140630000)}$$

$$\frac{1}{2}\log_{0.9841594045140630000}\left(1\Big/\left((1+2)\left(\frac{1}{4}\left(1+\frac{2}{9}\right)(2^2(3+2))+\frac{(2\times4\times5)\left(\frac{1}{4}\times2^2(3+2)\right)^2}{3^2\times6^2}+\frac{(2\times4\times5\times7\times8)\left(\frac{1}{4}\times2^2(3+2)\right)^3}{3^2\times6^2\times9^2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-1.0000000000000000\,\pi-31.314469936997706\log\left(\frac{2187}{130345}\right)-\frac{1}{2}\log\left(\frac{2187}{130345}\right)\sum_{k=0}^{\infty}(-0.0158405954859370000)^k\,G(k)$$
$$\text{for }\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

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$$(1-e^{-4\pi})(1-e^{-12\pi})(1-e^{-20\pi})\;\&c=\frac{\sqrt[4]{2(2+\sqrt{2})\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}.$$

(((2(2+sqrt2)*(2)^1/4)))^1/4 / (e^Pi)^1/6

Input:

$$\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}$$

Exact result:

$$2^{5/16} \sqrt[4]{2+\sqrt{2}}\ e^{-\pi/6}$$

Decimal approximation:

0.999996512657643748593144297518767322738600858791581915715...

0.999996512657…

Property:

$2^{5/16} \sqrt[4]{2+\sqrt{2}}\ e^{-\pi/6}$ is a transcendental number

Alternate form:

$$2^{3/8} \sqrt[8]{4+3\sqrt{2}}\ e^{-\pi/6}$$

Series representations:

$$\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^\pi}} = \frac{2^{5/16} \sqrt[4]{2+\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}}{\sqrt[6]{e^\pi}}$$

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

$$\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^\pi}} = \frac{2^{5/16} \sqrt[4]{2+\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}}{\sqrt[6]{e^\pi}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^\pi}} = \frac{2^{5/16} \sqrt[4]{2+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}}{\sqrt[6]{e^\pi}}$$

Or:

(1-exp(-4Pi))*(1-exp(-12Pi))*(1-exp(-20Pi))

Input:

$(1-\exp(-4\pi))(1-\exp(-12\pi))(1-\exp(-20\pi))$

Exact result:

$(1-e^{-20\pi})(1-e^{-12\pi})(1-e^{-4\pi})$

Decimal approximation:

0.999996512657643748593144297518767322744873646327432307325…

0.999996512657…

Property:

$(1-e^{-20\pi})(1-e^{-12\pi})(1-e^{-4\pi})$ is a transcendental number

Alternate forms:

$1-e^{-36\pi}+e^{-32\pi}+e^{-24\pi}-e^{-20\pi}+e^{-16\pi}-e^{-12\pi}-e^{-4\pi}$

$e^{-36\pi}(e^{\pi}-1)^3(1+e^{\pi})^3(1+e^{2\pi})^3(1-e^{\pi}+e^{2\pi})(1+e^{\pi}+e^{2\pi})(1-e^{2\pi}+e^{4\pi})$
$(1-e^{\pi}+e^{2\pi}-e^{3\pi}+e^{4\pi})(1+e^{\pi}+e^{2\pi}+e^{3\pi}+e^{4\pi})(1-e^{2\pi}+e^{4\pi}-e^{6\pi}+e^{8\pi})$

$e^{-36\pi}\left(-1+e^{4\pi}+e^{12\pi}-e^{16\pi}+e^{20\pi}-e^{24\pi}-e^{32\pi}+e^{36\pi}\right)$

Series representations:

$$(1-\exp(-4\pi))(1-\exp(-12\pi))(1-\exp(-20\pi)) = 1-e^{-144\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-128\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-96\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-80\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-64\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-48\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-16\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$$

$$(1-\exp(-4\pi))(1-\exp(-12\pi))(1-\exp(-20\pi)) = 1-\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-36\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-32\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-24\pi}-\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-20\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-16\pi}-\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-12\pi}-\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-4\pi}$$

$$(1-\exp(-4\pi))(1-\exp(-12\pi))(1-\exp(-20\pi)) = 1-\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-36\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-32\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-24\pi}-\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-20\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-16\pi}-\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-12\pi}-\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-4\pi}$$

((((((2(2+sqrt2)*(2)^1/4)))^1/4 / (e^Pi)^1/6)))^4096

Input:

$$\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)^{4096}$$

Decimal approximation:

0.985817355667224371645472757925975536738558671073643563446...

0.98581735566.... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

Series representations:

$$\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)^{4096} = \frac{1}{(e^{\pi})^{2048/3}}$$

$$20\,815\,864\,389\,328\,798\,163\,850\,480\,654\,728\,171\,077\,230\,524\,494\,533\,409\,610\,638\,224\,700\,807\,216\,119\,346\,720\,596\,024\,478\,883\,464\,648\,369\,684\,843\,227\,908\,562\,015\,582\,767\,132\,496\,646\,929\,816\,279\,813\,211\,354\,641\,525\,848\,259\,018\,778\,440\,691\,546\,366\,699\,323\,167\,100\,945\,918\,841\,095\,379\,622\,423\,387\,354\,295\,096\,957\,733\,925\,002\,768\,876\,520\,583\,464\,697\,770\,622\,321\,657\,076\,833\,170\,056\,511\,209\,332\,449\,663\,781\,837\,603\,694\,136\,444\,406\,281\,042\,053\,396\,870\,977\,465\,916\,057\,756\,101\,739\,472\,373\,801\,429\,441\,421\,111\,406\,337\,458\,176 \left(2+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^{1024}$$

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

$$\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)^{4096} = \frac{1}{\left(e^{\pi}\right)^{2048/3}}$$

$$20\,815\,864\,389\,328\,798\,163\,850\,480\,654\,728\,171\,077\,230\,524\,494\,533\,409\,610\,638\,224\,700\,807\,216\,119\,346\,720\,596\,024\,478\,883\,464\,648\,369\,684\,843\,227\,908\,562\,015\,582\,767\,132\,496\,646\,929\,816\,279\,813\,211\,354\,641\,525\,848\,259\,018\,778\,440\,691\,546\,366\,699\,323\,167\,100\,945\,918\,841\,095\,379\,622\,423\,387\,354\,295\,096\,957\,733\,925\,002\,768\,876\,520\,583\,464\,697\,770\,622\,321\,657\,076\,833\,170\,056\,511\,209\,332\,449\,663\,781\,837\,603\,694\,136\,444\,406\,281\,042\,053\,396\,870\,977\,465\,916\,057\,756\,101\,739\,472\,373\,801\,429\,441\,421\,111\,406\,337\,458\,176 \left(2+\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{1024}$$

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

$$\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)^{4096} = \frac{1}{\left(e^{\pi}\right)^{2048/3}}$$

$$20\,815\,864\,389\,328\,798\,163\,850\,480\,654\,728\,171\,077\,230\,524\,494\,533\,409\,610\,638\,224\,700\,807\,216\,119\,346\,720\,596\,024\,478\,883\,464\,648\,369\,684\,843\,227\,908\,562\,015\,582\,767\,132\,496\,646\,929\,816\,279\,813\,211\,354\,641\,525\,848\,259\,018\,778\,440\,691\,546\,366\,699\,323\,167\,100\,945\,918\,841\,095\,379\,622\,423\,387\,354\,295\,096\,957\,733\,925\,002\,768\,876\,520\,583\,464\,697\,770\,622\,321\,657\,076\,833\,170\,056\,511\,209\,332\,449\,663\,781\,837\,603\,694\,136\,444\,406\,281\,042\,053\,396\,870\,977\,465\,916\,057\,756\,101\,739\,472\,373\,801\,429\,441\,421\,111\,406\,337\,458\,176$$

$$\left(2+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^{1024}$$

Integral representation:

$$(1+z)^a = \frac{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

2*sqrt(((1/log base 0.9858173556672 ((((((2(2+sqrt2)*(2)^1/4))^1/4 / (e^Pi)^1/6))))))-Pi+1/golden ratio

Input interpretation:

$$2\sqrt{\frac{1}{\log_{0.9858173556672}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}-\pi+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.47644134…

125.47644134… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$2\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}-\pi+\frac{1}{\phi}=-\pi+\frac{1}{\phi}+2\sqrt{\frac{1}{\frac{\log\left(\frac{\sqrt[4]{2\sqrt[4]{2}\left(2+\sqrt{2}\right)}}{\sqrt[6]{e^{\pi}}}\right)}{\log(0.98581735566720000)}}}$$

Series representations:

$$2\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+2\sqrt{-\frac{\log(0.98581735566720000)}{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)^k}{k}}}$$

$$2\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+2\sqrt{-1+\frac{1}{\log_{0.98581735566720000}\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)}}$$

$$\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{1}{\log_{0.98581735566720000}\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)}\right)^{-k}$$

$$2\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+2\sqrt{\left(-\left(1.000000000000000\Big/\left(\log\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)\left(70.0087130816158+\sum_{k=0}^{\infty}(-0.01418264433280000)^{k}\,G(k)\right)\right)\right)\right)}$$

$$\text{for }\left(G(0)=0\text{ and }\frac{(-1)^{k}\,k}{2(1+k)(2+k)}+G(k)=\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

1/4sqrt(((1/log base 0.9858173556672 ((((((2(2+sqrt2)*(2)^1/4)))^1/4 / (e^Pi)^1/6))))))+1/golden ratio

Input interpretation:

$$\frac{1}{4}\sqrt{\frac{1}{\log_{0.9858173556672}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

16.618033988763740808734906979728022109282073159855746577764...

16.6180339887637… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representation:

$$\frac{1}{4}\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}+\frac{1}{\phi}=\frac{1}{\phi}+\frac{1}{4}\sqrt{\frac{1}{\frac{\log\left(\frac{\sqrt[4]{2\sqrt[4]{2}\left(2+\sqrt{2}\right)}}{\sqrt[6]{e^{\pi}}}\right)}{\log(0.98581735566720000)}}}$$

Series representations:

$$\frac{1}{4}\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{-\frac{\log(0.98581735566720000)}{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)^k}{k}}}$$

$$\frac{1}{4}\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}+\frac{1}{\phi}=$$

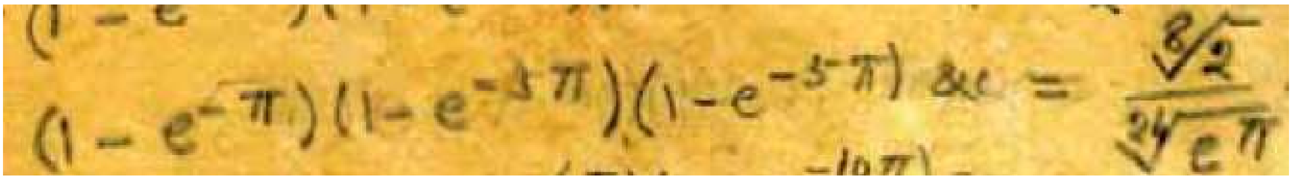
$$\frac{1}{\phi}+\frac{1}{4}\sqrt{-1+\frac{1}{\log_{0.98581735566720000}\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{1}{\log_{0.98581735566720000}\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)}\right)^{-k}$$

$$\frac{1}{4}\sqrt{\frac{1}{\log_{0.98581735566720000}\left(\frac{\sqrt[4]{2\left(2+\sqrt{2}\right)\sqrt[4]{2}}}{\sqrt[6]{e^{\pi}}}\right)}}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{\left(-\left(1.000000000000000\Big/\left(\log\left(\frac{2^{5/16}\sqrt[4]{2+\sqrt{2}}}{\sqrt[6]{e^{\pi}}}\right)\right.\right.\right.}$$

$$\left.\left.\left.\left(70.0087130816158+\sum_{k=0}^{\infty}(-0.01418264433280000)^{k}\,G(k)\right)\right)\right)\right)$$

$$\text{for}\left(G(0)=0\text{ and }\frac{(-1)^{k}\,k}{2\,(1+k)\,(2+k)}+G(k)=\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$



(1-exp(-Pi))*(1-exp(-3Pi))*(1-exp(-5Pi))

Input:

$$(1-\exp(-\pi))\,(1-\exp(-3\,\pi))\,(1-\exp(-5\,\pi))$$

Exact result:

$$\left(1-e^{-5\,\pi}\right)\left(1-e^{-3\,\pi}\right)\left(1-e^{-\pi}\right)$$

Decimal approximation:

0.956708725383334259887083150002997516798687988267252736507...

0.95670872538… result very near to the spectral index n_s , to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\dots}}}}\approx 0.9568666373$$

From:

Astronomy & Astrophysics manuscript no. ms c ESO 2019 - September 24, 2019
Planck 2018 results. VI. Cosmological parameters

The primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index n_s = 0.965 ± 0.004, consistent with the predictions of slow-roll, single-field, inflation.

We know that α' is the Regge slope (string tension). With regard the Omega mesons, the values are:

ω	6	$m_{u/d} = 0 - 60$	$0.910 - 0.918$
ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$
ω/ω_3	$5+3$	$m_{u/d} = 240 - 345$	$0.937 - 1.000$

Property:

$(1-e^{-5\pi})(1-e^{-3\pi})(1-e^{-\pi})$ is a transcendental number

Alternate forms:

$$(e^{-5\pi}-1)(e^{-3\pi}-1)(1-e^{-\pi})$$

$$(1-e^{-5\pi})(1-e^{-3\pi})(1+\sinh(\pi)-\cosh(\pi))$$

$$e^{-9\pi}(e^{\pi}-1)^3(1+e^{\pi}+e^{2\pi})(1+e^{\pi}+e^{2\pi}+e^{3\pi}+e^{4\pi})$$

$\cosh(x)$ is the hyperbolic cosine function

$\sinh(x)$ is the hyperbolic sine function

Series representations:

$$(1-\exp(-\pi))(1-\exp(-3\pi))(1-\exp(-5\pi)) = 1-e^{-36\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-32\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-24\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-20\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+e^{-16\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-12\sum_{k=0}^{\infty}(-1)^k/(1+2k)}-e^{-4\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$$

$$(1-\exp(-\pi))(1-\exp(-3\pi))(1-\exp(-5\pi)) = \left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-9\pi}\left(-1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}\right)^{3}$$
$$\left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}\right)\left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{3\pi}+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{4\pi}\right)$$

$$(1-\exp(-\pi))(1-\exp(-3\pi))(1-\exp(-5\pi)) =$$
$$\left(-1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}\right)^{3}\left(1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{2\pi}\right)$$
$$\left(1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{2\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{3\pi}+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{4\pi}\right)$$
$$\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-9\pi}$$

Or:

(2)^1/8 / (e^Pi)^1/24

Input:

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}$$

Exact result:

$$\sqrt[8]{2}\ e^{-\pi/24}$$

Decimal approximation:

0.956708725113587003449038717361890724715615702454393013400...

0.956708725113… as above

Property:

$\sqrt[8]{2}\ e^{-\pi/24}$ is a transcendental number

Alternative representations:

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}} = \frac{\sqrt[8]{2}}{\sqrt[24]{e^{180^\circ}}}$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \frac{\sqrt[8]{2}}{\sqrt[24]{\exp^\pi(z)}} \quad \text{for } z = 1$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \frac{\sqrt[8]{2}}{\sqrt[24]{e^{-i\log(-1)}}}$$

Series representations:

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\ e^{-1/6\sum_{k=0}^{\infty}(-1)^k/(1+2k)}$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-\pi/24}$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{-\pi/24}$$

Integral representations:

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\ e^{-1/6\int_0^1\sqrt{1-t^2}\,dt}$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\ e^{-1/12\int_0^1 1/\sqrt{1-t^2}\,dt}$$

$$\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}} = \sqrt[8]{2}\ e^{-1/12\int_0^\infty 1/(1+t^2)\,dt}$$

((((2)^1/8 / (e^Pi)^1/24)))^1/8

Input:

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}}$$

Exact result:

$$\sqrt[64]{2}\, e^{-\pi/192}$$

Decimal approximation:

0.9944832364981405995692496142445356197900835302094373069 09...

0.99448323649…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

Property:

$\sqrt[64]{2}\, e^{-\pi/192}$ is a transcendental number

All 8th roots of 2^(1/8) e^(-π/24):

$\sqrt[64]{2}\, e^{-\pi/192}\, e^0 \approx 0.994483$ (real, principal root)

$\sqrt[64]{2}\, e^{-\pi/192}\, e^{(i\pi)/4} \approx 0.70321 + 0.70321\, i$

$\sqrt[64]{2}\, e^{-\pi/192}\, e^{(i\pi)/2} \approx 0.994483\, i$

$\sqrt[64]{2}\, e^{-\pi/192}\, e^{(3i\pi)/4} \approx -0.7032 + 0.7032\, i$

$\sqrt[64]{2}\, e^{-\pi/192}\, e^{i\pi} \approx -0.9945$ (real root)

Alternative representations:

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}} = \sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^{180^\circ}}}}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^{-i\log(-1)}}}}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{\exp^\pi(z)}}} \quad \text{for } z = 1$$

Series representations:

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2}\ e^{-1/48 \sum_{k=0}^{\infty} (-1)^k/(1+2k)}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2} \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{-\pi/192}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2} \left(\frac{1}{\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}}\right)^{-\pi/192}$$

Integral representations:

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2}\ e^{-1/48 \int_0^1 \sqrt{1-t^2}\, dt}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2}\ e^{-1/96 \int_0^1 1/\sqrt{1-t^2}\, dt}$$

$$\sqrt[8]{\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}} = \sqrt[64]{2}\ e^{-1/96 \int_0^\infty 1/(1+t^2)\, dt}$$

16*(((log base 0.99448323649814 ((((2)^1/8 / (e^Pi)^1/24))))))-Pi+1/golden ratio

Input interpretation:

$$16 \log_{0.99448323649814}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^\pi}}\right) - \pi + \frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.476441335...

125.476441335… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$16 \log_{0.99448323649814000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) - \pi + \frac{1}{\phi} = -\pi + \frac{1}{\phi} + \frac{16 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right)}{\log(0.99448323649814000)}$$

Series representations:

$$16 \log_{0.99448323649814000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) - \pi + \frac{1}{\phi} = \frac{1}{\phi} - \pi - \frac{16 \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1+\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right)^k}{k}}{\log(0.99448323649814000)}$$

$$16 \log_{0.99448323649814000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) - \pi + \frac{1}{\phi} = \frac{1.000000000000000}{\phi} - 1.000000000000000\,\pi - 2892.251206093126 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) - 16.00000000000000 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) \sum_{k=0}^{\infty} (-0.00551676350186000)^k\, G(k)$$

$$\text{for } \left(G(0) = 0 \text{ and } G(k) = \frac{(-1)^{1+k}\, k}{2(1+k)(2+k)} + \sum_{j=1}^{k} \frac{(-1)^{1+j}\, G(-j+k)}{1+j}\right)$$

2*(((log base 0.99448323649814 ((((2)^1/8 / (e^Pi)^1/24))))))+1/golden ratio

Input interpretation:

$$2 \log_{0.99448323649814}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) + \frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

16.6180339887...

16.6180339887… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representation:

$$2 \log_{0.994483236498140000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) + \frac{1}{\phi} = \frac{1}{\phi} + \frac{2 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right)}{\log(0.994483236498140000)}$$

Series representations:

$$2 \log_{0.994483236498140000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) + \frac{1}{\phi} = \frac{1}{\phi} - \frac{2 \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1+\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right)^k}{k}}{\log(0.994483236498140000)}$$

$$2 \log_{0.994483236498140000}\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) + \frac{1}{\phi} = \frac{1.000000000000000}{\phi} - 361.531400761641 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) - 2.000000000000000 \log\left(\frac{\sqrt[8]{2}}{\sqrt[24]{e^{\pi}}}\right) \sum_{k=0}^{\infty} (-0.00551676350186000)^k \, G(k)$$

$$\text{for } \left(G(0) = 0 \text{ and } G(k) = \frac{(-1)^{1+k} k}{2(1+k)(2+k)} + \sum_{j=1}^{k} \frac{(-1)^{1+j} G(-j+k)}{1+j}\right)$$

On the coefficients in the expansions of certain modular functions
Proceedings of the Royal Society, A, XCV, 1919, 144 – 155 – *Srinivasa Ramanujan*

1. A very large proportion of the most interesting arithmetical functions – of the functions, for example, which occur in the theory of partitions, the theory of the divisors of numbers, or the theory of the representation of numbers by sums of squares – occur as the coefficients in the expansions of elliptic modular functions in powers of the variable $q = e^{\pi i\tau}$. All of these functions have a restricted region of existence, the unit circle $|q| = 1$ being a "natural boundary" or line of essential singularities. The most important of them, such as the functions*

$$(\omega_1/\pi)^{12}\Delta = q^2\{(1-q^2)(1-q^4)\cdots\}^{24}, \tag{1.1}$$

$$\vartheta_3(0) = 1 + 2q + 2q^4 + 2q^9 + \cdots, \tag{1.2}$$

$$12\left(\frac{\omega_1}{\pi}\right)^4 g_2 = 1 + 240\left(\frac{1^3q^2}{1-q^2} + \frac{2^3q^4}{1-q^4} + \cdots\right), \tag{1.3}$$

$$216\left(\frac{\omega_1}{\pi}\right)^6 g_3 = 1 - 504\left(\frac{1^5q^2}{1-q^2} + \frac{2^5q^4}{1-q^4} + \cdots\right), \tag{1.4}$$

are regular inside the unit circle; and many, such as the functions (1.1) and (1.2), have the additional property of having no zeros inside the circle, so that their reciprocals are also regular.

Or:

From:

J. London Math. Soc. (2) 75 (2007) 225–242 C_2007 London Mathematical Society
doi:10.1112/jlms/jdl017

RAMANUJAN'S EISENSTEIN SERIES AND POWERS OF DEDEKIND'S ETA-FUNCTION

HENG HUAT CHAN, SHAUN COOPER and PEE CHOON TOH

Let $\mathrm{Im}(\tau) > 0$ and put $q = \exp(2\pi i\tau)$. Dedekind's eta-function is defined by

$$\eta(\tau) = q^{1/24} \prod_{k=1}^{\infty} (1 - q^k),$$

and Ramanujan's Eisenstein series are

$$P = P(q) = 1 - 24 \sum_{k=1}^{\infty} \frac{kq^k}{1 - q^k},$$
$$Q = Q(q) = 1 + 240 \sum_{k=1}^{\infty} \frac{k^3 q^k}{1 - q^k}$$

and

$$R = R(q) = 1 - 504 \sum_{k=1}^{\infty} \frac{k^5 q^k}{1 - q^k}.$$

On page 369 of The Lost Notebook [28], Ramanujan gave the following results.

THEOREM 1.1 (Ramanujan). *Let*

$$S_1(m) = \sum_{\alpha \equiv 1 \pmod 6} (-1)^{(\alpha-1)/6} \alpha^m q^{\alpha^2/24},$$
$$S_3(m) = \sum_{\alpha \equiv 1 \pmod 4} \alpha^m q^{\alpha^2/8}.$$

Then

$$S_1(0) = \eta(\tau),$$
$$S_1(2) = \eta(\tau)P,$$
$$S_1(4) = \eta(\tau)(3P^2 - 2Q),$$
$$S_1(6) = \eta(\tau)(15P^3 - 30PQ + 16R),$$

and in general

$$S_1(2m) = \eta(\tau) \sum_{i+2j+3k=m} a_{ijk} P^i Q^j R^k,$$

where a_{ijk} are integers and i, j and k are non-negative integers. Also

$$S_3(1) = \eta^3(\tau),$$
$$S_3(3) = \eta^3(\tau)P,$$
$$S_3(5) = \eta^3(\tau)\frac{(5P^2 - 2Q)}{3},$$
$$S_3(7) = \eta^3(\tau)\frac{(35P^3 - 42PQ + 16R)}{9},$$

and in general

$$S_3(2m+1) = \eta^3(\tau) \sum_{i+2j+3k=m} b_{ijk} P^i Q^j R^k,$$

where b_{ijk} are rational numbers and i, j and k are non-negative integers.

We note that q can be equal to $\exp(2\pi i\tau)$ or $\exp(\pi i\tau)$ where $\mathrm{Im}(\tau) > 0$. In the our computation we put $\mathrm{Im}(\tau) = 0.1111111....$ or $0.2222222...$ that are equals to 24/216 and 24/108

exp(2Pi*0.111111111111) = exp(2Pi*24/216) = 2.00999392725

Input interpretation:

$$\exp(2\pi \times 0.111111111111) = \exp\left(2\pi \times \frac{24}{216}\right) = 2.00999392725$$

Result:

True

exp(Pi*0.222222222222) = exp(Pi*(24/108)) = 2.00999392725

Input interpretation:

$$\exp(\pi \times 0.222222222222) = \exp\left(\pi \times \frac{24}{108}\right) = 2.00999392725$$

Result:

True

Thus can be also utilized the value 2 for q or, as indicated from Ramanujan, x

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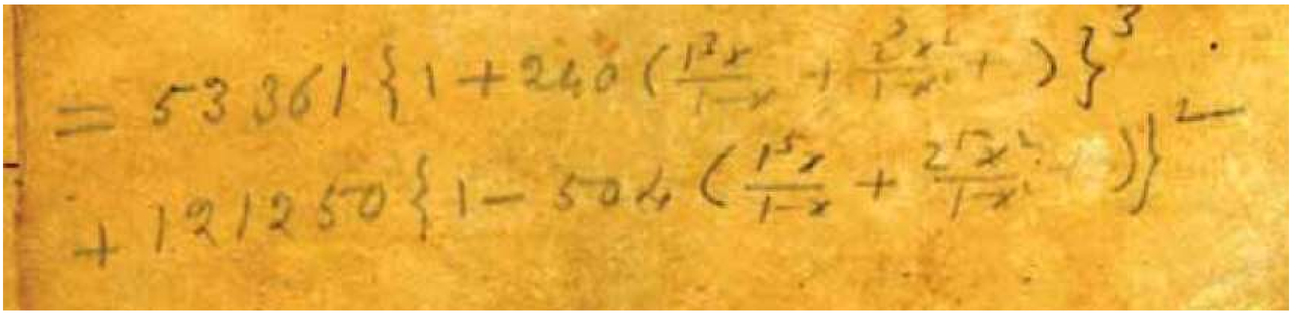


x = 2 or x = e^Pi

53361((((1+240(2/(1-2)+(2^3*2^2)/(1-2^2)))^3+121250((((1-504(2/(1-2)+(2^5*2^2)/(1-2^2)))^2

Input:

$$53361\left(1+240\left(\frac{2}{1-2}+\frac{2^3\times 2^2}{1-2^2}\right)\right)^3+121250\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}\right)\right)^2$$

Result:

-1436215992808909

-1436215992808909

Or, changing the sign:

-[53361(((((1+240(2/(1-2)+(2^3*2^2)/(1-2^2)))))))^3 +121250(((((1-504(2/(1-2)+(2^5*2^2)/(1-2^2)))))))^2]

Input:

$$-\left(53361\left(1+240\left(\frac{2}{1-2}+\frac{2^3\times 2^2}{1-2^2}\right)\right)^3+121250\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}\right)\right)^2\right)$$

Result:

1436215992808909

1436215992808909

Scientific notation:

$1.436215992808909\times 10^{15}$

$1.436215992808909*10^{15}\approx 1.436216...*10^{15}$

We note that form this expression, we can to obtain:

(-11-76-521)+2/(196884^2) (((((-[53361(((((1+240(2/(1-2)+(2^3*2^2)/(1-2^2)))))))^3 +121250(((((1-504(2/(1-2)+(2^5*2^2)/(1-2^2)))))))^2])))))

Where 11, 76 and 521 are Lucas numbers and 196884 is a fundamental number of the following j-invariant

$$j(\tau)=q^{-1}+744+196884q+21493760q^2+864299970q^3+20245856256q^4+\cdots$$

Input:

$$(-11-76-521)+\frac{2}{196884^2}\left(-\left(53361\left(1+240\left(\frac{2}{1-2}+\frac{2^3\times 2^2}{1-2^2}\right)\right)^3+121250\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}\right)\right)^2\right)\right)$$

Exact result:

$$\frac{1424431946734285}{19381654728}$$

Decimal approximation:

73493.825306693648371136126246650574426639842884729774864 24...

73493.8253…

Thence, we have the following mathematical connections:

$$\left(\frac{(-11-76-521)+\frac{2}{196884^2}}{\left(-\left(53361\left(1+240\left(\frac{2}{1-2}+\frac{2^3\times 2^2}{1-2^2}\right)\right)^3+121250\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}\right)\right)^2\right)\right)}\right)=73493.8253 \Rightarrow$$

$$\Rightarrow -3927+2\left(\sqrt[13]{\frac{N\exp\left[\int d\hat{\sigma}\left(-\frac{1}{4u^2}\mathbf{P}_i D\mathbf{P}_i\right)\right]|Bp\rangle_{\rm NS}}{\int[d\mathbf{X}^\mu]\exp\left\{\int d\hat{\sigma}\left(-\frac{1}{4v^2}D\mathbf{X}^\mu D^2\mathbf{X}^\mu\right)\right\}|\mathbf{X}^\mu,\mathbf{X}^i=0\rangle_{\rm NS}}+}\right)=$$

$$-3927+2\sqrt[13]{2.2983717437\times 10^{59}+2.0823329825883\times 10^{59}}$$

$= 73490.8437525.... \Rightarrow$

$$\Rightarrow\left(A(r)\times\frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right)\times\frac{1}{e^{\Lambda(r)}}\right)\Rightarrow$$

$$\Rightarrow\left(-0.000029211892\times\frac{1}{0.0003644621}\left(-\frac{1}{0.0005946833}\right)\times\frac{1}{0.00183393}\right)=$$

$= 73491.788325481187105491595720422205480251957265634133987 00\ldots$

$= 73491.7883254... \Rightarrow$

$$\left(\begin{array}{c} I_{21}\ll\int_{-\infty}^{+\infty}\exp\left(-\left(\frac{t}{H}\right)^2\right)\left|\sum_{\lambda\le P^{1-\varepsilon_2}}\frac{a(\lambda)}{\sqrt{\lambda}}B(\lambda)\lambda^{-i(T+t)}\right|^2dt\ll \\ \ll H\left\{\left(\frac{4}{\varepsilon_2\log T}\right)^{2r}(\log T)(\log X)^{-2\beta}+(\varepsilon_2^{-2r}(\log T)^{-2r}+\varepsilon_2^{-r}h_1^r(\log T)^{-r})T^{-\varepsilon_1}\right\}\end{array}\right)/$$

$$/(26\times 4)^2-24=\left(\frac{7.9313976505275\times 10^8}{(26\times 4)^2-24}\right)=73493.30662\ldots$$

Mathematical connections with the boundary state corresponding to the NSNS-sector of N Dp-branes in the limit of u → ∞, with the ratio concerning the general asymptotically flat solution of the equations of motion of the p-brane and with the Karatsuba's equation concerning the zeros of a special type of function connected with Dirichlet series.

We have also:

123+29+1/16*1/(196883^2) (((((-[53361(((((1+240(2/(1-2)+(2^3*2^2)/(1-2^2)))))))^3 +121250(((((1-504(2/(1-2)+(2^5*2^2)/(1-2^2)))))))^2])))))

Where 123 and 29 are Lucas numbers and 196884, very near to 196883, is a fundamental number of the following j-invariant

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

Input:

$$123 + 29 + \frac{1}{16} \times \frac{1}{196\,883^2} \left(-\left(53\,361\left(1+240\left(\frac{2}{1-2}+\frac{2^3\times 2^2}{1-2^2}\right)\right)^3 + 121\,250\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}\right)\right)^2\right)\right)$$

Exact result:

$$\frac{1\,530\,487\,403\,764\,557}{620\,206\,651\,024}$$

Decimal approximation:

2467.705564327029550762027043759824740979380768066763059537...

2467.705564.... result practically equal to the rest mass of charmed Xi baryon 2467.8

From the Ramanujan partition formula:

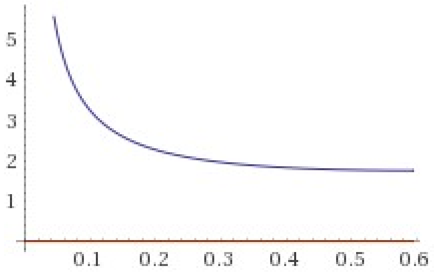
Input:

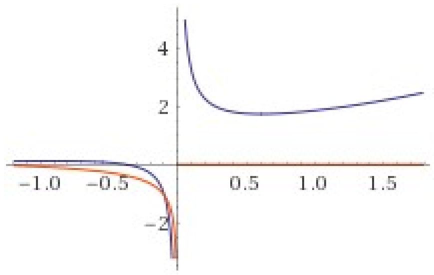
$$\frac{1}{4\,n\sqrt{3}} \exp\left(\pi\sqrt{\frac{2\,n}{3}}\right)$$

Exact result:

$$\frac{e^{\sqrt{2/3}\,\pi\sqrt{n}}}{4\sqrt{3}\,n}$$

Plots:





Roots:

(no roots exist)

Series expansion at n = 0:

$$\frac{1}{4\sqrt{3}\,n}+\frac{\pi}{6\sqrt{2}\,\sqrt{n}}+\frac{\pi^2}{12\sqrt{3}}+\frac{\pi^3\sqrt{n}}{54\sqrt{2}}+O(n^1)$$

(Puiseux series)

Derivative:

$$\frac{d}{dn}\left(\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}}\right)=\frac{e^{\sqrt{2/3}\,\pi\sqrt{n}}\left(\sqrt{2}\,\pi\sqrt{n}-2\sqrt{3}\right)}{24n^2}$$

Indefinite integral:

$$\int\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}}\,dn=\frac{\mathrm{Ei}\left(\sqrt{\frac{2}{3}}\,\sqrt{n}\,\pi\right)}{2\sqrt{3}}+\text{constant}$$

$\mathrm{Ei}(x)$ is the exponential integral Ei

Global minimum:

$$\min\left\{\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}}\right\} = \frac{e^2\pi^2}{24\sqrt{3}} \quad \text{at } n = \frac{6}{\pi^2}$$

Limit:

$$\lim_{n\to-\infty} \frac{e^{\sqrt{2/3}\sqrt{n}\,\pi}}{4\sqrt{3}\,n} = 0$$

Series representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}} = \frac{\sum_{k=0}^{\infty} \frac{\left(\frac{2}{3}\right)^{k/2} n^{k/2} \pi^k}{k!}}{4\sqrt{3}\,n}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}} = \frac{\sum_{k=-\infty}^{\infty} I_k\left(\sqrt{\frac{2}{3}}\sqrt{n}\,\pi\right)}{4\sqrt{3}\,n}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2n}{3}}\right)}{4n\sqrt{3}} = \frac{\sum_{k=0}^{\infty} \frac{\left(\frac{2}{3}\right)^k n^k \pi^{2k}\left(1+2k+\sqrt{\frac{2}{3}}\sqrt{n}\,\pi\right)}{(1+2k)!}}{4\sqrt{3}\,n}$$

For n = 274, we obtain:

1/(4*274*sqrt(3))*exp(Pi*(((sqrt(((2*274))/3)))))

Input:

$$\frac{1}{4\times 274\sqrt{3}} \exp\left(\pi\sqrt{\frac{2\times 274}{3}}\right)$$

Exact result:

$$\frac{e^{2\sqrt{137/3}\,\pi}}{1096\sqrt{3}}$$

Decimal approximation:

$1.451285196792629714746547679715723325432114873700127 1\ldots \times 10^{15}$

$1.45128519679\ldots*10^{15}$

Property:

$$\frac{e^{2\sqrt{137/3}\,\pi}}{1096\sqrt{3}} \text{ is a transcendental number}$$

Series representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 274}{3}}\right)}{4\times 274\sqrt{3}} = \frac{\exp\left(\pi\sqrt{\frac{545}{3}}\sum_{k=0}^{\infty}\left(\frac{545}{3}\right)^{-k}\binom{\frac{1}{2}}{k}\right)}{1096\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 274}{3}}\right)}{4\times 274\sqrt{3}} = \frac{\exp\left(\pi\sqrt{\frac{545}{3}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{545}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{1096\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 274}{3}}\right)}{4\times 274\sqrt{3}} = \frac{\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{548}{3}-z_0\right)^k z_0^{-k}}{k!}\right)}{1096\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}$$

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

While, for n = 273.8586489, we obtain:

1/(4*273.8586489*sqrt(3))*exp(Pi*(((sqrt(((2*273.8586489))/3)))))

Input interpretation:

$$\frac{1}{4\times 273.8586489\sqrt{3}}\exp\left(\pi\sqrt{\frac{2\times 273.8586489}{3}}\right)$$

Result:

$1.43621616\ldots \times 10^{15}$

$1.43621616\ldots*10^{15} \approx 1.436216\ldots*10^{15}$ value practically equal to the result of the expression above analyzed

Series representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}} = \frac{0.00091288\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty} e^{-5.20165\,k}\binom{\frac{1}{2}}{k}\right)}{\sqrt{2}\sum_{k=0}^{\infty} 2^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}} = \frac{0.00091288\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty}\frac{(-0.00550744)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}} = \frac{0.00091288\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(182.572-z_0)^k z_0^{-k}}{k!}\right)}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}$$

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

We have also:

(-11-76-521)+2/(196884^2)
1/(4*273.8586489*sqrt(3))*exp(Pi*(((sqrt(((2*273.8586489))/3)))))

Input interpretation:

$$(-11-76-521)+\frac{2}{196\,884^2}\times\frac{1}{4\times 273.8586489\sqrt{3}}\exp\left(\pi\sqrt{\frac{2\times 273.8586489}{3}}\right)$$

Result:

73493.8339...

73493.8339…

Thence, we have the following mathematical connections:

$$\left((-11-76-521)+\frac{2}{196\,884^2}\times\frac{1}{4\times 273.8586489\sqrt{3}}\exp\left(\pi\sqrt{\frac{2\times 273.8586489}{3}}\right)\right) = 73493.83 \Rightarrow$$

$$\Rightarrow -3927 + 2\left(\sqrt[13]{\begin{array}{c} N \exp\left[\int d\hat{\sigma}\left(-\frac{1}{4u^2}\mathrm{P}_i D\mathrm{P}_i\right)\right] | Bp\rangle_{\mathrm{NS}} + \\ \int [d\mathrm{X}^\mu] \exp\left\{\int d\hat{\sigma}\left(-\frac{1}{4v^2} D\mathrm{X}^\mu D^2 \mathrm{X}^\mu\right)\right\} | \mathrm{X}^\mu, \mathrm{X}^i = 0\rangle_{\mathrm{NS}} \end{array}}\right) =$$

$$-3927 + 2\sqrt[13]{2.2983717437 \times 10^{59} + 2.0823329825883 \times 10^{59}}$$

$$= 73490.8437525.... \Rightarrow$$

$$\Rightarrow \left(A(r) \times \frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right) \times \frac{1}{e^{\Lambda(r)}}\right) \Rightarrow$$

$$\Rightarrow \left(-0.000029211892 \times \frac{1}{0.0003644621}\left(-\frac{1}{0.0005946833}\right) \times \frac{1}{0.00183393}\right) =$$

$$= 73491.788325481187105491595720422205480251957265634133987 00...$$

$$= 73491.7883254... \Rightarrow$$

$$\left(\begin{array}{c} I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \leq P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda)\, \lambda^{-i(T+t)} \right|^2 dt \ll \\ \ll H\left\{\left(\frac{4}{\varepsilon_2 \log T}\right)^{2r} (\log T)(\log X)^{-2\beta} + (\varepsilon_2^{-2r}(\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r})\, T^{-\varepsilon_1}\right\} \end{array}\right) /$$

$$/(26 \times 4)^2 - 24 = \left(\frac{7.9313976505275 \times 10^8}{(26 \times 4)^2 - 24}\right) = 73493.30662\ldots$$

Mathematical connections with the boundary state corresponding to the NSNS-sector of N Dp-branes in the limit of u → ∞, with the ratio concerning the general asymptotically flat solution of the equations of motion of the p-brane and with the Karatsuba's equation concerning the zeros of a special type of function connected with Dirichlet series.

Series representations:

$$(-11-76-521)+\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)2}{(4\times 273.859\sqrt{3})\,196\,884^2}=$$
$$\frac{4.71002\times 10^{-14}\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty}e^{-5.20165\,k}\binom{\frac{1}{2}}{k}\right)-608\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}{\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}$$

$$(-11-76-521)+\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)2}{(4\times 273.859\sqrt{3})\,196\,884^2}=$$
$$\frac{4.71002\times 10^{-14}\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty}\frac{(-0.00550744)^k\left(-\frac{1}{2}\right)_k}{k!}\right)-608\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$(-11-76-521)+\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)2}{(4\times 273.859\sqrt{3})\,196\,884^2}=$$
$$\left(4.71002\times 10^{-14}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(182.572-z_0)^k z_0^{-k}}{k!}\right)-608\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\quad \text{for not } ((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

Adding 47, that is a Lucas number, to the previous expression and performing the 8th root, we obtain:

47+(((1/(4*273.8586492*sqrt(3))*exp(Pi*(((sqrt(((2*273.8586492))/3))))))))^1/8

Input interpretation:

$$47+\sqrt[8]{\frac{1}{4\times 273.8586492\sqrt{3}}\exp\left(\pi\sqrt{\frac{2\times 273.8586492}{3}}\right)}$$

Result:

125.4607540...

125.4607540… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Series representations:

$$47+\sqrt[8]{\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}}}=0.416919\left(112.732+\sqrt[8]{\frac{\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty}e^{-5.20165k}\binom{\frac{1}{2}}{k}\right)}{\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}}\right)$$

$$47+\sqrt[8]{\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}}}=0.416919\left(112.732+\sqrt[8]{\frac{\exp\left(\pi\sqrt{181.572}\sum_{k=0}^{\infty}\frac{(-0.00550744)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}}\right)$$

$$47+\sqrt[8]{\frac{\exp\left(\pi\sqrt{\frac{2\times 273.859}{3}}\right)}{4\times 273.859\sqrt{3}}}=0.416919\left(112.732+\sqrt[8]{\frac{\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(182.572-z_0)^k z_0^{-k}}{k!}\right)}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}}\right)$$

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

If we put x = e^{π} the result is:

exp(Pi)

Input:

$\exp(\pi)$

Exact result:

e^{π}

Decimal approximation:

23.140692632779269005729086367948547380266106242600211993445...

23.1406926327…

Property:

e^{π} is a transcendental number

Alternative representations:

$$e^{\pi} = e^{180^{\circ}}$$

$$e^{\pi} = \exp^{\pi}(z) \quad \text{for } z = 1$$

$$e^{\pi} = e^{-i \log(-1)}$$

Series representations:

$$e^{\pi} = e^{4 \sum_{k=0}^{\infty} (-1)^k / (1+2k)}$$

$$e^{\pi} = \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{\pi}$$

$$e^{\pi} = \left(\frac{1}{\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}}\right)^{\pi}$$

Thence, for x = e^{π}, we obtain:

53361 [((((((((1+240(((((exp(Pi)/((1-(exp(Pi))))+(((((2^3*(exp(Pi)^2))/((1-(exp(Pi)^2))))))))))))))))))))]^3

Input:

$$53\,361\left(1+240\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^3\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^3$$

Exact result:

$$53\,361\left(1+240\left(\frac{e^{\pi}}{1-e^{\pi}}+\frac{8\,e^{2\pi}}{1-e^{2\pi}}\right)\right)^3$$

Decimal approximation:

$$-5.478505618025463336249959336436186272084300519504145\ldots\times10^{14}$$

$-5.47850561802546...*10^{14}$

Property:

$$53\,361\left(1+240\left(\frac{e^{\pi}}{1-e^{\pi}}+\frac{8\,e^{2\pi}}{1-e^{2\pi}}\right)\right)^3 \text{ is a transcendental number}$$

Alternate forms:

$$-53\,361\,(1079+1080\coth(\pi)+120\operatorname{csch}(\pi))^3$$

$$-\frac{53\,361\,(1+240\,e^{\pi}+2159\,e^{2\pi})^3}{(e^{\pi}-1)^3\,(1+e^{\pi})^3}$$

$$-537\,009\,398\,737\,119-\frac{92\,207\,808\,000\,000}{(e^{\pi}-1)^3}-\frac{387\,042\,274\,080\,000}{(e^{\pi}-1)^2}-\frac{596\,861\,333\,283\,600}{e^{\pi}-1}+\frac{47\,210\,397\,696\,000}{(1+e^{\pi})^3}-\frac{230\,003\,156\,275\,200}{(1+e^{\pi})^2}+\frac{417\,775\,290\,166\,080}{1+e^{\pi}}$$

coth(x) is the hyperbolic cotangent function

csch(x) is the hyperbolic cosecant function

Series representations:

$$53\,361\left(1+240\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^3\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^3=-\frac{53\,361\left(1+240\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}+2159\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}\right)^3}{\left(-1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}\right)^3\left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}\right)^3}$$

$$53361\left(1+240\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^3\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^3 = -\frac{53361\left(1+240\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}+2159\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{2\pi}\right)^3}{\left(-1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}\right)^3\left(1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}\right)^3}$$

$$53361\left(1+240\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^3\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^3 = -\left(\left(53361\left(1+240\,e^{4\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+2159\,e^{8\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^3\right)\Big/\left(\left(-1+e^{\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^3\left(1+e^{\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^3\left(1+e^{2\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^3\left(1+e^{4\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^3\right)\right)$$

121250 [((((((((1-504(((((exp(Pi)/((1-(exp(Pi))))+(((((2^5*(exp(Pi)^2))/((1-(exp(Pi)^2)))))))))))))))))))))]^2

Input:

$$121250\left(1-504\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^5\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^2$$

Exact result:

$$121250\left(1-504\left(\frac{e^{\pi}}{1-e^{\pi}}+\frac{32\,e^{2\pi}}{1-e^{2\pi}}\right)\right)^2$$

Decimal approximation:

$3.3758488814440055767176178468722964312089472713099035\ldots\times10^{13}$

Property:

$121250\left(1-504\left(\frac{e^{\pi}}{1-e^{\pi}}+\frac{32\,e^{2\pi}}{1-e^{2\pi}}\right)\right)^2$ is a transcendental number

Alternate forms:

$$121250\,(8317+8316\coth(\pi)+252\,\mathrm{csch}(\pi))^2$$

$$\frac{121250\,(-1+504\,e^{\pi}+16633\,e^{2\pi})^2}{(e^{\pi}-1)^2\,(1+e^{\pi})^2}$$

$$33544623541250+\frac{8901038160000}{(e^{\pi}-1)^2}+\frac{26181601740000}{e^{\pi}-1}+\frac{7884656640000}{(1+e^{\pi})^2}-\frac{24148716480000}{1+e^{\pi}}$$

coth(x) is the hyperbolic cotangent function csch(x) is the hyperbolic cosecant function

Series representations:

$$121250\left(1-504\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^5\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^2 = \frac{121250\left(-1+504\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}+16633\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{2\pi}\right)^2}{\left(-1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}\right)^2\left(1+\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{\pi}\right)^2}$$

$$121250\left(1-504\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^5\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^2 = \frac{121250\left(-1+504\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}+16633\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{2\pi}\right)^2}{\left(-1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}\right)^2\left(1+\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{\pi}\right)^2}$$

$$121250\left(1-504\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^5\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^2 = \left(121250\left(-1+504\,e^{4\sum_{k=0}^{\infty}(-1)^k/(1+2k)}+16633\,e^{8\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^2\right)\Big/ \left(\left(-1+e^{\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^2\left(1+e^{\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^2 \left(1+e^{2\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^2\left(1+e^{4\sum_{k=0}^{\infty}(-1)^k/(1+2k)}\right)^2\right)$$

53361 [((((((((1+240(((((exp(Pi)/((1-(exp(Pi))))+(((((2^3*(exp(Pi)^2))/((1-(exp(Pi)^2))))))))))))))))))))))]^3 + 3.37584888144400557671761784687229643120894727130990 35 × 10^13

Input interpretation:

$$53361\left(1+240\left(\frac{\exp(\pi)}{1-\exp(\pi)}+\frac{2^3\exp^2(\pi)}{1-\exp^2(\pi)}\right)\right)^3 + 3.3758488814440055767176178468722964312089472713099035\times10^{13}$$

Result:

$-5.1409207298810627785781975517489566289634057923731 55\ldots\times10^{14}$

$-5.14092072988*10^{14}$

As above, from the partition formula, for n = 260.115165, we obtain:

1/(4*260.115165*sqrt(3))*exp(Pi*(((sqrt(((2*260.115165))/3)))))

Input interpretation:

$$\frac{1}{4\times 260.115165\sqrt{3}}\exp\left(\pi\sqrt{\frac{2\times 260.115165}{3}}\right)$$

Result:

$5.1409207... \times 10^{14}$

5.1409207…*10^{14} result practically equal to the value of the above expression

Series representations:

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 260.115}{3}}\right)}{4\times 260.115\sqrt{3}} = \frac{0.000961113\exp\left(\pi\sqrt{172.41}\sum_{k=0}^{\infty} e^{-5.14988k}\binom{\frac{1}{2}}{k}\right)}{\sqrt{2}\sum_{k=0}^{\infty} 2^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 260.115}{3}}\right)}{4\times 260.115\sqrt{3}} = \frac{0.000961113\exp\left(\pi\sqrt{172.41}\sum_{k=0}^{\infty}\frac{(-0.00580012)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{\exp\left(\pi\sqrt{\frac{2\times 260.115}{3}}\right)}{4\times 260.115\sqrt{3}} = \frac{0.000961113\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(173.41-z_0)^k z_0^{-k}}{k!}\right)}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}$$

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

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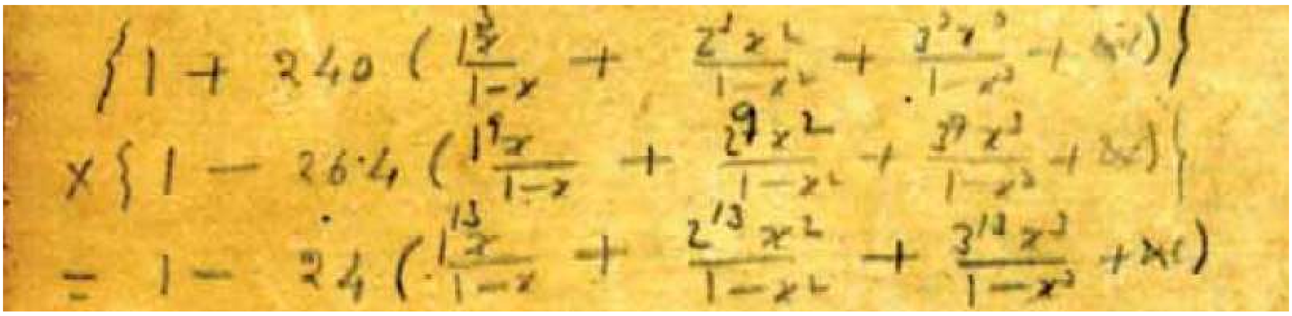

$$\left\{1+240\left(\frac{1^3x}{1-x}+\frac{2^3x^2}{1-x^2}+\frac{3^3x^3}{1-x^3}+\&c\right)\right\}$$
$$\times\left\{1-264\left(\frac{1^9x}{1-x}+\frac{2^9x^2}{1-x^2}+\frac{3^9x^3}{1-x^3}+\&c\right)\right\}$$
$$=1-24\left(\frac{1^{13}x}{1-x}+\frac{2^{13}x^2}{1-x^2}+\frac{3^{13}x^3}{1-x^3}+\&c\right)$$

For x = 2, we obtain:

1-24(2/(1-2)+(2^13*2^2)/(1-2^2)+(3^13*2^3)/(1-2^3)

Input:

$$1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^{2}}{1-2^{2}}+\frac{3^{13}\times 2^{3}}{1-2^{3}}\right)$$

Exact result:

$$\frac{307945367}{7}$$

Decimal approximation:

$4.39921952857142857142857142857142857142857142857142857... \times 10^{7}$

$4.399219528571...*10^{7}$

1/(((1-24(2/(1-2)+(2^13*2^2)/(1-2^2)+(3^13*2^3)/(1-2^3)))))^1/4096

Input:

$$\frac{1}{\sqrt[4096]{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^{2}}{1-2^{2}}+\frac{3^{13}\times 2^{3}}{1-2^{3}}\right)}}$$

Result:

$$\sqrt[4096]{\frac{7}{307945367}}$$

Decimal approximation:

0.995712459364566098402133104582928231233818852901463000270...

0.995712459364566….. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

Alternate form:

$$\frac{\sqrt[4096]{7}\ 307945367^{4095/4096}}{307945367}$$

2*sqrt[log base 0.995712459364566 (((1/(((1-24(2/(1-2)+(2^13*2^2)/(1-2^2)+(3^13*2^3)/(1-2^3)))))))]-Pi+1/(golden ratio)

Input interpretation:

$$2\sqrt{\log_{0.995712459364566}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764413352...

125.4764413352… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$2\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+2\sqrt{\frac{\log\left(\frac{1}{1-24\left(-2+-\frac{4\times 2^{13}}{3}+-\frac{8\times 3^{13}}{7}\right)}\right)}{\log(0.9957124593645660000)}}$$

Series representations:

$$2\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+2\sqrt{-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{307945360}{307945367}\right)^k}{k}}{\log(0.9957124593645660000)}}$$

$$2\sqrt{\log_{0.995712459364566000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+2\sqrt{-1+\log_{0.995712459364566000}\left(\frac{7}{307945367}\right)}$$

$$\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\log_{0.995712459364566000}\left(\frac{7}{307945367}\right)\right)^{-k}$$

$$2\sqrt{\log_{0.995712459364566000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+2\sqrt{-1+\log_{0.995712459364566000}\left(\frac{7}{307945367}\right)}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\log_{0.995712459364566000}\left(\frac{7}{307945367}\right)\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

1/4*sqrt[log base 0.995712459364566 (((1/(((1-24(2/(1-2)+(2^13*2^2)/(1-2^2)+(3^13*2^3)/(1-2^3))))))))]+1/(golden ratio)

Input interpretation:

$$\frac{1}{4}\sqrt{\log_{0.995712459364566}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

16.61803398875...

16.61803398875... result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representation:

$$\frac{1}{4}\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{\frac{\log\left(\frac{1}{1-24\left(-2+-\frac{4\times 2^{13}}{3}+-\frac{8\times 3^{13}}{7}\right)}\right)}{\log(0.9957124593645660000)}}$$

Series representations:

$$\frac{1}{4}\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{307945360}{307945367}\right)^k}{k}}{\log(0.9957124593645660000)}}$$

$$\frac{1}{4}\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{-1+\log_{0.9957124593645660000}\left(\frac{7}{307945367}\right)}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\log_{0.9957124593645660000}\left(\frac{7}{307945367}\right)\right)^{-k}$$

$$\frac{1}{4}\sqrt{\log_{0.9957124593645660000}\left(\frac{1}{1-24\left(\frac{2}{1-2}+\frac{2^{13}\times 2^2}{1-2^2}+\frac{3^{13}\times 2^3}{1-2^3}\right)}\right)}+\frac{1}{\phi}=$$

$$\frac{1}{\phi}+\frac{1}{4}\sqrt{-1+\log_{0.9957124593645660000}\left(\frac{7}{307945367}\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\log_{0.9957124593645660000}\left(\frac{7}{307945367}\right)\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

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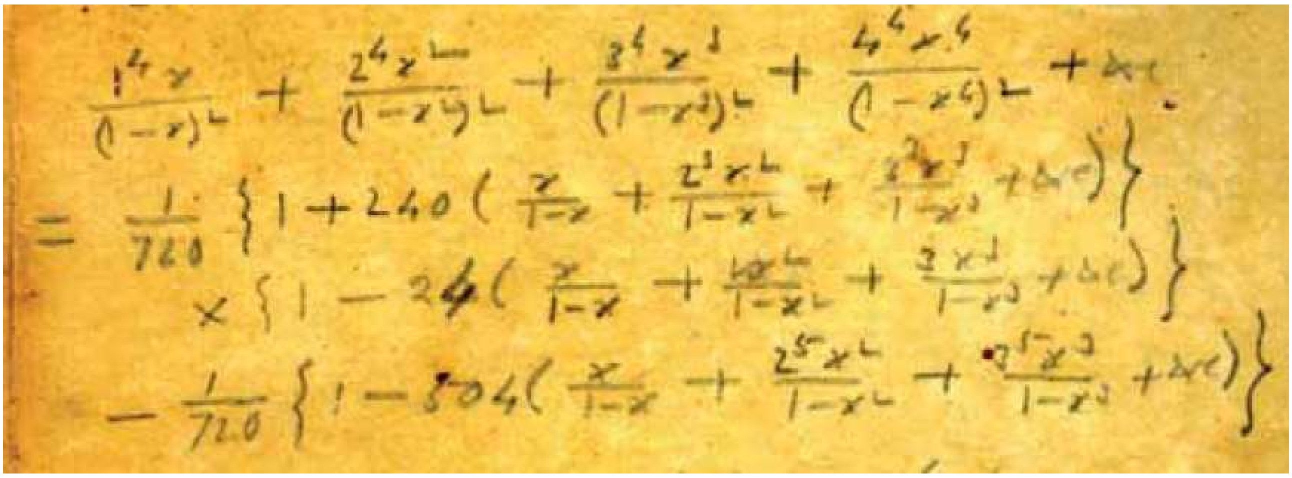

$$\frac{1^4 x}{(1-x)^2}+\frac{2^4 x^2}{(1-x^2)^2}+\frac{3^4 x^3}{(1-x^3)^2}+\frac{4^4 x^4}{(1-x^4)^2}+\&c.$$
$$=\frac{1}{720}\left\{1+240\left(\frac{x}{1-x}+\frac{2^3x^2}{1-x^2}+\frac{3^3x^3}{1-x^3}+\&c\right)\right\}$$
$$\times\left\{1-24\left(\frac{x}{1-x}+\frac{2x^2}{1-x^2}+\frac{3x^3}{1-x^3}+\&c\right)\right\}$$
$$-\frac{1}{720}\left\{1-504\left(\frac{x}{1-x}+\frac{2^5x^2}{1-x^2}+\frac{2^5x^3}{1-x^3}+\&c\right)\right\}$$

For x = 2, we obtain:

1/760(((1+240(2/(1-2)+(2^2*2^2)/(1-2^2)+(3^3*2^3)/(1-2^3))))) (((1-24((2/(1-2)+(2*2^2)/(1-2^2)+(3*2^3)/(1-2^3))))))

Input:

$$\frac{1}{760}\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)$$

Exact result:

$$-\frac{87697151}{37240}$$

Decimal approximation:

$-2354.918125671321160042964554242749731471535982814178302 90\ldots$

-1/720(((1-504(2/(1-2)+(2^5*2^2)/(1-2^2)+(3^5*2^3)/(1-2^3)))

Input:

$$-\frac{1}{720}\left(1-504\left(\frac{2}{1-2}+\frac{2^5\times 2^2}{1-2^2}+\frac{3^5\times 2^3}{1-2^3}\right)\right)$$

Exact result:

$$-\frac{162481}{720}$$

Decimal approximation:

$-225.66805555555555555555555555555555555555555555555555555\ldots$

1/760(((1+240(2/(1-2)+(2^2*2^2)/(1-2^2)+(3^3*2^3)/(1-2^3))))) (((1-24((2/(1-2)+(2*2^2)/(1-2^2)+(3*2^3)/(1-2^3)))))) -225.6680555555

Input interpretation:

$$\frac{1}{760}\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)-225.6680555555$$

Result:

−2580.586181226821160042964554242749731471535982814178302 90...

-2580.586181226... result very near to the rest mass of charmed Xi prime baryon 2577.9 with minus sign

1/((((-1/760(((1+240(2/(1-2)+(2^2*2^2)/(1-2^2)+(3^3*2^3)/(1-2^3))))) (((1-24((2/(1-2)+(2*2^2)/(1-2^2)+(3*2^3)/(1-2^3)))))) +225.6680555555))))^1/4096

Input interpretation:

$$1/\left(\left(-\frac{1}{760}\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)+225.6680555555\right)\text{^}(1/4096)\right)$$

Result:

0.998083924969666398...

0.998083924... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243}=\boldsymbol{\phi}$

1/(golden ratio)+2sqrt((((log base 0.998083925 ((((1/((((-1/760(((1+240(2/(1-2)+(2^2*2^2)/(1-2^2)+(3^3*2^3)/(1-2^3))))) (((1-24((2/(1-2)+(2*2^2)/(1-2^2)+(3*2^3)/(1-2^3)))))) +225.668055)))))))))))-Pi

Input interpretation:

$$\frac{1}{\phi}+2\sqrt{\log_{0.998083925}\left(\frac{1}{-\frac{1}{760}\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)+225.668055}\right)}-\pi$$

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

ϕ is the golden ratio

Result:

125.47644234756991389037323473815496034690967131596609495 08...

125.4764423475… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\frac{1}{\phi}+2\sqrt{\log_{0.998084}\left(1\Big/\left(\frac{1}{760}\left(\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)\right)(-1)+225.668\right)\right)}-\pi=$$
$$-\pi+\frac{1}{\phi}+2\sqrt{\frac{\log\left(\frac{1}{225.668-\frac{1}{760}\left(1-24\left(-2+-\frac{24}{7}+-\frac{8}{3}\right)\right)\left(1+240\left(-2+-\frac{216}{7}+-\frac{16}{3}\right)\right)}\right)}{\log(0.998084)}}$$

Series representations:

$$\frac{1}{\phi}+2\sqrt{\log_{0.998084}\left(1\Big/\left(\frac{1}{760}\left(\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)\right)(-1)+225.668\right)\right)}-$$
$$\pi=\frac{1}{\phi}-\pi+2\sqrt{-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k(-0.999612)^k}{k}}{\log(0.998084)}}$$

$$\frac{1}{\phi}+2\sqrt{\log_{0.998084}\left(1\Big/\left(\frac{1}{760}\left(\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)\right)(-1)+225.668\right)\right)}-\pi = \frac{1}{\phi}-\pi+2\sqrt{-1+\log_{0.998084}(0.000387509)}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}(-1+\log_{0.998084}(0.000387509))^{-k}$$

$$\frac{1}{\phi}+2\sqrt{\log_{0.998084}\left(1\Big/\left(\frac{1}{760}\left(\left(1+240\left(\frac{2}{1-2}+\frac{2^2\times 2^2}{1-2^2}+\frac{3^3\times 2^3}{1-2^3}\right)\right)\left(1-24\left(\frac{2}{1-2}+\frac{2\times 2^2}{1-2^2}+\frac{3\times 2^3}{1-2^3}\right)\right)\right)(-1)+225.668\right)\right)}-\pi = \frac{1}{\phi}-\pi+2\sqrt{-1+\log_{0.998084}(0.000387509)}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+\log_{0.998084}(0.000387509))^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

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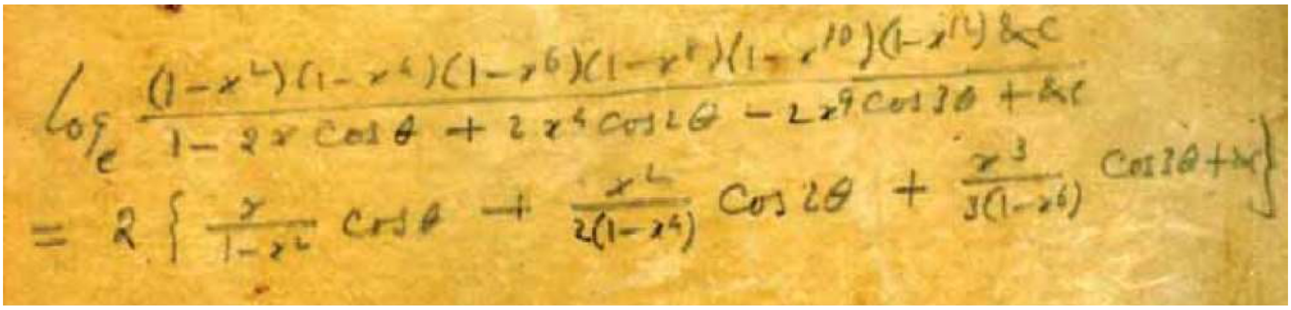

$$\log_e \frac{(1-x^2)(1-x^4)(1-x^6)(1-x^8)(1-x^{10})(1-x^{12})\,\&c}{1-2x\cos\theta+2x^4\cos 2\theta-2x^9\cos 3\theta+\&c} = 2\left\{\frac{x}{1-x^2}\cos\theta+\frac{x^2}{2(1-x^4)}\cos 2\theta+\frac{x^3}{3(1-x^6)}\cos 3\theta+\&c\right\}$$

For x = 2 and θ = $\pi/2$

2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6)))))

Input:

$$2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)$$

Exact result:

$$\frac{332}{945}$$

Decimal approximation:

0.35132275132275132275132275132275132275132275132275132275 1322751...

0.35132275132…

Alternative representations:

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=2\left(-\frac{2}{3}\cosh\left(\frac{i\pi}{2}\right)+\frac{4\cosh(i\pi)}{2\left(1-2^4\right)}+\frac{8\cosh(i\pi)}{3\left(1-2^6\right)}\right)$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=2\left(-\frac{2}{3\csc(0)}+\frac{4}{\csc\left(-\frac{\pi}{2}\right)\left(2\left(1-2^4\right)\right)}+\frac{8}{\csc\left(-\frac{\pi}{2}\right)\left(3\left(1-2^6\right)\right)}\right)$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=2\left(-\frac{2}{3\sec\left(\frac{\pi}{2}\right)}+\frac{4}{\left(2\left(1-2^4\right)\right)\sec(\pi)}+\frac{8}{\left(3\left(1-2^6\right)\right)\sec(\pi)}\right)$$

Series representations:

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=\sum_{k=0}^{\infty}-\frac{(-1)^k\,4^{1-k}\left(315+83\times 4^k\right)\pi^{2k}}{945\,(2k)!}$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=\sum_{k=0}^{\infty}-\frac{4\cos\left(\frac{k\pi}{2}+z_0\right)\left(315\left(\frac{\pi}{2}-z_0\right)^k+83\,(\pi-z_0)^k\right)}{945\,k!}$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=-\frac{332\cos(\pi)}{945}+\frac{4}{3}\sum_{k=0}^{\infty}(-1)^k\,J_{2k}\left(\frac{1}{2}\right)T_{2k}(\pi)\,(-2+\delta_k)$$

Integral representations:

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=-\frac{1592}{945}+\int_0^1\left(\frac{2}{3}\,\pi\sin\left(\frac{\pi t}{2}\right)+\frac{332}{945}\,\pi\sin(\pi t)\right)dt$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=\int_{-i\infty+\gamma}^{i\infty+\gamma}-\frac{2\,e^{-\pi^2/(4s)+s}\left(83+315\,e^{(3\pi^2)/(16s)}\right)\sqrt{\pi}}{945\,i\pi\sqrt{s}}\,ds\quad\text{for }\gamma>0$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=$$
$$\int_{-i\infty+\gamma}^{i\infty+\gamma}-\frac{2^{1+2s}\left(83+315\times 4^s\right)\pi^{-1-2s}\,\Gamma(s)\sqrt{\pi}}{945\,i\,\Gamma\left(\frac{1}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<\frac{1}{2}$$

Half-argument formula:

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=2\left(-\frac{2}{3}(-1)^{\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(\pi))\right)-\frac{166}{945}(-1)^{\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(2\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(2\pi))\right)\right)$$

Multiple-argument formulas:

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=-\frac{4}{945}\left(315\,T_{\frac{1}{2}}(\cos(\pi))+83\cos(\pi)\right)$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=\frac{8}{945}\left(-199+315\sin^2\left(\frac{\pi}{4}\right)+83\sin^2\left(\frac{\pi}{2}\right)\right)$$

$$2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=-\frac{8}{945}\left(-199+315\cos^2\left(\frac{\pi}{4}\right)+83\cos^2\left(\frac{\pi}{2}\right)\right)$$

48*(((2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6))))))))

Input:

$$48\left(2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)$$

Exact result:

$$\frac{5312}{315}$$

Decimal approximation:

16.8634920634920634920634920634920634920634920634920634920634920634920…

16.8634920634… result very near to the mass of the hypothetical light particle, the boson $m_X = 16.84$ MeV

Repeating decimal:

$16.8\overline{634920}$ (period 6)

Alternative representations:

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)= 96\left(-\frac{2}{3}\cosh\left(\frac{i\pi}{2}\right)+\frac{4\cosh(i\pi)}{2\left(1-2^4\right)}+\frac{8\cosh(i\pi)}{3\left(1-2^6\right)}\right)$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)= 96\left(-\frac{2}{3\csc(0)}+\frac{4}{\csc\left(-\frac{\pi}{2}\right)\left(2\left(1-2^4\right)\right)}+\frac{8}{\csc\left(-\frac{\pi}{2}\right)\left(3\left(1-2^6\right)\right)}\right)$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)= 96\left(-\frac{2}{3\sec\left(\frac{\pi}{2}\right)}+\frac{4}{\left(2\left(1-2^4\right)\right)\sec(\pi)}+\frac{8}{\left(3\left(1-2^6\right)\right)\sec(\pi)}\right)$$

Series representations:

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=\sum_{k=0}^{\infty}-\frac{(-1)^k\,4^{3-k}\left(315+83\times 4^k\right)\pi^{2k}}{315\,(2k)!}$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)= \sum_{k=0}^{\infty}-\frac{64\cos\left(\frac{k\pi}{2}+z_0\right)\left(315\left(\frac{\pi}{2}-z_0\right)^k+83\left(\pi-z_0\right)^k\right)}{315\,k!}$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)= -\frac{5312\cos(\pi)}{315}+64\sum_{k=0}^{\infty}(-1)^k J_{2k}\left(\frac{1}{2}\right)T_{2k}(\pi)\,(-2+\delta_k)$$

Integral representations:

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)= -\frac{25\,472}{315}+\int_0^1\left(32\,\pi\sin\left(\frac{\pi\,t}{2}\right)+\frac{5312}{315}\,\pi\sin(\pi\,t)\right)dt$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)= \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}-\frac{32\,e^{-\pi^2/(4\,s)+s}\left(83+315\,e^{(3\,\pi^2)/(16\,s)}\right)\sqrt{\pi}}{315\,i\,\pi\sqrt{s}}\,ds \quad \text{for } \gamma>0$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)= \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}-\frac{2^{5+2\,s}\,(83+315\times 4^s)\,\pi^{-1-2\,s}\,\Gamma(s)\sqrt{\pi}}{315\,i\,\Gamma\left(\frac{1}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<\frac{1}{2}$$

Half-argument formula:

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)=96\left(-\frac{2}{3}(-1)^{\lfloor(\pi+\mathrm{Re}(\pi))/(2\,\pi)\rfloor}\sqrt{\frac{1}{2}\,(1+\cos(\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(\pi))/(2\,\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(\pi))/(2\,\pi)\rfloor}\right)\theta(-\mathrm{Im}(\pi))\right)-\frac{166}{945}(-1)^{\lfloor(\pi+\mathrm{Re}(2\,\pi))/(2\,\pi)\rfloor}\sqrt{\frac{1}{2}\,(1+\cos(2\,\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(2\,\pi))/(2\,\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(2\,\pi))/(2\,\pi)\rfloor}\right)\theta(-\mathrm{Im}(2\,\pi))\right)\right)$$

Multiple-argument formulas:

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)=-64\,T_{\frac{1}{2}}(\cos(\pi))-\frac{5312\cos(\pi)}{315}$$

$$48\times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\,(1-2^4)}+\frac{2^3\cos(\pi)}{3\,(1-2^6)}\right)=\frac{128}{315}\left(-199+315\sin^2\left(\frac{\pi}{4}\right)+83\sin^2\left(\frac{\pi}{2}\right)\right)$$

$$48 \times 2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)=-\frac{128}{315}\left(-199+315\cos^2\left(\frac{\pi}{4}\right)+83\cos^2\left(\frac{\pi}{2}\right)\right)$$

(((2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6))))))))^1/256

Input:

$$\sqrt[256]{2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)}$$

Exact result:

$$\frac{\sqrt[128]{2}\ \sqrt[256]{\frac{83}{35}}}{3^{3/256}}$$

Decimal approximation:

0.9959222042302611206349258838593868904444148378103677988 88...

0.995922204... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

1/2*log base 0.99592220423 (((2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6)))))))) - Pi+1/golden ratio

Input interpretation:

$$\frac{1}{2}\log_{0.99592220423}\left(2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764413269468848203416354772136114330107380426433795659...

125.4764413269… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representations:

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$-\pi+\frac{1}{\phi}+\frac{\log\left(2\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)+\frac{4\cos(\pi)}{2\left(1-2^4\right)}+\frac{8\cos(\pi)}{3\left(1-2^6\right)}\right)\right)}{2\log(0.995922204230000)}$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$-\pi+\frac{1}{2}\log_{0.995922204230000}\left(2\left(-\frac{2}{3}\cosh\left(\frac{i\pi}{2}\right)+\frac{4\cosh(i\pi)}{2\left(1-2^4\right)}+\frac{8\cosh(i\pi)}{3\left(1-2^6\right)}\right)\right)+\frac{1}{\phi}$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{2}$$
$$\log_{0.995922204230000}\left(2\left(-\frac{2}{3\csc(0)}+\frac{4}{\csc\left(-\frac{\pi}{2}\right)\left(2\left(1-2^4\right)\right)}+\frac{8}{\csc\left(-\frac{\pi}{2}\right)\left(3\left(1-2^6\right)\right)}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(-\frac{4}{945}\sum_{k=0}^{\infty}\frac{\left(83(-1)^k+315\left(-\frac{1}{4}\right)^k\right)\pi^{2k}}{(2k)!}\right)$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{4}{3}\cos\left(\frac{\pi}{2}\right)-\frac{332\cos(\pi)}{945}\right)^k}{k}}{2\log(0.995922204230000)}$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(-\frac{4}{945}\sum_{k=0}^{\infty}\frac{\cos\left(\frac{k\pi}{2}+z_0\right)\left(315\left(\frac{\pi}{2}-z_0\right)^k+83\,(\pi-z_0)^k\right)}{k!}\right)$$

Integral representations:

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(\frac{2}{945}\left(-796+\int_0^1\pi\left(315\sin\left(\frac{\pi t}{2}\right)+166\sin(\pi t)\right)dt\right)\right)$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(2\int_{-i\infty+\gamma}^{i\infty+\gamma}-\frac{e^{-\pi^2/(4s)+s}\left(83+315\,e^{(3\pi^2)/(16s)}\right)\sqrt{\pi}}{945\,i\,\pi\sqrt{s}}\,ds\right)$$
for $\gamma > 0$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(-\frac{2\sqrt{\pi}}{945\,i\,\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^s\left(83+315\times4^s\right)\pi^{-2s}\,\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\,ds\right)$$ for
$0<\gamma<\frac{1}{2}$

Half-argument formula:

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\Bigg(2\left(-\frac{2}{3}(-1)^{\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(\pi))\right)-\frac{166}{945}(-1)^{\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(2\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(2\pi))\right)\right)\Bigg)$$

Multiple-argument formulas:

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(-\frac{4}{945}\left(315\,T_{\frac{1}{2}}(\cos(\pi))+83\cos(\pi)\right)\right)$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\left(\log_{0.995922204230000}(2)+\log_{0.995922204230000}\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)-\frac{166\cos(\pi)}{945}\right)\right)$$

$$\frac{1}{2}\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi+\frac{1}{2}\log_{0.995922204230000}\left(\frac{8}{945}\left(-199+315\sin^2\left(\frac{\pi}{4}\right)+83\sin^2\left(\frac{\pi}{2}\right)\right)\right)$$

13.6056923((((1/2*log base 0.99592220423 (((2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6)))))))))))))-13+1/golden ratio

Where 13.6056923 is the Rydberg constant in energy unit and 13 is a Fibonacci number

Value of the Rydberg constant in energy unit

$$1\ \mathrm{Ry} \equiv hcR_\infty = \frac{m_e e^4}{8\varepsilon_0^2 h^2}$$

$$= 13.605\ 693\ 009(84)\ \mathrm{eV}$$

$$\approx 2.179 \times 10^{-18}\ \mathrm{J}$$

Input interpretation:

$$13.6056923\left(\frac{1}{2}\log_{0.99592220423}\left(2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)\right)-13+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

1729.1466...

1729.1466…

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:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+\frac{1}{\phi}=$$
$$-13+\frac{1}{\phi}+\frac{6.80285\log\left(2\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)+\frac{4\cos(\pi)}{2(1-2^4)}+\frac{8\cos(\pi)}{3(1-2^6)}\right)\right)}{\log(0.995922204230000)}$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+\frac{1}{\phi}=$$
$$-13+6.80285\log_{0.995922204230000}\left(2\left(-\frac{2}{3}\cosh\left(\frac{i\pi}{2}\right)+\frac{4\cosh(i\pi)}{2(1-2^4)}+\frac{8\cosh(i\pi)}{3(1-2^6)}\right)\right)+\frac{1}{\phi}$$

$$\frac{1}{2} \times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2} + \frac{2^2\cos(\pi)}{2\left(1-2^4\right)} + \frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right) - 13 + \frac{1}{\phi} =$$

$$-13 + 6.80285 \log_{0.995922204230000}\left(2\left(-\frac{2}{3\csc(0)} + \frac{4}{\csc\left(-\frac{\pi}{2}\right)\left(2\left(1-2^4\right)\right)} + \frac{8}{\csc\left(-\frac{\pi}{2}\right)\left(3\left(1-2^6\right)\right)}\right)\right) + \frac{1}{\phi}$$

Series representations:

$$\frac{1}{2} \times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2} + \frac{2^2\cos(\pi)}{2\left(1-2^4\right)} + \frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right) - 13 + \frac{1}{\phi} =$$

$$-13 + \frac{1}{\phi} + 6.80285 \log_{0.995922204230000}\left(-\frac{4}{945} \sum_{k=0}^{\infty} \frac{\left(83(-1)^k + 315\left(-\frac{1}{4}\right)^k\right)\pi^{2k}}{(2k)!}\right)$$

$$\frac{1}{2} \times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2} + \frac{2^2\cos(\pi)}{2\left(1-2^4\right)} + \frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right) - 13 + \frac{1}{\phi} =$$

$$-13 + \frac{1}{\phi} - \frac{6.80285 \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1-\frac{4}{3}\cos\left(\frac{\pi}{2}\right)-\frac{332\cos(\pi)}{945}\right)^k}{k}}{\log(0.995922204230000)}$$

$$\frac{1}{2} \times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2} + \frac{2^2\cos(\pi)}{2\left(1-2^4\right)} + \frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right) - 13 + \frac{1}{\phi} =$$

$$-13 + \frac{1}{\phi} + 6.80285 \log_{0.995922204230000}\left(-\frac{4}{945} \sum_{k=0}^{\infty} \frac{\cos\left(\frac{k\pi}{2} + z_0\right)\left(315\left(\frac{\pi}{2} - z_0\right)^k + 83(\pi - z_0)^k\right)}{k!}\right)$$

Integral representations:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+\frac{1}{\phi}=$$

$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(\frac{2}{945}\left(-796+\int_0^1\pi\left(315\sin\left(\frac{\pi t}{2}\right)+166\sin(\pi t)\right)dt\right)\right)$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+\frac{1}{\phi}=$$

$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(2\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}-\frac{e^{-\pi^2/(4s)+s}\left(83+315\,e^{(3\pi^2)/(16s)}\right)\sqrt{\pi}}{945\,i\,\pi\sqrt{s}}\,ds\right)\quad\text{for }\gamma>0$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+\frac{1}{\phi}=$$

$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(-\frac{2\sqrt{\pi}}{945\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{4^s\left(83+315\times 4^s\right)\pi^{-2s}\,\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\,ds\right)\quad\text{for }0<\gamma<\frac{1}{2}$$

Half-argument formula:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+\frac{1}{\phi}=$$

$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(2\left(-\frac{2}{3}(-1)^{\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(\pi))\right)-\frac{166}{945}(-1)^{\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(2\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(2\pi))\right)\right)\right)$$

Multiple-argument formulas:

$$\frac{1}{2}\times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+\frac{1}{\phi}=$$
$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(-\frac{4}{945}\left(315\, T_{\frac{1}{2}}(\cos(\pi))+83\cos(\pi)\right)\right)$$

$$\frac{1}{2}\times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+\frac{1}{\phi}=$$
$$-13+\frac{1}{\phi}+$$
$$6.80285\left(\log_{0.995922204230000}(2)+\log_{0.995922204230000}\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)-\frac{166\cos(\pi)}{945}\right)\right)$$

$$\frac{1}{2}\times 13.6057 \log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+\frac{1}{\phi}=$$
$$-13+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(\frac{8}{945}\left(-199+315\sin^2\left(\frac{\pi}{4}\right)+83\sin^2\left(\frac{\pi}{2}\right)\right)\right)$$

13.6056923((((1/2*log base 0.99592220423 (((2((((2*cos(Pi/2)/(1-2^2)) + (2^2*cos(Pi))/(2*(1-2^4)) + (2^3*cos(Pi))/(3*(1-2^6))))))))))))-13+55+1/golden ratio

Input interpretation:

$$13.6056923\left(\frac{1}{2}\log_{0.99592220423}\left(2\left(2\times\frac{\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)\right)-13+55+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

1784.1466...

1784.1466… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+\frac{6.80285\log\left(2\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)+\frac{4\cos(\pi)}{2\left(1-2^4\right)}+\frac{8\cos(\pi)}{3\left(1-2^6\right)}\right)\right)}{\log(0.995922204230000)}$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+6.80285\log_{0.995922204230000}\left(2\left(-\frac{2}{3}\cosh\left(\frac{i\pi}{2}\right)+\frac{4\cosh(i\pi)}{2\left(1-2^4\right)}+\frac{8\cosh(i\pi)}{3\left(1-2^6\right)}\right)\right)+\frac{1}{\phi}$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+6.80285\log_{0.995922204230000}\left(2\left(-\frac{2}{3\csc(0)}+\frac{4}{\csc\left(-\frac{\pi}{2}\right)\left(2\left(1-2^4\right)\right)}+\frac{8}{\csc\left(-\frac{\pi}{2}\right)\left(3\left(1-2^6\right)\right)}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(-\frac{4}{945}\sum_{k=0}^{\infty}\frac{\left(83(-1)^k+315\left(-\frac{1}{4}\right)^k\right)\pi^{2k}}{(2k)!}\right)$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}-\frac{6.80285\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{4}{3}\cos\left(\frac{\pi}{2}\right)-\frac{332\cos(\pi)}{945}\right)^k}{k}}{\log(0.995922204230000)}$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+$$
$$6.80285\log_{0.995922204230000}\left(-\frac{4}{945}\sum_{k=0}^{\infty}\frac{\cos\left(\frac{k\pi}{2}+z_0\right)\left(315\left(\frac{\pi}{2}-z_0\right)^k+83(\pi-z_0)^k\right)}{k!}\right)$$

Integral representations:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+$$
$$6.80285\log_{0.995922204230000}\left(\frac{2}{945}\left(-796+\int_0^1\pi\left(315\sin\left(\frac{\pi t}{2}\right)+166\sin(\pi t)\right)dt\right)\right)$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(2\int_{-i\infty+\gamma}^{i\infty+\gamma}-\frac{e^{-\pi^2/(4s)+s}\left(83+315e^{(3\pi^2)/(16s)}\right)\sqrt{\pi}}{945i\pi\sqrt{s}}\,ds\right)\quad\text{for }\gamma>0$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2\left(1-2^4\right)}+\frac{2^3\cos(\pi)}{3\left(1-2^6\right)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(-\frac{2\sqrt{\pi}}{945i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^s\left(83+315\times4^s\right)\pi^{-2s}\,\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\,ds\right)\quad\text{for }0<\gamma<\frac{1}{2}$$

Half-argument formula:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(2\left(-\frac{2}{3}(-1)^{\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(\pi))\right)-\frac{166}{945}(-1)^{\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\sqrt{\frac{1}{2}(1+\cos(2\pi))}\left(1-\left(1+(-1)^{\lfloor-(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor+\lfloor(\pi+\mathrm{Re}(2\pi))/(2\pi)\rfloor}\right)\theta(-\mathrm{Im}(2\pi))\right)\right)\right)$$

Multiple-argument formulas:

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(-\frac{4}{945}\left(315\,T_{\frac{1}{2}}(\cos(\pi))+83\cos(\pi)\right)\right)$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\left(\log_{0.995922204230000}(2)+\log_{0.995922204230000}\left(-\frac{2}{3}\cos\left(\frac{\pi}{2}\right)-\frac{166\cos(\pi)}{945}\right)\right)$$

$$\frac{1}{2}\times 13.6057\log_{0.995922204230000}\left(2\left(\frac{2\cos\left(\frac{\pi}{2}\right)}{1-2^2}+\frac{2^2\cos(\pi)}{2(1-2^4)}+\frac{2^3\cos(\pi)}{3(1-2^6)}\right)\right)-13+55+\frac{1}{\phi}=$$
$$42+\frac{1}{\phi}+6.80285\log_{0.995922204230000}\left(\frac{8}{945}\left(-199+315\sin^2\left(\frac{\pi}{4}\right)+83\sin^2\left(\frac{\pi}{2}\right)\right)\right)$$

Now, we have that:

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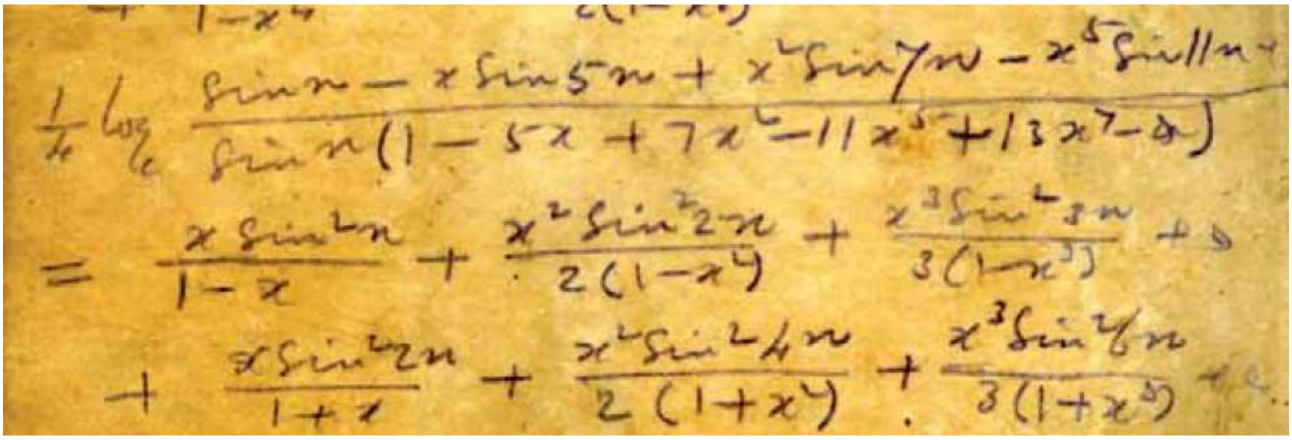


$$\frac{1}{4}\log_e \frac{\sin n - x\sin 5n + x^2\sin 7n - x^5\sin 11n + \&c}{\sin n(1-5x+7x^2-11x^5+13x^7-\&c)}$$

$$= \frac{x\sin^2 n}{1-x} + \frac{x^2\sin^2 2n}{2(1-x^2)} + \frac{x^3\sin^2 3n}{3(1-x^3)} + \&c$$

$$+ \frac{x\sin^2 2n}{1+x} + \frac{x^2\sin^2 4n}{2(1+x^2)} + \frac{x^3\sin^2 6n}{3(1+x^3)} + \&c.$$

For x = 2 and n = 4, we obtain:

2 sin^2(4) / (1-2) + 2^2 sin^2(2*4) / (2(1-2^2)) +2^3 sin^2(3*4) / (3(1-2^3))+ 2 sin^2(2*4) / (1+2) + 2^2 sin^2(4*4) / (2(1+2^2)) + 2^3 sin^2(6*4) / (3(1+2^3))

Input:

$$2\times\frac{\sin^2(4)}{1-2}+2^2\times\frac{\sin^2(2\times4)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times4)}{3(1-2^3)}+2\times\frac{\sin^2(2\times4)}{1+2}+2^2\times\frac{\sin^2(4\times4)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times4)}{3(1+2^3)}$$

Exact result:

$$-2\sin^2(4)-\frac{8\sin^2(12)}{21}+\frac{2\sin^2(16)}{5}+\frac{8\sin^2(24)}{27}$$

Decimal approximation:

-0.979040548400553233166464169368546295916022926160612770 58...

-0.979040548… result very near to the dilaton value **0.989117352243 = $\boldsymbol{\phi}$** with minus sign

Property:

$-2\sin^2(4)-\frac{8\sin^2(12)}{21}+\frac{2\sin^2(16)}{5}+\frac{8\sin^2(24)}{27}$ is a transcendental number

Alternate forms:

$$-\frac{796}{945}+\cos(8)+\frac{4\cos(24)}{21}-\frac{\cos(32)}{5}-\frac{4\cos(48)}{27}$$

$$\frac{1}{945}\left(-796+945\cos(8)+180\cos(24)-189\cos(32)-140\cos(48)\right)$$

$$-\frac{2}{945}\left(945\sin^2(4)+180\sin^2(12)-189\sin^2(16)-140\sin^2(24)\right)$$

Alternative representations:

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times 4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 4)}{3(1-2^3)}+\frac{2\sin^2(2\times 4)}{1+2}+\frac{2^2\sin^2(4\times 4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 4)}{3(1+2^3)}=-2\left(\frac{1}{\csc(4)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(8)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(8)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(12)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(16)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(24)}\right)^2$$

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times 4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 4)}{3(1-2^3)}+\frac{2\sin^2(2\times 4)}{1+2}+\frac{2^2\sin^2(4\times 4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 4)}{3(1+2^3)}=\frac{8}{27}\cos^2\left(-24+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-16+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-12+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-8+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-8+\frac{\pi}{2}\right)-2\cos^2\left(-4+\frac{\pi}{2}\right)$$

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times 4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 4)}{3(1-2^3)}+\frac{2\sin^2(2\times 4)}{1+2}+\frac{2^2\sin^2(4\times 4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 4)}{3(1+2^3)}=-2\left(-\cos\left(4+\frac{\pi}{2}\right)\right)^2+\frac{2}{3}\left(-\cos\left(8+\frac{\pi}{2}\right)\right)^2+-\frac{4}{6}\left(-\cos\left(8+\frac{\pi}{2}\right)\right)^2+-\frac{8}{21}\left(-\cos\left(12+\frac{\pi}{2}\right)\right)^2+\frac{4}{10}\left(-\cos\left(16+\frac{\pi}{2}\right)\right)^2+\frac{8}{27}\left(-\cos\left(24+\frac{\pi}{2}\right)\right)^2$$

Series representations:

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times 4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 4)}{3(1-2^3)}+\frac{2\sin^2(2\times 4)}{1+2}+\frac{2^2\sin^2(4\times 4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 4)}{3(1+2^3)}=\sum_{k=1}^{\infty}\frac{(-1)^{1+k}\,64^k\left(-945+35\times 4^{1+k}\times 9^k-20\times 9^{1+k}+189\times 16^k\right)}{945\,(2k)!}$$

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times 4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 4)}{3(1-2^3)}+\frac{2\sin^2(2\times 4)}{1+2}+\frac{2^2\sin^2(4\times 4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 4)}{3(1+2^3)}=-\frac{1592}{945}+\sum_{k=1}^{\infty}\left(\frac{(-1)^{1+k}\left(2\left(4-\frac{\pi}{2}\right)\right)^{2k}}{(2k)!}-\frac{(-1)^k\,2^{2+2k}\left(12-\frac{\pi}{2}\right)^{2k}}{21\,(2k)!}+\frac{(-1)^k\left(2\left(16-\frac{\pi}{2}\right)\right)^{2k}}{5\,(2k)!}+\frac{(-1)^k\,2^{2+2k}\left(24-\frac{\pi}{2}\right)^{2k}}{27\,(2k)!}\right)$$

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times4)}{3(1-2^3)}+\frac{2\sin^2(2\times4)}{1+2}+\frac{2^2\sin^2(4\times4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times4)}{3(1+2^3)}=-\frac{2}{945}\left(945\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,4^{1+2k}}{(1+2k)!}\right)^2+180\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,12^{1+2k}}{(1+2k)!}\right)^2-189\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,16^{1+2k}}{(1+2k)!}\right)^2-140\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,24^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formulas:

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times4)}{3(1-2^3)}+\frac{2\sin^2(2\times4)}{1+2}+\frac{2^2\sin^2(4\times4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times4)}{3(1+2^3)}=\frac{2}{945}(111+1814\cos(8)+1516\cos(16)+1218\cos(24)+560\cos(32)+280\cos(40))\sin^2(4)$$

$$\frac{2\sin^2(4)}{1-2}+\frac{2^2\sin^2(2\times4)}{2(1-2^2)}+\frac{2^3\sin^2(3\times4)}{3(1-2^3)}+\frac{2\sin^2(2\times4)}{1+2}+\frac{2^2\sin^2(4\times4)}{2(1+2^2)}+\frac{2^3\sin^2(6\times4)}{3(1+2^3)}=-8\cos^2(2)\sin^2(2)-\frac{32}{21}\cos^2(6)\sin^2(6)+\frac{8}{5}\cos^2(8)\sin^2(8)+\frac{32}{27}\cos^2(12)\sin^2(12)$$

For x = 2 and n = 5, we obtain:

2 sin^2(5) / (1-2) + 2^2 sin^2(2*5) / (2(1-2^2)) +2^3 sin^2(3*5) / (3(1-2^3))+ 2 sin^2(2*5) / (1+2) + 2^2 sin^2(4*5) / (2(1+2^2)) + 2^3 sin^2(6*5) / (3(1+2^3))

Input:

$$2\times\frac{\sin^2(5)}{1-2}+2^2\times\frac{\sin^2(2\times5)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times5)}{3(1-2^3)}+2\times\frac{\sin^2(2\times5)}{1+2}+2^2\times\frac{\sin^2(4\times5)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times5)}{3(1+2^3)}$$

Exact result:

$$-2\sin^2(5)-\frac{8\sin^2(15)}{21}+\frac{2\sin^2(20)}{5}+\frac{8\sin^2(30)}{27}$$

Decimal approximation:

$-1.3775325112032625065497771270674110835257405279577227729 5\ldots$

-1.3775325112…

Property:

$-2\sin^2(5) - \frac{8\sin^2(15)}{21} + \frac{2\sin^2(20)}{5} + \frac{8\sin^2(30)}{27}$ is a transcendental number

Alternate forms:

$$-\frac{796}{945} + \cos(10) + \frac{4\cos(30)}{21} - \frac{\cos(40)}{5} - \frac{4\cos(60)}{27}$$

$$\frac{1}{945}(-796 + 945\cos(10) + 180\cos(30) - 189\cos(40) - 140\cos(60))$$

$$-\frac{2}{945}(945\sin^2(5) + 180\sin^2(15) - 189\sin^2(20) - 140\sin^2(30))$$

Alternative representations:

$$\frac{2\sin^2(5)}{1-2} + \frac{2^2\sin^2(2\times5)}{2(1-2^2)} + \frac{2^3\sin^2(3\times5)}{3(1-2^3)} + \frac{2\sin^2(2\times5)}{1+2} + \frac{2^2\sin^2(4\times5)}{2(1+2^2)} + \frac{2^3\sin^2(6\times5)}{3(1+2^3)} = -2\left(\frac{1}{\csc(5)}\right)^2 + \frac{2}{3}\left(\frac{1}{\csc(10)}\right)^2 + -\frac{4}{6}\left(\frac{1}{\csc(10)}\right)^2 + -\frac{8}{21}\left(\frac{1}{\csc(15)}\right)^2 + \frac{4}{10}\left(\frac{1}{\csc(20)}\right)^2 + \frac{8}{27}\left(\frac{1}{\csc(30)}\right)^2$$

$$\frac{2\sin^2(5)}{1-2} + \frac{2^2\sin^2(2\times5)}{2(1-2^2)} + \frac{2^3\sin^2(3\times5)}{3(1-2^3)} + \frac{2\sin^2(2\times5)}{1+2} + \frac{2^2\sin^2(4\times5)}{2(1+2^2)} + \frac{2^3\sin^2(6\times5)}{3(1+2^3)} = \frac{8}{27}\cos^2\left(-30+\frac{\pi}{2}\right) + \frac{4}{10}\cos^2\left(-20+\frac{\pi}{2}\right) + -\frac{8}{21}\cos^2\left(-15+\frac{\pi}{2}\right) + \frac{2}{3}\cos^2\left(-10+\frac{\pi}{2}\right) + -\frac{4}{6}\cos^2\left(-10+\frac{\pi}{2}\right) - 2\cos^2\left(-5+\frac{\pi}{2}\right)$$

$$\frac{2\sin^2(5)}{1-2} + \frac{2^2\sin^2(2\times5)}{2(1-2^2)} + \frac{2^3\sin^2(3\times5)}{3(1-2^3)} + \frac{2\sin^2(2\times5)}{1+2} + \frac{2^2\sin^2(4\times5)}{2(1+2^2)} + \frac{2^3\sin^2(6\times5)}{3(1+2^3)} = -2\left(-\cos\left(5+\frac{\pi}{2}\right)\right)^2 + \frac{2}{3}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2 + -\frac{4}{6}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2 + -\frac{8}{21}\left(-\cos\left(15+\frac{\pi}{2}\right)\right)^2 + \frac{4}{10}\left(-\cos\left(20+\frac{\pi}{2}\right)\right)^2 + \frac{8}{27}\left(-\cos\left(30+\frac{\pi}{2}\right)\right)^2$$

Series representations:

$$\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}=\sum_{k=1}^{\infty}\left(\frac{(-1)^{-1+k}\,2^{2+4k}\times 3^{-3+2k}\times 5^{2k}}{(2k)!}-\frac{(-1)^{-1+k}\,2^{2+2k}\times 3^{-1+2k}\times 5^{2k}}{7(2k)!}+\frac{(-1)^{-1+k}\,2^{6k}\times 5^{-1+2k}}{(2k)!}+\frac{(-1)^k\,10^{2k}}{(2k)!}\right)$$

$$\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}=-\frac{1592}{945}+\sum_{k=1}^{\infty}\left(\frac{(-1)^{1+k}\left(2\left(5-\frac{\pi}{2}\right)\right)^{2k}}{(2k)!}-\frac{(-1)^k\,2^{2+2k}\left(15-\frac{\pi}{2}\right)^{2k}}{21(2k)!}+\frac{(-1)^k\left(2\left(20-\frac{\pi}{2}\right)\right)^{2k}}{5(2k)!}+\frac{(-1)^k\,2^{2+2k}\left(30-\frac{\pi}{2}\right)^{2k}}{27(2k)!}\right)$$

$$\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}=-\frac{2}{945}\left(945\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,5^{1+2k}}{(1+2k)!}\right)^2+180\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,15^{1+2k}}{(1+2k)!}\right)^2-189\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,20^{1+2k}}{(1+2k)!}\right)^2-140\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,30^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formulas:

$$\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}=\frac{2}{945}(111+1814\cos(10)+1516\cos(20)+1218\cos(30)+560\cos(40)+280\cos(50))\sin^2(5)$$

$$\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}=-8\cos^2\left(\frac{5}{2}\right)\sin^2\left(\frac{5}{2}\right)-\frac{32}{21}\cos^2\left(\frac{15}{2}\right)\sin^2\left(\frac{15}{2}\right)+\frac{8}{5}\cos^2(10)\sin^2(10)+\frac{32}{27}\cos^2(15)\sin^2(15)$$

1-0.47[2 sin^2(5) / (1-2) + 2^2 sin^2(2*5) / (2(1-2^2)) +2^3 sin^2(3*5) / (3(1-2^3))+ 2 sin^2(2*5) / (1+2) + 2^2 sin^2(4*5) / (2(1+2^2)) + 2^3 sin^2(6*5) / (3(1+2^3))]

Input:

$$1-0.47\left(2\times\frac{\sin^2(5)}{1-2}+2^2\times\frac{\sin^2(2\times 5)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times 5)}{3(1-2^3)}+2\times\frac{\sin^2(2\times 5)}{1+2}+2^2\times\frac{\sin^2(4\times 5)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times 5)}{3(1+2^3)}\right)$$

Result:

1.647440280265533378078395249721683209257098048140129703290...

1.64744028026… ≈ $\zeta(2)=\frac{\pi^2}{6}=1.644934$ ...

Alternative representations:

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=1-0.47\left(-2\left(\frac{1}{\csc(5)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(10)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(10)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(15)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(20)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(30)}\right)^2\right)$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=1-0.47\left(\frac{8}{27}\cos^2\left(-30+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-20+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-15+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-10+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-10+\frac{\pi}{2}\right)-2\cos^2\left(-5+\frac{\pi}{2}\right)\right)$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1-0.47\left(-2\left(-\cos\left(5+\frac{\pi}{2}\right)\right)^2+\frac{2}{3}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{4}{6}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{8}{21}\left(-\cos\left(15+\frac{\pi}{2}\right)\right)^2+\frac{4}{10}\left(-\cos\left(20+\frac{\pi}{2}\right)\right)^2+\frac{8}{27}\left(-\cos\left(30+\frac{\pi}{2}\right)\right)^2\right)$$

Series representations:

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1+\sum_{k=1}^{\infty}\frac{(-100)^k\left(-0.47-0.0895238\times 9^k+0.094\times 16^k+0.0696296\times 36^k\right)}{(2k)!}$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1.79179+\sum_{k=1}^{\infty}\frac{1}{(2k)!}e^{ik\pi}\left(0.47(10-\pi)^{2k}+0.0895238(30-\pi)^{2k}-0.094(40-\pi)^{2k}-0.0696296(60-\pi)^{2k}\right)$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$0.94\left(1.06383+\left(\sum_{k=0}^{\infty}\frac{(-1)^k 5^{1+2k}}{(1+2k)!}\right)^2+0.190476\left(\sum_{k=0}^{\infty}\frac{(-1)^k 15^{1+2k}}{(1+2k)!}\right)^2-0.2\left(\sum_{k=0}^{\infty}\frac{(-1)^k 20^{1+2k}}{(1+2k)!}\right)^2-0.148148\left(\sum_{k=0}^{\infty}\frac{(-1)^k 30^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formulas:

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1.+3.76\cos^2\left(\frac{5}{2}\right)\sin^2\left(\frac{5}{2}\right)+0.71619\cos^2\left(\frac{15}{2}\right)\sin^2\left(\frac{15}{2}\right)-0.752\cos^2(10)\sin^2(10)-0.557037\cos^2(15)\sin^2(15)$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1-0.47\left(-2\left(3\sin\left(\frac{5}{3}\right)-4\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}\left(3\sin(5)-4\sin^3(5)\right)^2+\frac{2}{5}\left(3\sin\left(\frac{20}{3}\right)-4\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}\left(3\sin(10)-4\sin^3(10)\right)^2\right)$$

$$1-0.47\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1-0.47\left(-2\left(3\cos^2\left(\frac{5}{3}\right)\sin\left(\frac{5}{3}\right)-\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}\left(3\cos^2(5)\sin(5)-\sin^3(5)\right)^2+\frac{2}{5}\left(3\cos^2\left(\frac{20}{3}\right)\sin\left(\frac{20}{3}\right)-\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}\left(3\cos^2(10)\sin(10)-\sin^3(10)\right)^2\right)$$

1-0.49[2 sin^2(5) / (1-2) + 2^2 sin^2(2*5) / (2(1-2^2)) +2^3 sin^2(3*5) / (3(1-2^3))+ 2 sin^2(2*5) / (1+2) + 2^2 sin^2(4*5) / (2(1+2^2)) + 2^3 sin^2(6*5) / (3(1+2^3))]

Input:

$$1-0.49\left(2\times\frac{\sin^2(5)}{1-2}+2^2\times\frac{\sin^2(2\times 5)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times 5)}{3(1-2^3)}+2\times\frac{\sin^2(2\times 5)}{1+2}+2^2\times\frac{\sin^2(4\times 5)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times 5)}{3(1+2^3)}\right)$$

Result:

1.674990930489598628209390792263031430927612858699284158749...

1.674990930489… result practically equal to the neutron mass

Alternative representations:

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.49\left(-2\left(\frac{1}{\csc(5)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(10)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(10)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(15)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(20)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(30)}\right)^2\right)$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.49\left(\frac{8}{27}\cos^2\left(-30+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-20+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-15+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-10+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-10+\frac{\pi}{2}\right)-2\cos^2\left(-5+\frac{\pi}{2}\right)\right)$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.49\left(-2\left(-\cos\left(5+\frac{\pi}{2}\right)\right)^2+\frac{2}{3}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{4}{6}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{8}{21}\left(-\cos\left(15+\frac{\pi}{2}\right)\right)^2+\frac{4}{10}\left(-\cos\left(20+\frac{\pi}{2}\right)\right)^2+\frac{8}{27}\left(-\cos\left(30+\frac{\pi}{2}\right)\right)^2\right)$$

Series representations:

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1+\sum_{k=1}^{\infty}\frac{(-100)^k\left(-0.49-0.0933333\times9^k+0.098\times16^k+0.0725926\times36^k\right)}{(2k)!}$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1.82548+\sum_{k=1}^{\infty}\frac{1}{(2k)!}e^{ik\pi}\left(0.49(10-\pi)^{2k}+0.0933333(30-\pi)^{2k}-0.098(40-\pi)^{2k}-0.0725926(60-\pi)^{2k}\right)$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$0.98\left(1.02041+\left(\sum_{k=0}^{\infty}\frac{(-1)^k 5^{1+2k}}{(1+2k)!}\right)^2+0.190476\left(\sum_{k=0}^{\infty}\frac{(-1)^k 15^{1+2k}}{(1+2k)!}\right)^2-0.2\left(\sum_{k=0}^{\infty}\frac{(-1)^k 20^{1+2k}}{(1+2k)!}\right)^2-0.148148\left(\sum_{k=0}^{\infty}\frac{(-1)^k 30^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formulas:

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1+3.92\cos^2\left(\frac{5}{2}\right)\sin^2\left(\frac{5}{2}\right)+0.746667\cos^2\left(\frac{15}{2}\right)\sin^2\left(\frac{15}{2}\right)-0.784\cos^2(10)\sin^2(10)-0.580741\cos^2(15)\sin^2(15)$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1-0.49\left(-2\left(3\sin\left(\frac{5}{3}\right)-4\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}\left(3\sin(5)-4\sin^3(5)\right)^2+\frac{2}{5}\left(3\sin\left(\frac{20}{3}\right)-4\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}\left(3\sin(10)-4\sin^3(10)\right)^2\right)$$

$$1-0.49\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times 5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 5)}{3(1-2^3)}+\frac{2\sin^2(2\times 5)}{1+2}+\frac{2^2\sin^2(4\times 5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 5)}{3(1+2^3)}\right)=$$
$$1-0.49\left(-2\left(3\cos^2\left(\frac{5}{3}\right)\sin\left(\frac{5}{3}\right)-\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}\left(3\cos^2(5)\sin(5)-\sin^3(5)\right)^2+\frac{2}{5}\left(3\cos^2\left(\frac{20}{3}\right)\sin\left(\frac{20}{3}\right)-\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}\left(3\cos^2(10)\sin(10)-\sin^3(10)\right)^2\right)$$

1-0.45[2 sin^2(5) / (1-2) + 2^2 sin^2(2*5) / (2(1-2^2)) +2^3 sin^2(3*5) / (3(1-2^3))+ 2 sin^2(2*5) / (1+2) + 2^2 sin^2(4*5) / (2(1+2^2)) + 2^3 sin^2(6*5) / (3(1+2^3))]

Input:

$$1-0.45\left(2\times\frac{\sin^2(5)}{1-2}+2^2\times\frac{\sin^2(2\times5)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times5)}{3(1-2^3)}+2\times\frac{\sin^2(2\times5)}{1+2}+2^2\times\frac{\sin^2(4\times5)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times5)}{3(1+2^3)}\right)$$

Result:

1.619889630041468127947399707180334987586583237580975247830...

1.61988963…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.45\left(-2\left(\frac{1}{\csc(5)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(10)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(10)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(15)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(20)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(30)}\right)^2\right)$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.45\left(\frac{8}{27}\cos^2\left(-30+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-20+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-15+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-10+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-10+\frac{\pi}{2}\right)-2\cos^2\left(-5+\frac{\pi}{2}\right)\right)$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$
$$1-0.45\left(-2\left(-\cos\left(5+\frac{\pi}{2}\right)\right)^2+\frac{2}{3}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{4}{6}\left(-\cos\left(10+\frac{\pi}{2}\right)\right)^2+-\frac{8}{21}\left(-\cos\left(15+\frac{\pi}{2}\right)\right)^2+\frac{4}{10}\left(-\cos\left(20+\frac{\pi}{2}\right)\right)^2+\frac{8}{27}\left(-\cos\left(30+\frac{\pi}{2}\right)\right)^2\right)$$

Series representations:

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=1+\sum_{k=1}^{\infty}\frac{(-100)^k\left(-0.45-0.0857143\times9^k+0.09\times16^k+0.0666667\times36^k\right)}{(2k)!}$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=1.7581+\sum_{k=1}^{\infty}\frac{1}{(2k)!}e^{ik\pi}\left(0.45(10-\pi)^{2k}+0.0857143(30-\pi)^{2k}-0.09(40-\pi)^{2k}-0.0666667(60-\pi)^{2k}\right)$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=0.9\left(1.11111+\left(\sum_{k=0}^{\infty}\frac{(-1)^k 5^{1+2k}}{(1+2k)!}\right)^2+0.190476\left(\sum_{k=0}^{\infty}\frac{(-1)^k 15^{1+2k}}{(1+2k)!}\right)^2-0.2\left(\sum_{k=0}^{\infty}\frac{(-1)^k 20^{1+2k}}{(1+2k)!}\right)^2-0.148148\left(\sum_{k=0}^{\infty}\frac{(-1)^k 30^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formulas:

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=1+3.6\cos^2\left(\frac{5}{2}\right)\sin^2\left(\frac{5}{2}\right)+0.685714\cos^2\left(\frac{15}{2}\right)\sin^2\left(\frac{15}{2}\right)-0.72\cos^2(10)\sin^2(10)-0.533333\cos^2(15)\sin^2(15)$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$

$$1-0.45\left(-2\left(3\sin\left(\frac{5}{3}\right)-4\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}(3\sin(5)-4\sin^3(5))^2+\frac{2}{5}\left(3\sin\left(\frac{20}{3}\right)-4\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}(3\sin(10)-4\sin^3(10))^2\right)$$

$$1-0.45\left(\frac{2\sin^2(5)}{1-2}+\frac{2^2\sin^2(2\times5)}{2(1-2^2)}+\frac{2^3\sin^2(3\times5)}{3(1-2^3)}+\frac{2\sin^2(2\times5)}{1+2}+\frac{2^2\sin^2(4\times5)}{2(1+2^2)}+\frac{2^3\sin^2(6\times5)}{3(1+2^3)}\right)=$$

$$1-0.45\left(-2\left(3\cos^2\left(\frac{5}{3}\right)\sin\left(\frac{5}{3}\right)-\sin^3\left(\frac{5}{3}\right)\right)^2-\frac{8}{21}(3\cos^2(5)\sin(5)-\sin^3(5))^2+\frac{2}{5}\left(3\cos^2\left(\frac{20}{3}\right)\sin\left(\frac{20}{3}\right)-\sin^3\left(\frac{20}{3}\right)\right)^2+\frac{8}{27}(3\cos^2(10)\sin(10)-\sin^3(10))^2\right)$$

For x = 2 and n = 3, we obtain:

2 sin^2(3) / (1-2) + 2^2 sin^2(2*3) / (2(1-2^2)) +2^3 sin^2(3*3) / (3(1-2^3))+ 2 sin^2(2*3) / (1+2) + 2^2 sin^2(4*3) / (2(1+2^2)) + 2^3 sin^2(6*3) / (3(1+2^3))

Input:

$$2\times\frac{\sin^2(3)}{1-2}+2^2\times\frac{\sin^2(2\times3)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times3)}{3(1-2^3)}+2\times\frac{\sin^2(2\times3)}{1+2}+2^2\times\frac{\sin^2(4\times3)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times3)}{3(1+2^3)}$$

Exact result:

$$-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}$$

Decimal approximation:

0.177738637597539198279791235923774232458804364738542155991...

0.17773863759…

Property:

$-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}$ is a transcendental number

Alternate forms:

$$-\frac{796}{945}+\cos(6)+\frac{4\cos(18)}{21}-\frac{\cos(24)}{5}-\frac{4\cos(36)}{27}$$

$$\frac{1}{945}\left(-796+945\cos(6)+180\cos(18)-189\cos(24)-140\cos(36)\right)$$

$$-\frac{2}{945}\left(945\sin^2(3)+180\sin^2(9)-189\sin^2(12)-140\sin^2(18)\right)$$

Alternative representations:

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times3)}{2\left(1-2^2\right)}+\frac{2^3\sin^2(3\times3)}{3\left(1-2^3\right)}+\frac{2\sin^2(2\times3)}{1+2}+\frac{2^2\sin^2(4\times3)}{2\left(1+2^2\right)}+\frac{2^3\sin^2(6\times3)}{3\left(1+2^3\right)}=-2\left(\frac{1}{\csc(3)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(6)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(6)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(9)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(12)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(18)}\right)^2$$

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times3)}{2\left(1-2^2\right)}+\frac{2^3\sin^2(3\times3)}{3\left(1-2^3\right)}+\frac{2\sin^2(2\times3)}{1+2}+\frac{2^2\sin^2(4\times3)}{2\left(1+2^2\right)}+\frac{2^3\sin^2(6\times3)}{3\left(1+2^3\right)}=\frac{8}{27}\cos^2\left(-18+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-12+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-9+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-6+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-6+\frac{\pi}{2}\right)-2\cos^2\left(-3+\frac{\pi}{2}\right)$$

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times3)}{2\left(1-2^2\right)}+\frac{2^3\sin^2(3\times3)}{3\left(1-2^3\right)}+\frac{2\sin^2(2\times3)}{1+2}+\frac{2^2\sin^2(4\times3)}{2\left(1+2^2\right)}+\frac{2^3\sin^2(6\times3)}{3\left(1+2^3\right)}=-2\left(-\cos\left(3+\frac{\pi}{2}\right)\right)^2+\frac{2}{3}\left(-\cos\left(6+\frac{\pi}{2}\right)\right)^2+-\frac{4}{6}\left(-\cos\left(6+\frac{\pi}{2}\right)\right)^2+-\frac{8}{21}\left(-\cos\left(9+\frac{\pi}{2}\right)\right)^2+\frac{4}{10}\left(-\cos\left(12+\frac{\pi}{2}\right)\right)^2+\frac{8}{27}\left(-\cos\left(18+\frac{\pi}{2}\right)\right)^2$$

Series representations:

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times3)}{2\left(1-2^2\right)}+\frac{2^3\sin^2(3\times3)}{3\left(1-2^3\right)}+\frac{2\sin^2(2\times3)}{1+2}+\frac{2^2\sin^2(4\times3)}{2\left(1+2^2\right)}+\frac{2^3\sin^2(6\times3)}{3\left(1+2^3\right)}=\sum_{k=1}^{\infty}\frac{(-4)^k\,3^{-3+2k}\left(945-35\times4^{1+k}\times9^k+20\times9^{1+k}-189\times16^k\right)}{35\,(2k)!}$$

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times 3)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 3)}{3(1-2^3)}+\frac{2\sin^2(2\times 3)}{1+2}+\frac{2^2\sin^2(4\times 3)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 3)}{3(1+2^3)}=$$
$$-\frac{1592}{945}+\sum_{k=1}^{\infty}\left(\frac{(-1)^{1+k}\left(2\left(3-\frac{\pi}{2}\right)\right)^{2k}}{(2k)!}-\frac{(-1)^k\,2^{2+2k}\left(9-\frac{\pi}{2}\right)^{2k}}{21\,(2k)!}+\frac{(-1)^k\left(2\left(12-\frac{\pi}{2}\right)\right)^{2k}}{5\,(2k)!}+\frac{(-1)^k\,2^{2+2k}\left(18-\frac{\pi}{2}\right)^{2k}}{27\,(2k)!}\right)$$

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times 3)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 3)}{3(1-2^3)}+\frac{2\sin^2(2\times 3)}{1+2}+\frac{2^2\sin^2(4\times 3)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 3)}{3(1+2^3)}=-\frac{2}{945}\left(945\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,3^{1+2k}}{(1+2k)!}\right)^2+180\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,9^{1+2k}}{(1+2k)!}\right)^2-189\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,12^{1+2k}}{(1+2k)!}\right)^2-140\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,18^{1+2k}}{(1+2k)!}\right)^2\right)$$

Multiple-argument formula:

$$\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(2\times 3)}{2(1-2^2)}+\frac{2^3\sin^2(3\times 3)}{3(1-2^3)}+\frac{2\sin^2(2\times 3)}{1+2}+\frac{2^2\sin^2(4\times 3)}{2(1+2^2)}+\frac{2^3\sin^2(6\times 3)}{3(1+2^3)}=$$
$$\frac{2}{945}\,(111+1814\cos(6)+1516\cos(12)+1218\cos(18)+560\cos(24)+280\cos(30))\sin^2(3)$$

[(((2 sin^2(3) / (1-2) + 2^2 sin^2(2*3) / (2(1-2^2)) +2^3 sin^2(3*3) / (3(1-2^3))+ 2 sin^2(2*3) / (1+2) + 2^2 sin^2(4*3) / (2(1+2^2)) + 2^3 sin^2(6*3) / (3(1+2^3))))))]^1/256

Input:

$$\left(2\times\frac{\sin^2(3)}{1-2}+2^2\times\frac{\sin^2(2\times 3)}{2(1-2^2)}+2^3\times\frac{\sin^2(3\times 3)}{3(1-2^3)}+2\times\frac{\sin^2(2\times 3)}{1+2}+2^2\times\frac{\sin^2(4\times 3)}{2(1+2^2)}+2^3\times\frac{\sin^2(6\times 3)}{3(1+2^3)}\right)\verb|^|(1/256)$$

Exact result:

$$\sqrt[256]{-2\sin^2(3) - \frac{8\sin^2(9)}{21} + \frac{2\sin^2(12)}{5} + \frac{8\sin^2(18)}{27}}$$

Decimal approximation:

0.993274898457990358581491928013425008735737555382025977372...

0.99327489… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

Property:

$$\sqrt[256]{-2\sin^2(3) - \frac{8\sin^2(9)}{21} + \frac{2\sin^2(12)}{5} + \frac{8\sin^2(18)}{27}}$$ is a transcendental number

Alternate forms:

$$\sqrt[256]{-\frac{796}{945} + \cos(6) + \frac{4\cos(18)}{21} - \frac{\cos(24)}{5} - \frac{4\cos(36)}{27}}$$

$$\frac{\sqrt[256]{\frac{1}{35}(-796 + 945\cos(6) + 180\cos(18) - 189\cos(24) - 140\cos(36))}}{3^{3/256}}$$

$$\frac{\sqrt[256]{\frac{2}{35}(-945\sin^2(3) - 180\sin^2(9) + 189\sin^2(12) + 140\sin^2(18))}}{3^{3/256}}$$

1/2*log base 0.99327489845799 [(((2 sin^2(3)/(1-2) + 2^2 sin^2(6)/(2(1-2^2)) +2^3 sin^2(9)/(3(1-2^3))+ 2 sin^2(6)/(1+2) + 2^2 sin^2(12)/(2(1+2^2)) + 2^3 sin^2(18)/(3(1+2^3)))))] -Pi+1/golden ratio

Input interpretation:

$$\frac{1}{2}\log_{0.99327489845799}\left(2\times\frac{\sin^2(3)}{1-2}+2^2\times\frac{\sin^2(6)}{2(1-2^2)}+2^3\times\frac{\sin^2(9)}{3(1-2^3)}+2\times\frac{\sin^2(6)}{1+2}+2^2\times\frac{\sin^2(12)}{2(1+2^2)}+2^3\times\frac{\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.476441335...

125.476441335... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representations:

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{\phi}+\frac{\log\left(-2\sin^2(3)+\frac{2\sin^2(6)}{3}+-\frac{4}{6}\sin^2(6)+-\frac{8}{21}\sin^2(9)+\frac{4\sin^2(12)}{10}+\frac{8\sin^2(18)}{27}\right)}{2\log(0.993274898457990000)}$$

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{2}\log_{0.993274898457990000}\left(-2\left(\frac{1}{\csc(3)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(6)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(6)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(9)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(12)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(18)}\right)^2\right)+\frac{1}{\phi}$$

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}=$$
$$-\pi+\frac{1}{2}\log_{0.993274898457990000}\left(\frac{8}{27}\cos^2\left(-18+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-12+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-9+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-6+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-6+\frac{\pi}{2}\right)-2\cos^2\left(-3+\frac{\pi}{2}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)^k}{k}}{2\log(0.993274898457990000)}$$

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{\phi}=\frac{1.000000000000000}{\phi}-1.000000000000000\,\pi+\log\left(-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)\left(-74.0983197802482-0.5000000000000000\sum_{k=0}^{\infty}(-0.006725101542010000)^k\,G(k)\right)$$
$$\text{for}\left(G(0)=0\text{ and }\frac{(-1)^k\,k}{2(1+k)(2+k)}+G(k)=\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

$$\frac{1}{2}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)-$$

$$\pi+\frac{1}{\phi}=\frac{1.000000000000000}{\phi}-1.000000000000000\,\pi+$$
$$\log\left(-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)\left(-74.0983197802482-\right.$$
$$\left.0.5000000000000000\sum_{k=0}^{\infty}(-0.00672510154201000)^k\,G(k)\right)$$
$$\text{for}\ \left(G(0)=0\ \text{and}\ G(k)=\frac{(-1)^{1+k}k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

From which:

1/2*log base 0.99327489845799 [(((2 sin^2(3)/(1-2) + 2^2 sin^2(6)/(2(1-2^2)) +2^3 sin^2(9)/(3(1-2^3))+ 2 sin^2(6)/(1+2) + 2^2 sin^2(12)/(2(1+2^2)) + 2^3 sin^2(18)/(3(1+2^3)))))] -Pi+1/x = 125.47644133

Input interpretation:

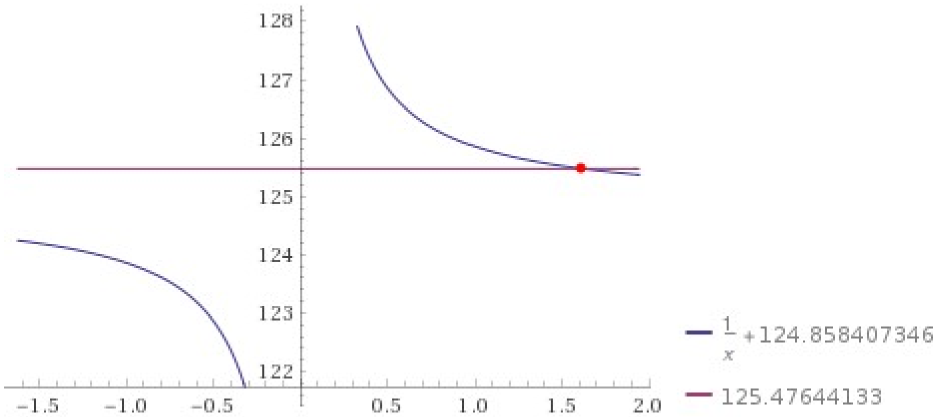
$$\frac{1}{2}\log_{0.99327489845799}\left(2\times\frac{\sin^2(3)}{1-2}+2^2\times\frac{\sin^2(6)}{2(1-2^2)}+2^3\times\frac{\sin^2(9)}{3(1-2^3)}+2\times\frac{\sin^2(6)}{1+2}+2^2\times\frac{\sin^2(12)}{2(1+2^2)}+2^3\times\frac{\sin^2(18)}{3(1+2^3)}\right)-\pi+\frac{1}{x}=125.47644133$$

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

Result:

$$\frac{1}{x}+124.858407346=125.47644133$$

Plot:



Alternate form assuming x is real:

$$\frac{1.6180340}{x} = 1.00000000$$

Alternate form:

$$\frac{124.858407346\,(1.00000000000\,x + 0.0080090722063)}{x} = 125.47644133$$

Alternate form assuming x is positive:

$1.00000000\,x = 1.6180340$ (for $x \neq 0$)

Solution:

$x \approx 1.6180340$

1.6180340 result that is the value of the golden ratio 1,618033988749...

1/16*log base 0.99327489845799 [(((2 sin^2(3)/(1-2) + 2^2 sin^2(6)/(2(1-2^2)) +2^3 sin^2(9)/(3(1-2^3))+ 2 sin^2(6)/(1+2) + 2^2 sin^2(12)/(2(1+2^2)) + 2^3 sin^2(18)/(3(1+2^3))))]+1/golden ratio

Input interpretation:

$$\frac{1}{16}\log_{0.99327489845799}\left(2\times\frac{\sin^2(3)}{1-2}+2^2\times\frac{\sin^2(6)}{2\left(1-2^2\right)}+2^3\times\frac{\sin^2(9)}{3\left(1-2^3\right)}+2\times\frac{\sin^2(6)}{1+2}+2^2\times\frac{\sin^2(12)}{2\left(1+2^2\right)}+2^3\times\frac{\sin^2(18)}{3\left(1+2^3\right)}\right)+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

16.6180339887...

16.6180339887… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representations:

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1}{\phi}+\frac{\log\left(-2\sin^2(3)+\frac{2\sin^2(6)}{3}+-\frac{4}{6}\sin^2(6)+-\frac{8}{21}\sin^2(9)+\frac{4\sin^2(12)}{10}+\frac{8\sin^2(18)}{27}\right)}{16\log(0.993274898457990000)}$$

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1}{16}\log_{0.993274898457990000}\left(-2\left(\frac{1}{\csc(3)}\right)^2+\frac{2}{3}\left(\frac{1}{\csc(6)}\right)^2+-\frac{4}{6}\left(\frac{1}{\csc(6)}\right)^2+-\frac{8}{21}\left(\frac{1}{\csc(9)}\right)^2+\frac{4}{10}\left(\frac{1}{\csc(12)}\right)^2+\frac{8}{27}\left(\frac{1}{\csc(18)}\right)^2\right)+\frac{1}{\phi}$$

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1}{16}\log_{0.993274898457990000}\left(\frac{8}{27}\cos^2\left(-18+\frac{\pi}{2}\right)+\frac{4}{10}\cos^2\left(-12+\frac{\pi}{2}\right)+-\frac{8}{21}\cos^2\left(-9+\frac{\pi}{2}\right)+\frac{2}{3}\cos^2\left(-6+\frac{\pi}{2}\right)+-\frac{4}{6}\cos^2\left(-6+\frac{\pi}{2}\right)-2\cos^2\left(-3+\frac{\pi}{2}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1}{\phi}-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)^k}{k}}{16\log(0.993274898457990000)}$$

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1.000000000000000}{\phi}+\log\left(-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)\left(-9.26228997253103-0.0625000000000000\sum_{k=0}^{\infty}(-0.00672510154201000)^k\,G(k)\right)$$

$$\text{for}\left(G(0)=0\text{ and }\frac{(-1)^k k}{2(1+k)(2+k)}+G(k)=\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

$$\frac{1}{16}\log_{0.993274898457990000}\left(\frac{2\sin^2(3)}{1-2}+\frac{2^2\sin^2(6)}{2(1-2^2)}+\frac{2^3\sin^2(9)}{3(1-2^3)}+\frac{2\sin^2(6)}{1+2}+\frac{2^2\sin^2(12)}{2(1+2^2)}+\frac{2^3\sin^2(18)}{3(1+2^3)}\right)+\frac{1}{\phi}=\frac{1.000000000000000}{\phi}+\log\left(-2\sin^2(3)-\frac{8\sin^2(9)}{21}+\frac{2\sin^2(12)}{5}+\frac{8\sin^2(18)}{27}\right)\left(-9.26228997253103-0.0625000000000000\sum_{k=0}^{\infty}(-0.00672510154201000)^k\,G(k)\right)$$

$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k} k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

Now, we have that:

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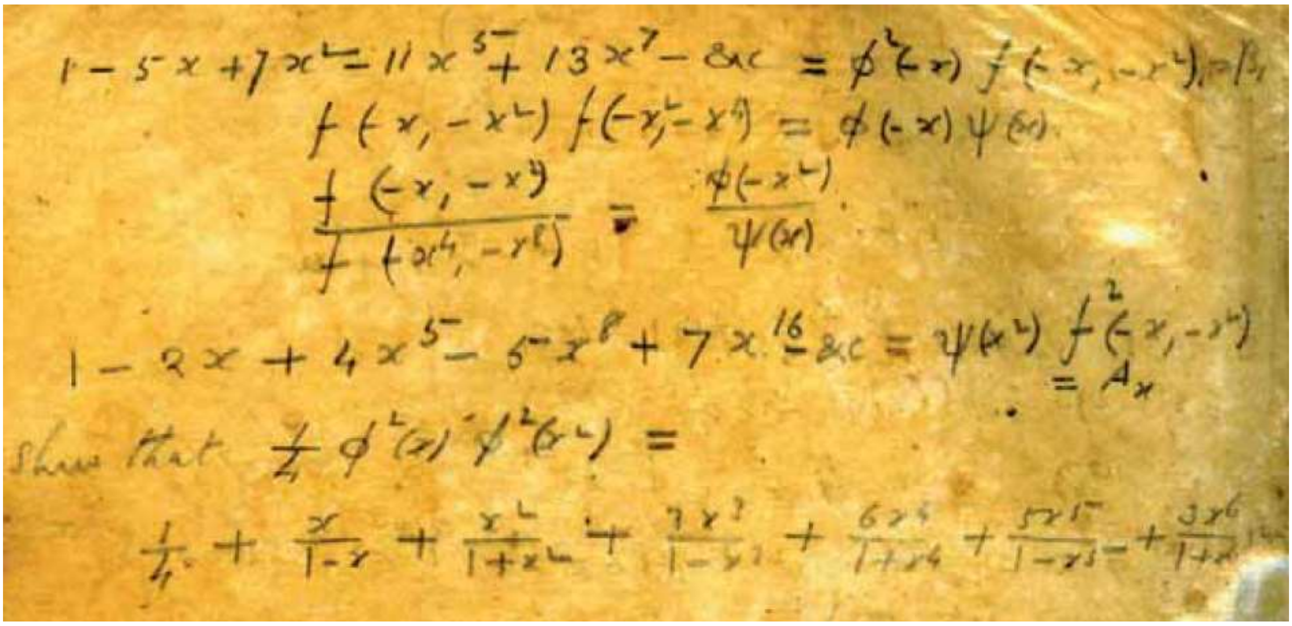


$1-5x+7x^2-11x^5+13x^7-\&c=\phi^2(-x)\,f(-x,-x^4)$

$f(-x,-x^2)\,f(-x^2,-x^4)=\phi(-x)\,\psi(x)$

$\dfrac{f(-x,-x^4)}{f(-x^4,-x^6)}=\dfrac{\phi(-x^2)}{\psi(x)}$

$1-2x+4x^5-5x^8+7x^{16}-\&c=\psi(x^2)\,f^2(-x,-x^3)=A_x$

Show that $\frac{1}{4}\phi^2(x)\psi^2(x^2)=$

$\frac{1}{4}+\frac{x}{1-x}+\frac{x^2}{1+x^2}+\frac{7x^3}{1-x^3}+\frac{6x^4}{1+x^4}+\frac{5x^5}{1-x^5}+\frac{3x^6}{1+x^6}$

For x = 2, we have that:

1/4 + 2/(1-2) + 2^2/(1+2^2)+7*2^3/(1-2^3)+6*2^4/(1+2^4)+5*2^5/(1-2^5)+3*2^6/(1+2^6)

Input:

$$\frac{1}{4} + \frac{2}{1-2} + \frac{2^2}{1+2^2} + 7\times\frac{2^3}{1-2^3} + 6\times\frac{2^4}{1+2^4} + 5\times\frac{2^5}{1-2^5} + 3\times\frac{2^6}{1+2^6}$$

Exact result:

$$-\frac{755033}{137020}$$

Decimal approximation:

-5.5103853452050795504305940738578309735804991971974894176O...

-5.5103853452...

-3[1/4 + 2/(1-2) + 2^2/(1+2^2)+7*2^3/(1-2^3)+6*2^4/(1+2^4)+5*2^5/(1-2^5)+3*2^6/(1+2^6)]

Input:

$$-3\left(\frac{1}{4} + \frac{2}{1-2} + \frac{2^2}{1+2^2} + 7\times\frac{2^3}{1-2^3} + 6\times\frac{2^4}{1+2^4} + 5\times\frac{2^5}{1-2^5} + 3\times\frac{2^6}{1+2^6}\right)$$

Exact result:

$$\frac{2265099}{137020}$$

Decimal approximation:

16.531156035615238651291782221573492920741497591592468252 80...

16.531156035... result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

(1/((([1/4 + 2/(1-2) + 2^2/(1+2^2)+7*2^3/(1-2^3)+6*2^4/(1+2^4)+5*2^5/(1-2^5)+3*2^6/(1+2^6)]^1/256))))

Input:

$$\frac{1}{\sqrt[256]{\frac{1}{4}+\frac{2}{1-2}+\frac{2^2}{1+2^2}+7\times\frac{2^3}{1-2^3}+6\times\frac{2^4}{1+2^4}+5\times\frac{2^5}{1-2^5}+3\times\frac{2^6}{1+2^6}}}$$

Result:

$$-(-1)^{255/256}\sqrt[256]{\frac{34\,255}{755\,033}}\sqrt[128]{2}$$

Decimal approximation:

0.9932808330005471077535463741781621366345022946651107221... − 0.01219000165534346639936622310037115254954768885455588314... i

Polar coordinates:

$r \approx 0.993356$ (radius), $\theta \approx -0.703125°$ (angle)

0.993356 result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243 = \phi}$

Alternate forms:

$$-\frac{\sqrt[128]{2}\,\sqrt[256]{34\,255}\,(-755\,033)^{255/256}}{755\,033}$$

$$\sqrt[256]{\frac{34\,255}{755\,033}}\sqrt[128]{2}\cos\left(\frac{\pi}{256}\right)-i\sqrt[256]{\frac{34\,255}{755\,033}}\sqrt[128]{2}\sin\left(\frac{\pi}{256}\right)$$

$$-\sqrt[256]{\frac{34\,255}{755\,033}}\sqrt[128]{2}\,e^{(255\,i\,\pi)/256}$$

(((((i^2(((1/2log base 0.993356 (i^2/((([1/4 + 2/(1-2) + 2^2/(1+2^2)+7*2^3/(1-2^3)+6*2^4/(1+2^4)+5*2^5/(1-2^5)+3*2^6/(1+2^6)])))))))i+(Pi-1/golden ratio)i)))))*i

Input interpretation:

$$\left(i^2\left(\frac{1}{2}\log_{0.993356}\left(\frac{i^2}{\frac{1}{4}+\frac{2}{1-2}+\frac{2^2}{1+2^2}+7\times\frac{2^3}{1-2^3}+6\times\frac{2^4}{1+2^4}+5\times\frac{2^5}{1-2^5}+3\times\frac{2^6}{1+2^6}}\right)\right)i+\left(\pi-\frac{1}{\phi}\right)i\right)i$$

ϕ is the golden ratio

Result:

125.483576903250271150143334234310664077232502082048959440 8...

125.483576903… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\left(\frac{1}{2}\left(i^2 i\right)\log_{0.993356}\left(\frac{i^2}{\frac{1}{4}+\frac{2}{1-2}+\frac{2^2}{1+2^2}+\frac{7\times2^3}{1-2^3}+\frac{6\times2^4}{1+2^4}+\frac{5\times2^5}{1-2^5}+\frac{3\times2^6}{1+2^6}}\right)+\left(\pi-\frac{1}{\phi}\right)i\right)i = i\left(i\left(\pi-\frac{1}{\phi}\right)+\frac{i\log\left(\frac{i^2}{-2+-\frac{56}{7}+\frac{1}{4}+\frac{4}{5}+\frac{6\times2^4}{1+2^4}+\frac{5\times2^5}{1-2^5}+\frac{3\times2^6}{1+2^6}}\right)i^2}{2\log(0.993356)}\right)$$

Series representations:

$$\left(\frac{1}{2}\left(i^2 i\right)\log_{0.993356}\left(\frac{i^2}{\frac{1}{4}+\frac{2}{1-2}+\frac{2^2}{1+2^2}+\frac{7\times2^3}{1-2^3}+\frac{6\times2^4}{1+2^4}+\frac{5\times2^5}{1-2^5}+\frac{3\times2^6}{1+2^6}}\right)+\left(\pi-\frac{1}{\phi}\right)i\right)i = -\frac{i^2}{\phi}+i^2\pi-\frac{i^4\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{137020\,i^2}{755033}\right)^k}{k}}{2\log(0.993356)}$$

$$\left(\frac{1}{2}\left(i^2 i\right)\log_{0.993356}\left(\frac{i^2}{\frac{1}{4}+\frac{2}{1-2}+\frac{2^2}{1+2^2}+\frac{7\times 2^3}{1-2^3}+\frac{6\times 2^4}{1+2^4}+\frac{5\times 2^5}{1-2^5}+\frac{3\times 2^6}{1+2^6}}\right)+\left(\pi-\frac{1}{\phi}\right)i\right)i =$$

$$-\frac{i^2}{\phi}+i^2\pi-75.0059\,i^4\log\left(-\frac{137020\,i^2}{755033}\right)-$$

$$0.5\,i^4\log\left(-\frac{137020\,i^2}{755033}\right)\sum_{k=0}^{\infty}(-0.006644)^k\,G(k)$$

$$\text{for }\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

for x = 0.83, we obtain:

1/4 + 0.83/(1-0.83) + 0.83^2/(1+0.83^2)+7*0.83^3/(1-0.83^3)+6*0.83^4/(1+0.83^4)+5*0.83^5/(1-0.83^5)+3*0.83^6/(1+0.83^6)

Input:

$$\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+7\times\frac{0.83^3}{1-0.83^3}+6\times\frac{0.83^4}{1+0.83^4}+5\times\frac{0.83^5}{1-0.83^5}+3\times\frac{0.83^6}{1+0.83^6}$$

Result:

20.806989089715743967052362121550032787722799294753398325 38...

20.806989089.... result very near to the Fibonacci number 21

(((1/4 + 0.83/(1-0.83) + 0.83^2/(1+0.83^2)+7*0.83^3/(1-0.83^3)+6*0.83^4/(1+0.83^4)+5*0.83^5/(1-0.83^5)+3*0.83^6/(1+0.83^6))))-5+1/golden ratio

Input:

$$\left(\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+7\times\frac{0.83^3}{1-0.83^3}+6\times\frac{0.83^4}{1+0.83^4}+5\times\frac{0.83^5}{1-0.83^5}+3\times\frac{0.83^6}{1+0.83^6}\right)-5+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

16.425023078465638815256948955915670905443108474559161187 51...

16.425023078… result very near to the mass of the hypothetical light particle, the boson $m_X = 16.84$ MeV

Alternative representations:

$$\left(\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}\right)-5+\frac{1}{\phi}=$$
$$-5+\frac{0.83}{0.17}+\frac{1}{4}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}+\frac{1}{2\sin(54^\circ)}$$

$$\left(\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}\right)-5+\frac{1}{\phi}=$$
$$-5+\frac{0.83}{0.17}+\frac{1}{4}+-\frac{1}{2\cos(216^\circ)}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}$$

$$\left(\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}\right)-5+\frac{1}{\phi}=$$
$$-5+\frac{0.83}{0.17}+\frac{1}{4}+\frac{0.83^2}{1+0.83^2}+\frac{7\times 0.83^3}{1-0.83^3}+\frac{6\times 0.83^4}{1+0.83^4}+\frac{5\times 0.83^5}{1-0.83^5}+\frac{3\times 0.83^6}{1+0.83^6}+-\frac{1}{2\sin(666^\circ)}$$

1/(((1/4 + 0.83/(1-0.83) + 0.83^2/(1+0.83^2)+7*0.83^3/(1-0.83^3)+6*0.83^4/(1+0.83^4)+5*0.83^5/(1-0.83^5)+3*0.83^6/(1+0.83^6))))^1/512

Input:

$$\frac{1}{\sqrt[512]{\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+7\times\frac{0.83^3}{1-0.83^3}+6\times\frac{0.83^4}{1+0.83^4}+5\times\frac{0.83^5}{1-0.83^5}+3\times\frac{0.83^6}{1+0.83^6}}}$$

Result:

0.99408924…

0.99408924... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$

1/4*log base 0.99408924((1/(((1/4 + 0.83/(1-0.83) + 0.83^2/(1+0.83^2)+7*0.83^3/(1-0.83^3)+6*0.83^4/(1+0.83^4)+5*0.83^5/(1-0.83^5)+3*0.83^6/(1+0.83^6))))))-Pi+1/golden ratio

Input interpretation:

$$\frac{1}{4}\log_{0.99408924}\left(\frac{1}{\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+7\times\frac{0.83^3}{1-0.83^3}+6\times\frac{0.83^4}{1+0.83^4}+5\times\frac{0.83^5}{1-0.83^5}+3\times\frac{0.83^6}{1+0.83^6}}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764636981497716290964179374465813945660685073705472317...

125.476463698… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Alternative representation:

$$\frac{1}{4}\log_{0.994089}\left(\frac{1}{\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times0.83^3}{1-0.83^3}+\frac{6\times0.83^4}{1+0.83^4}+\frac{5\times0.83^5}{1-0.83^5}+\frac{3\times0.83^6}{1+0.83^6}}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{\frac{0.83}{0.17}+\frac{1}{4}+\frac{0.83^2}{1+0.83^2}+\frac{7\times0.83^3}{1-0.83^3}+\frac{6\times0.83^4}{1+0.83^4}+\frac{5\times0.83^5}{1-0.83^5}+\frac{3\times0.83^6}{1+0.83^6}}\right)}{4\log(0.994089)}$$

Series representations:

$$\frac{1}{4}\log_{0.994089}\left(\frac{1}{\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times0.83^3}{1-0.83^3}+\frac{6\times0.83^4}{1+0.83^4}+\frac{5\times0.83^5}{1-0.83^5}+\frac{3\times0.83^6}{1+0.83^6}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k(-0.951939)^k}{k}}{4\log(0.994089)}$$

$$\frac{1}{4}\log_{0.994089}\left(\frac{1}{\frac{1}{4}+\frac{0.83}{1-0.83}+\frac{0.83^2}{1+0.83^2}+\frac{7\times0.83^3}{1-0.83^3}+\frac{6\times0.83^4}{1+0.83^4}+\frac{5\times0.83^5}{1-0.83^5}+\frac{3\times0.83^6}{1+0.83^6}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-42.1707\log(0.0480608)-\frac{1}{4}\log(0.0480608)\sum_{k=0}^{\infty}(-0.00591076)^k\,G(k)$$
$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

For x = 0.508, we obtain:

1/4 + 0.508/(1-0.508) + 0.508^2/(1+0.508^2)+7*0.508^3/(1-0.508^3)+6*0.508^4/(1+0.508^4)+5*0.508^5/(1-0.508^5)+3*0.508^6/(1+0.508^6)

Input:

$$\frac{1}{4}+\frac{0.508}{1-0.508}+\frac{0.508^2}{1+0.508^2}+7\times\frac{0.508^3}{1-0.508^3}+6\times\frac{0.508^4}{1+0.508^4}+5\times\frac{0.508^5}{1-0.508^5}+3\times\frac{0.508^6}{1+0.508^6}$$

Result:

3.14417894331636718821490094758586047733698264867038977337...

3.144178943... ≈ π

1/6*[1/4 + 0.508/(1-0.508) + 0.508^2/(1+0.508^2)+7*0.508^3/(1-0.508^3)+6*0.508^4/(1+0.508^4)+5*0.508^5/(1-0.508^5)+3*0.508^6/(1+0.508^6)]^2

Input:

$$\frac{1}{6}\left(\frac{1}{4}+\frac{0.508}{1-0.508}+\frac{0.508^2}{1+0.508^2}+7\times\frac{0.508^3}{1-0.508^3}+6\times\frac{0.508^4}{1+0.508^4}+5\times\frac{0.508^5}{1-0.508^5}+3\times\frac{0.508^6}{1+0.508^6}\right)^2$$

Result:

1.647643537932337891997151139039903492629411611839298592652...

1.647643537.... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Example of physical application of Ramanujan's mathematics

From:

The Current Ability to Test Theories of Gravity with Black Hole Shadows
Yosuke Mizuno, Ziri Younsi, Christian M. Fromm, Oliver Porth, Mariafelicia De Laurentis, Hector Olivares, Heino Falcke, Michael Kramer, and Luciano Rezzolla

Supplementary Information: The Current Ability to Test Theories of Gravity with Black Hole Shadows
Yosuke Mizuno, Ziri Younsi, Christian M. Fromm, Oliver Porth, Mariafelicia De Laurentis, Hector Olivares, Heino Falcke, Michael Kramer and Luciano Rezzolla - arXiv:1804.05812v1 [astro-ph.GA] 16 Apr 2018

Location of characteristic radii for Kerr BH and dilaton BH

$$\hat{b}_{\rm h} = \frac{1}{2}\left(M - \sqrt{M^2 - a^2}\right) . \tag{19}$$

1/2*(((13.12806e+39-sqrt(((13.12806e+39)^2-(0.6*13.12806e+39)^2)))))

Input interpretation:

$$\frac{1}{2}\left(13.12806\times 10^{39} - \sqrt{(13.12806\times 10^{39})^2 - (0.6\times 13.12806\times 10^{39})^2}\right)$$

Result:

1 312 806 000 000 000 000 000 000 000 000 000 000 000 000

Scientific notation:

1.312806×10^{39}

$1.312806*10^{39}$

Similarly, the ISCO for particles circulating in the equatorial plane may be determined by setting to zero the effective potential, along with its first and second derivatives, and solving for r. For a spherically-symmetric spacetime this yields[10]

$$E^2 \frac{d^2 g_{\phi\phi}}{dr^2} + L_z^2 \frac{d^2 g_{tt}}{dr^2} + \frac{d^2}{dr^2}\left(g_{tt} g_{\phi\phi}\right) = 0\,, \tag{20}$$

where the particle's energy, E, and angular momentum, L_z, are given respectively by

$$\begin{aligned} E &:= -u^t g_{tt}\,, && (21)\\ L_z &:= \Omega\, u^t g_{\phi\phi}\,, && (22) \end{aligned}$$

and where Ω (angular velocity) and u^t are then given by

$$\begin{aligned} \Omega &:= \frac{u^\phi}{u^t} = \left(-\frac{dg_{tt}}{dr} \Big/ \frac{dg_{\phi\phi}}{dr}\right)^{1/2}, && (23)\\ u^t &= \left(-g_{tt} - \Omega^2 g_{\phi\phi}\right)^{-1/2}. && (24) \end{aligned}$$

Solving Eq. (20) with Eqs. (21)–(24) yields the ISCO radius of the dilation BH as

$$r_{\rm ISCO} = 2M\left(\mathcal{B} + \mathcal{B}^2 + \mathcal{B}^3\right)\,, \tag{25}$$

where $\mathcal{B}$ is defined as

$$\mathcal{B} := \left(1 - \frac{\hat{b}}{M}\right)^{1/3}. \tag{26}$$

Similar to the derivation of (19), equating the dilaton ISCO radius and the Kerr ISCO radius ($r_{\rm K,ISCO}$, see Bardeen et al. 1972[11]), the dilaton parameter as a function of a is obtained as

$$\hat{b}_{\rm ISCO} = M\left[1 + \frac{1}{27}\left(1 + \sigma - \frac{2}{\sigma}\right)^3\right], \tag{27}$$

where σ is defined as

$$\sigma^3 := \frac{-14M + 3\left(-9\, r_{\rm K,ISCO} + \sqrt{36M^2 + 84M\, r_{\rm K,ISCO} + 81\, r_{\rm K,ISCO}^2}\right)}{4M}. \tag{28}$$

Finally, the radius of the (unstable) photon orbit may be calculated from Eq. (24) as

$$r_{\rm photon} = \frac{1}{2}\left[3(M-b) + \sqrt{(M-b)(9M-b)}\right], \tag{29}$$

from which upon equating with the expression for the Kerr photon orbit radius yields the dilaton parameter expressed in terms of a as

$$\hat{b}_{\rm photon} = \frac{1}{2}M\left(-2 - 3\mathcal{C} + \sqrt{8 + \mathcal{C}(\mathcal{C}+8)}\right), \tag{30}$$

where $\mathcal{C}$ is defined as

$$\mathcal{C} := \cos\left[\frac{2}{3}\cos^{-1}\left(-\frac{a}{M}\right)\right]. \tag{31}$$

Recalling that in the Letter the Kerr spin parameter is specified to be $a = 0.6\,M$, which gives $r_{\rm K,ISCO} = 3.829\,M$, the corresponding values of the dilaton parameter for which the Kerr BH and dilaton BH event horizon, photon orbit, and ISCO radii coincide are $\hat{b} = 0.1\,M$, $0.339\,M$, and $0.504\,M$, respectively.

From:

$$\hat{b}_{\text{photon}} = \frac{1}{2}M\left(-2 - 3\mathcal{C} + \sqrt{8 + \mathcal{C}(\mathcal{C}+8)}\right) , \qquad (30)$$

$$\mathcal{C} := \cos\left[\frac{2}{3}\cos^{-1}\left(-\frac{a}{M}\right)\right] . \qquad (31)$$

we obtain:

cos(2/3 cos^-1(-0.6)) = 0.0944570

Input:

$$\cos\left(\frac{2}{3}\cos^{-1}(-0.6)\right)$$

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

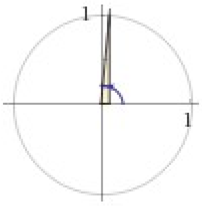
Result:

0.0944570...

(result in radians)

0.0944570... = $\mathcal{C}$

Reference triangle for angle 1.476 radians:



width	$\cos(1.4762) = 0.094457$
height	$\sin(1.4762) = 0.995529$

Alternative representations:

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \cosh\left(\frac{2}{3}\,i\cos^{-1}(-0.6)\right)$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \cosh\left(-\frac{2}{3}\,i\cos^{-1}(-0.6)\right)$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \frac{1}{2}\left(e^{-2/3\,i\cos^{-1}(-0.6)} + e^{2/3\,i\cos^{-1}(-0.6)}\right)$$

Series representations:

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \sum_{k=0}^{\infty} \frac{\left(-\frac{4}{9}\right)^k \cos^{-1}(-0.6)^{2k}}{(2k)!}$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = -\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{\pi}{2} + \frac{2}{3}\cos^{-1}(-0.6)\right)^{1+2k}}{(1+2k)!}$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \sum_{k=0}^{\infty} \frac{\cos\left(\frac{k\pi}{2} + z_0\right)\left(\frac{2}{3}\cos^{-1}(-0.6) - z_0\right)^k}{k!}$$

Integral representations:

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = -\int_{\frac{\pi}{2}}^{\frac{2}{3}\cos^{-1}(-0.6)} \sin(t)\,dt$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = 1 - \frac{2}{3}\cos^{-1}(-0.6)\int_0^1 \sin\left(\frac{2}{3}\,t\cos^{-1}(-0.6)\right)dt$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \frac{\sqrt{\pi}}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{e^{s-\cos^{-1}(-0.6)^2/(9s)}}{\sqrt{s}}\,ds \quad \text{for } \gamma > 0$$

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) = \frac{\sqrt{\pi}}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{9^s \cos^{-1}(-0.6)^{-2s}\,\Gamma(s)}{\Gamma\left(\frac{1}{2} - s\right)}\,ds \quad \text{for } 0 < \gamma < \frac{1}{2}$$

Continued fraction representation:

$$\cos\left(\frac{1}{3}\cos^{-1}(-0.6)\,2\right) =$$

$$\cos\left(\frac{\pi}{3} + \frac{0.4\sqrt{0.64}}{1 + \underset{k=1}{\overset{\infty}{\mathrm{K}}} \frac{-0.72\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{1+2k}}\right) = \sin\left(\frac{\pi}{6} - \frac{0.32}{1 + -\frac{0.72}{3-\frac{0.72}{5-\frac{4.32}{7-\frac{4.32}{9+\dots}}}}}\right)$$

Now, we analyzed this continued fraction:

sin(π/6 - 0.32/(1 + -0.72/(3 - 0.72/(5 - 4.32/(7 - 4.32/(9))))))

Input:

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3-\frac{0.72}{5-\frac{4.32}{7-\frac{4.32}{9}}}}}\right)$$

Result:

0.0944701...

0.0944701…

Addition formulas:

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3-\frac{0.72}{5-\frac{4.32}{7-\frac{4.32}{9}}}}}\right) = \cos\left(\frac{\pi}{6}\right)\sin(-0.428988) + \cos(-0.428988)\sin\left(\frac{\pi}{6}\right)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3-\frac{0.72}{5-\frac{4.32}{7-\frac{4.32}{9}}}}}\right) = \cos\left(-\frac{\pi}{6}\right)\sin(-0.428988) - \cos(-0.428988)\sin\left(-\frac{\pi}{6}\right)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = -i\left(\cos(-0.428988)\sinh\left(\frac{i\pi}{6}\right)\right) + \cosh\left(\frac{i\pi}{6}\right)\sin(-0.428988)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = i\cos(-0.428988)\sinh\left(-\frac{i\pi}{6}\right) + \cosh\left(-\frac{i\pi}{6}\right)\sin(-0.428988)$$

Alternative representations:

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \cos\left(\frac{\pi}{2} - \frac{\pi}{6} + \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = -\cos\left(\frac{\pi}{2} + \frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \cosh\left(\frac{i\pi}{2} - i\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right)\right)$$

Series representations:

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = 2\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(-0.428988 + 0.166667\pi)$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-0.428988 - \frac{\pi}{3}\right)^{2k}}{(2k)!}$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-0.428988 + \frac{\pi}{6}\right)^{1+2k}}{(1+2k)!}$$

Integral representations:

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = 0.166667 (-2.57393 + \pi) \int_0^1 \cos(0.166667 (-2.57393 + \pi) t) \, dt$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \frac{0.0416667 (-2.57393 + \pi) \sqrt{\pi}}{i \pi} \int_{-i \infty + \gamma}^{i \infty + \gamma} \frac{e^{-\left(0.00694444 (-2.57393 + \pi)^2\right)/s + s}}{s^{3/2}} \, ds \quad \text{for } \gamma > 0$$

$$\sin\left(\frac{\pi}{6} - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9}}}}}\right) = \frac{0.0416667 \sqrt{\pi}}{i \pi} \int_{-i \infty + \gamma}^{i \infty + \gamma} \frac{4^s e^{3.58352 s} (-2.57393 + \pi)^{1 - 2s} \Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)} \, ds \quad \text{for } 0 < \gamma < 1$$

sin(x - 0.32/(1 + -0.72/(3 - 0.72/(5 - 4.32/(7 - 4.32/(9-4.32)))))) = 0.0944570

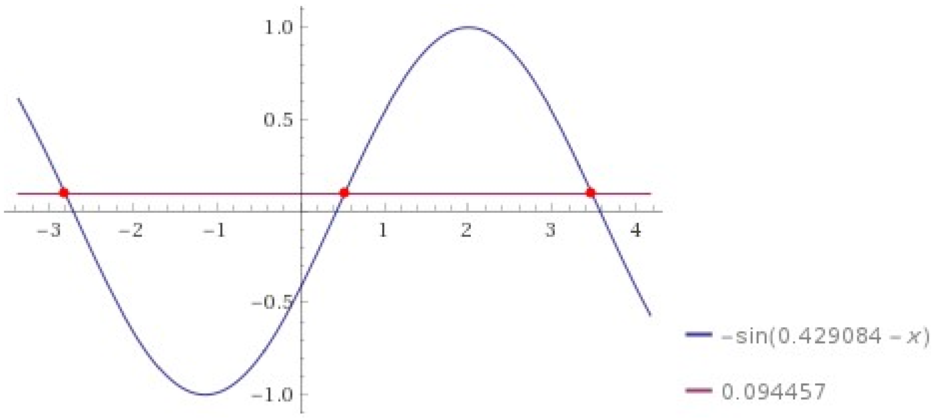
Input interpretation:

$$\sin\left(x - \frac{0.32}{1 - \frac{0.72}{3 - \frac{0.72}{5 - \frac{4.32}{7 - \frac{4.32}{9 - 4.32}}}}}\right) = 0.0944570$$

Result:

$$-\sin(0.429084 - x) = 0.094457$$

Plot:



Alternate forms:

$$-\sin(-x + (0.429084 + 0\,i)) = 0.094457$$

$$(0.909347 + 0\,i)\sin(x) - (0.416038 + 0\,i)\cos(x) = 0.094457$$

$$(-0.208019 + 0.454674\,i)\,e^{-i x} - (0.208019 + 0.454674\,i)\,e^{i x} = 0.094457$$

Alternate form assuming x is positive:

$$\sin(0.429084 - x) + 0.094457 = 0$$

Solutions:

$$x = \frac{-298\,198\,\pi\,n - 149\,099\,\pi + 63\,976 - 149\,099\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099}, \quad n \in \mathbb{Z}$$

$$x = \frac{-298\,198\,\pi\,n + 63\,976 + 149\,099\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099}, \quad n \in \mathbb{Z}$$

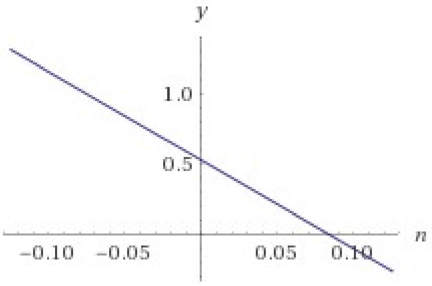
63976/149099 - 2 n π + sin^(-1)(94457/1000000)

Input:

$$\frac{63976}{149099} - 2 n \pi + \sin^{-1}\left(\frac{94457}{1000000}\right)$$

$\sin^{-1}(x)$ is the inverse sine function

Plot:



(n from −0.1 to 0.1)

Geometric figure:

line

Alternate forms:

$$\frac{-298198 \pi n + 63976 + 149099 \sin^{-1}\left(\frac{94457}{1000000}\right)}{149099}$$

$$-2 \pi n + \frac{63976}{149099} - i \log\left(\frac{\sqrt{991077875151}}{1000000} + \frac{94457 i}{1000000}\right)$$

$\log(x)$ is the natural logarithm

Alternate form assuming n is real:

$$-2 \pi n + \frac{63976}{149099} + \tan^{-1}\left(\frac{94457}{\sqrt{991077875151}}\right)$$

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

Root:

$n \approx 0.083347$

0.083347 ≈ 1/12 = 0.833333

Derivative:

$$\frac{d}{dn}\left(\frac{63\,976}{149\,099} - 2\,n\,\pi + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)\right) = -2\,\pi$$

Indefinite integral:

$$\int\left(\frac{63\,976}{149\,099} - 2\,n\,\pi + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)\right)dn =$$
$$-\pi\,n^2 + \frac{63\,976\,n}{149\,099} + n\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) + \text{constant}$$

63976/149099 - 2 *1/12 π + sin^(-1)(94457/1000000)

Where 1/12 = 0.833333 ≈ 0.083347

Input:

$$\frac{63\,976}{149\,099} - \left(2\times\frac{1}{12}\right)\pi + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)$$

$\sin^{-1}(x)$ is the inverse sine function

Exact Result:

$$\frac{63\,976}{149\,099} - \frac{\pi}{6} + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)$$

(result in radians)

Decimal approximation:

0.000083282293648218400792493533246940636472764811661192455...

(result in radians)

0.0000832822936…

Alternate forms:

$$\frac{383\,856 - 149\,099\,\pi}{894\,594} + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)$$

$$\frac{383\,856 - 149\,099\,\pi + 894\,594\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{894\,594}$$

$$\frac{63\,976}{149\,099} - \frac{\pi}{6} + \tan^{-1}\left(\frac{94\,457}{\sqrt{991\,077\,875\,151}}\right)$$

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

Alternative representations:

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=\operatorname{sd}^{-1}\left(\frac{94457}{1000000}\,\middle|\,0\right)-\frac{2\pi}{12}+\frac{63976}{149099}$$

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=\operatorname{sn}^{-1}\left(\frac{94457}{1000000}\,\middle|\,0\right)-\frac{2\pi}{12}+\frac{63976}{149099}$$

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=-i\sinh^{-1}\left(\frac{94457\,i}{1000000}\right)-\frac{2\pi}{12}+\frac{63976}{149099}$$

Series representations:

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=\frac{63976}{149099}-\frac{\pi}{6}+\sum_{k=0}^{\infty}\frac{\left(\frac{1000000}{94457}\right)^{-1-2k}\left(\frac{1}{2}\right)_k}{k!+2k\,k!}$$

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=$$
$$\frac{63976}{149099}+\frac{\pi}{3}-\frac{1}{500}\sqrt{\frac{905543}{2}}\sum_{k=0}^{\infty}\frac{\left(\frac{905543}{2000000}\right)^{k}\left(\frac{1}{2}\right)_k}{k!+2k\,k!}$$

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=$$
$$\frac{63976}{149099}-\frac{2\pi}{3}+\frac{1}{500}\sqrt{\frac{1094457}{2}}\sum_{k=0}^{\infty}\frac{\left(\frac{1094457}{2000000}\right)^{k}\left(\frac{1}{2}\right)_k}{k!+2k\,k!}$$

Integral representations:

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=$$
$$\frac{63976}{149099}-\frac{\pi}{6}+\frac{94457}{1000000}\int_0^1\frac{1}{\sqrt{1-\frac{8922124849t^2}{1000000000000}}}\,dt$$

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=\frac{63976}{149099}-\frac{\pi}{6}-\frac{94457\,i}{4000000\,\pi^{3/2}}$$
$$\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(\frac{1000000000000}{991077875151}\right)^{s}\Gamma\left(\frac{1}{2}-s\right)^{2}\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

Continued fraction representation:

$$\frac{63976}{149099}-\frac{\pi 2}{12}+\sin^{-1}\left(\frac{94457}{1000000}\right)=$$
$$\frac{63976}{149099}-\frac{\pi}{6}+\frac{94457\sqrt{991077875151}}{1000000000000\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-\frac{8922124849\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{500000000000}}{1+2k}\right)}=$$
$$\frac{63976}{149099}-\frac{\pi}{6}+\left(94457\sqrt{991077875151}\right)\Big/\left(1000000000000\left(1+-\left(8922124849\Big/\left(500000000000\left(3-8922124849\Big/\left(500000000000\left(5-26766374547\Big/\left(250000000000\left(7-\frac{26766374547}{250000000000\,(9+\ldots)}\right)\right)\right)\right)\right)\right)\right)\right)\right)$$

63976/149099 - x + sin^(-1)(94457/1000000) = 0.00008328229364821840079

Input interpretation:

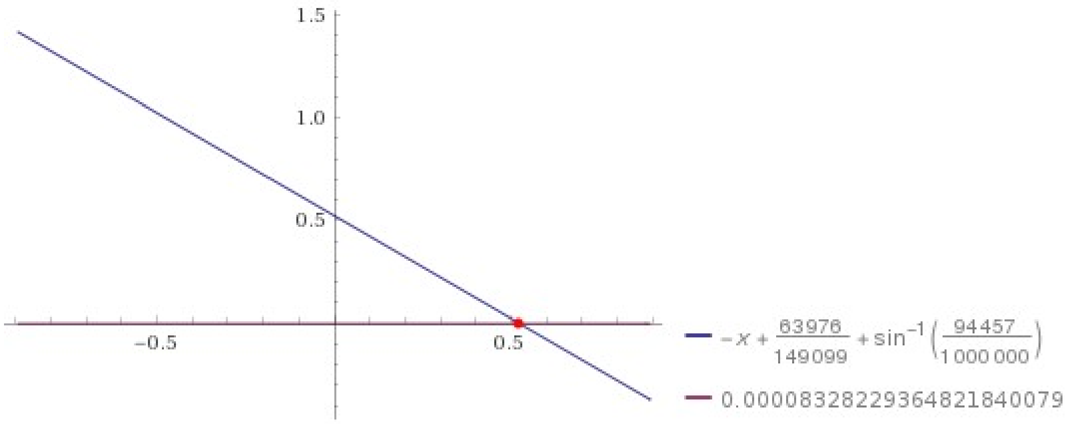
$$\frac{63976}{149099}-x+\sin^{-1}\left(\frac{94457}{1000000}\right)=0.00008328229364821840079$$

$\sin^{-1}(x)$ is the inverse sine function

Result:

$$-x+\frac{63976}{149099}+\sin^{-1}\left(\frac{94457}{1000000}\right)=0.00008328229364821840079$$

Plot:



Alternate forms:

$0.5235987755982988730771 1 - x = 0$

$$\frac{-149\,099\,x + 63\,976 + 149\,099 \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099} = 0.000083282293648218400 79$$

$$-x + \frac{63\,976}{149\,099} - i \log\left(\frac{\sqrt{991\,077\,875\,151}}{1\,000\,000} + \frac{94\,457\,i}{1\,000\,000}\right) =$$
$$0.000083282293648218400 79$$

log(x) is the natural logarithm

Alternate form assuming x is real:

$$-x + \frac{63\,976}{149\,099} + \tan^{-1}\left(\frac{94\,457}{\sqrt{991\,077\,875\,151}}\right) = 0.000083282293648218400 79$$

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

Solution:

$x \approx 0.5235987755982988730771 1$

$0.5235987755\ldots = \frac{\pi}{6}$

Possible closed forms:

$\frac{\pi}{6} \approx 0.523598775598298873077107230$

Inserting 0.5269391135 that is the following Ramanujan continued fraction:

$$2\int_0^\infty \frac{t^2\,dt}{e^{\sqrt{3}t}\sinh t} = \cfrac{1}{1+\cfrac{1^3}{1+\cfrac{1^3}{3+\cfrac{2^3}{1+\cfrac{2^3}{5+\cfrac{3^3}{1+\cfrac{3^3}{7+\ldots}}}}}}} \approx 0.5269391135$$

63976/149099 - 0.5269391135 + sin^(-1)(94457/1000000)

Input interpretation:

$$\frac{63976}{149099} - 0.5269391135 + \sin^{-1}\left(\frac{94457}{1000000}\right)$$

$\sin^{-1}(x)$ is the inverse sine function

Result:

$-0.0032570556...$

(result in radians)

-0.0032570556…

Alternative representations:

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.526939 + \text{sd}^{-1}\left(\frac{94457}{1000000} \middle| 0\right) + \frac{63976}{149099}$$

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.526939 + \text{sn}^{-1}\left(\frac{94457}{1000000} \middle| 0\right) + \frac{63976}{149099}$$

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.526939 - i \sinh^{-1}\left(\frac{94457\, i}{1000000}\right) + \frac{63976}{149099}$$

Series representations:

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 + \sum_{k=0}^{\infty} \frac{\left(\frac{1000000}{94457}\right)^{-1-2k} \left(\frac{1}{2}\right)_k}{k! + 2\, k\, k!}$$

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 - \frac{\pi}{2} + \sqrt{\frac{1094457}{1000000}}\, \sqrt{2} \sum_{k=0}^{\infty} \frac{\left(\frac{1094457}{2000000}\right)^k \left(\frac{1}{2}\right)_k}{k! + 2\, k\, k!}$$

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 + \frac{\pi}{2} - \frac{1}{2}\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(-\frac{94457}{1000000}+x\right)}{2\pi}\right\rfloor\right) + \frac{1}{2}\exp\left(i\pi\left\lfloor\frac{\arg\left(-\frac{94457}{1000000}+x\right)}{2\pi}\right\rfloor\right)\sqrt{\pi}\sum_{k=0}^{\infty}\frac{\left(\frac{94457}{500000}-2x\right)^k x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};x^2\right)}{k!} \quad \text{for } (x \in \mathbb{R} \text{ and } x > 1)$$

Integral representations:

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 + 0.094457\int_0^1 \frac{1}{\sqrt{1-\frac{8922124849t^2}{1000000000000}}}\,dt$$

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 + \frac{0.0236143}{i\pi\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(\frac{1000000000000}{991077875151}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds \quad \text{for } 0 < \gamma < \frac{1}{2}$$

Continued fraction representation:

$$\frac{63976}{149099} - 0.526939 + \sin^{-1}\left(\frac{94457}{1000000}\right) = -0.0978551 + \frac{94457\sqrt{\frac{991077875151}{1000000000000}}}{1000000\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-\frac{8922124849\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{500000000000}}{1+2k}\right)} =$$

$$-0.0978551 + \left(94457\sqrt{991077875151}\right) / \left(1000000000000\left(1 + -\left(8922124849 / \left(500000000000\left(3 - 8922124849 / \left(500000000000\left(5 - 26766374547 / \left(250000000000\left(7 - \frac{26766374547}{250000000000\,(9+\ldots)}\right)\right)\right)\right)\right)\right)\right)\right)\right)\right)$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}} a_k / b_k$ is a continued fraction

63976/149099 - x + sin^(-1)(94457/1000000) = -0.0032570556

Input interpretation:

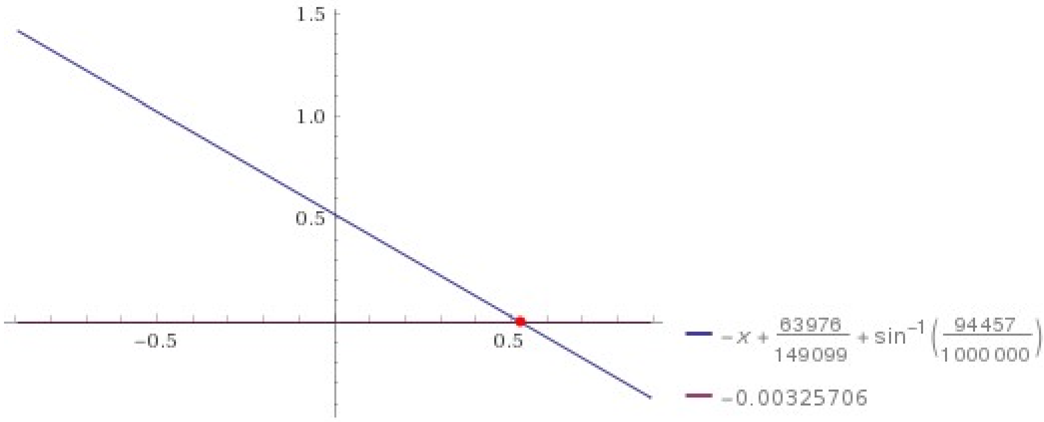
$$\frac{63\,976}{149\,099} - x + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) = -0.0032570556$$

$\sin^{-1}(x)$ is the inverse sine function

Result:

$$-x + \frac{63\,976}{149\,099} + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) = -0.00325706$$

Plot:



Alternate forms:

$0.526939 - x = 0$

$$\frac{-149\,099\,x + 63\,976 + 149\,099\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099} = -0.00325706$$

$$-x + \frac{63\,976}{149\,099} - i\log\left(\frac{\sqrt{991\,077\,875\,151}}{1\,000\,000} + \frac{94\,457\,i}{1\,000\,000}\right) = -0.00325706$$

$\log(x)$ is the natural logarithm

Alternate form assuming x is real:

$$-x + \frac{63\,976}{149\,099} + \tan^{-1}\left(\frac{94\,457}{\sqrt{991\,077\,875\,151}}\right) = -0.00325706$$

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

Solution:

$x \approx 0.526939$

0.526939

From:

63976/149099 - x + sin^(-1)(94457/1000000) = -0.0032570556

inserting 0.000084 in the right hand-side

63976/149099 - x + sin^(-1)(94457/1000000) = 0.000084

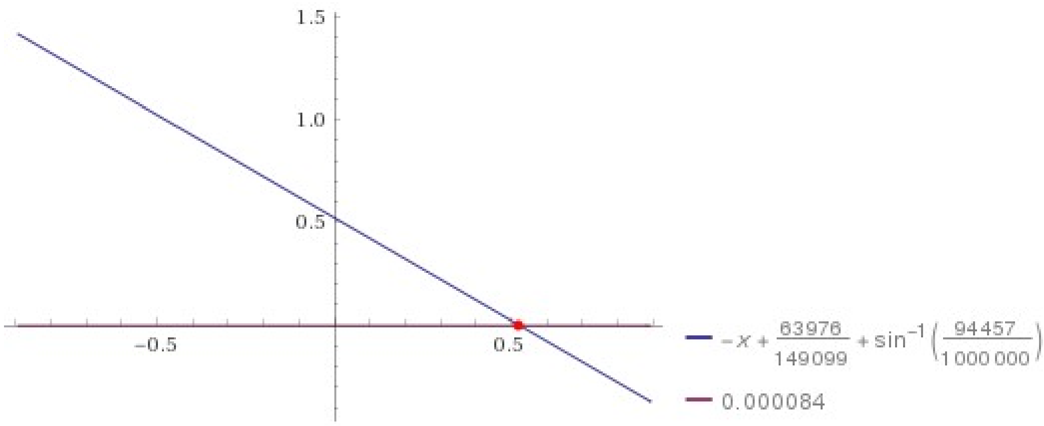
Where 0.000084 ≈ 0.00325706/39 = 0.000083514, where 39 = 34+5 (Fibonacci numbers), we obtain:

Input:

$$\frac{63\,976}{149\,099} - x + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) = 0.000084$$

$\sin^{-1}(x)$ is the inverse sine function

Plot:



Alternate forms:

$$0.523598 - x = 0$$

$$\frac{-149\,099\,x + 63\,976 + 149\,099\,\sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099} = 0.000084$$

$$-x + \frac{63\,976}{149\,099} - i\log\left(\frac{\sqrt{991\,077\,875\,151}}{1\,000\,000} + \frac{94\,457\,i}{1\,000\,000}\right) = 0.000084$$

$\log(x)$ is the natural logarithm

Alternate form assuming x is real:

$$-x + \frac{63\,976}{149\,099} + \tan^{-1}\left(\frac{94\,457}{\sqrt{991\,077\,875\,151}}\right) = 0.000084$$

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

Solution:

$x \approx 0.523598$

$0.523598 = \frac{\pi}{6}$

Or, dividing by 39 the previous expressions:

63976/149099 - x + sin^(-1)(94457/1000000) = -0.0032570556/39

We obtain:

Input interpretation:

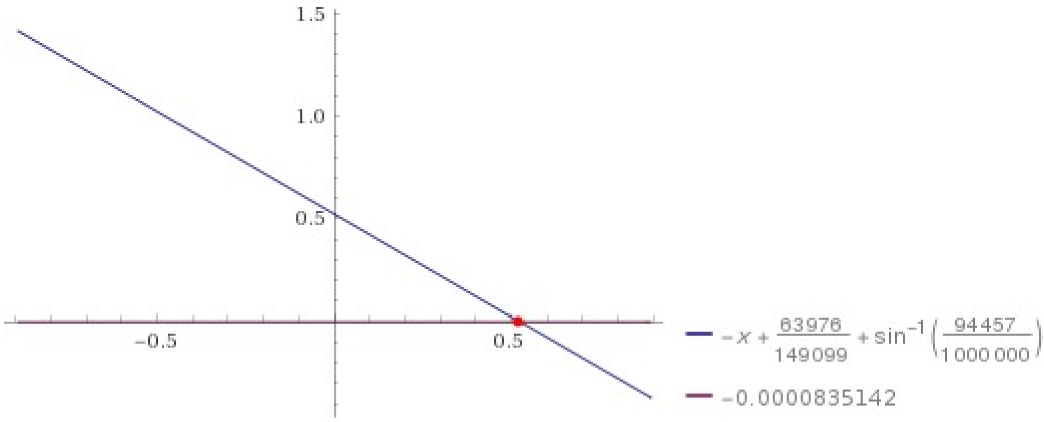
$$\frac{63\,976}{149\,099} - x + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) = -\frac{0.0032570556}{39}$$

$\sin^{-1}(x)$ is the inverse sine function

Result:

$$-x + \frac{63\,976}{149\,099} + \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right) = -0.0000835142$$

Plot:



Alternate forms:

$0.523766 - x = 0$

$$\frac{-149\,099\,x + 63\,976 + 149\,099 \sin^{-1}\left(\frac{94\,457}{1\,000\,000}\right)}{149\,099} = -0.0000835142$$

$$-x + \frac{63\,976}{149\,099} - i \log\left(\frac{\sqrt{991\,077\,875\,151}}{1\,000\,000} + \frac{94\,457\,i}{1\,000\,000}\right) = -0.0000835142$$

$\log(x)$ is the natural logarithm

Alternate form assuming x is real:

$$-x+\frac{63976}{149099}+\tan^{-1}\left(\frac{94457}{\sqrt{991077875151}}\right)=-0.0000835142$$

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

Solution:

$x \approx 0.523766$

0.523766 a result very near to $0.523598 = \frac{\pi}{6}$

Or also dividing -0.0032570556 by 4096 = 64^2 :

((63976/149099 - x + sin^(-1)(94457/1000000))) = -0.0032570556/64^2

Input interpretation:

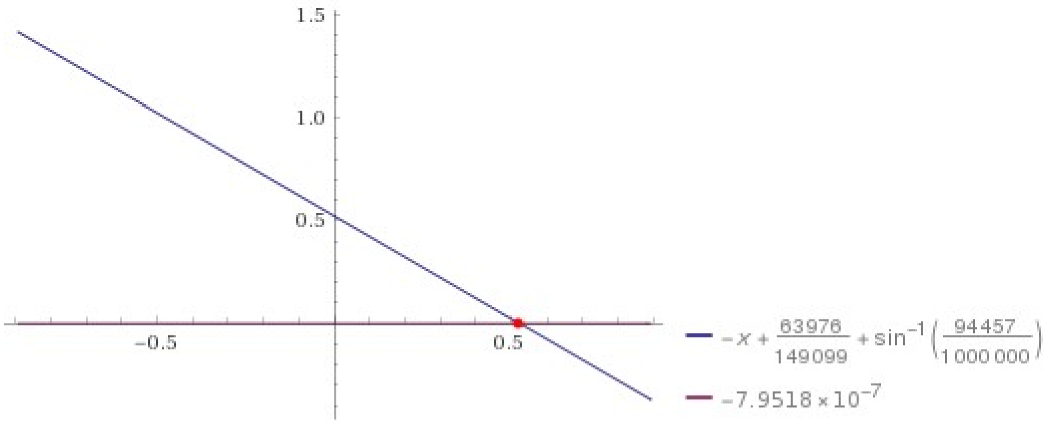
$$\frac{63976}{149099}-x+\sin^{-1}\left(\frac{94457}{1000000}\right)=-\frac{0.0032570556}{64^2}$$

$\sin^{-1}(x)$ is the inverse sine function

Result:

$$-x+\frac{63976}{149099}+\sin^{-1}\left(\frac{94457}{1000000}\right)=-7.9518\times10^{-7}$$

Plot:



Alternate forms:

$0.523683 - x = 0$

$$\frac{-149099\,x+63976+149099\sin^{-1}\left(\frac{94457}{1000000}\right)}{149099}=-7.9518\times10^{-7}$$

$$-x+\frac{63976}{149099}-i\log\left(\frac{\sqrt{991077875151}}{1000000}+\frac{94457\,i}{1000000}\right)=-7.9518\times10^{-7}$$

$\log(x)$ is the natural logarithm

Alternate form assuming x is real:

$$-x+\frac{63976}{149099}+\tan^{-1}\left(\frac{94457}{\sqrt{991077875151}}\right)=-7.9518\times10^{-7}$$

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

Solution:

$x \approx 0.523683$

0.523683 a result very near to 0.523598 $= \frac{\pi}{6}$

Thence we note that increasing the denominator in the right-hand side of the expression, the result tends more and more to 0.523598 $= \frac{\pi}{6}$

Possible closed forms:

$\frac{\pi}{6} \approx 0.52359877559$

$\sqrt{\frac{\zeta(2)}{6}} \approx 0.52359877559$

$\frac{3}{2}\log^3(2)\sqrt{\log(3)} \approx 0.523588221$

Now, we have that:

1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8)))))))

Input interpretation:

$$\frac{1}{2} \times 13.12806 \times 10^{39} \left(-2 + 3 \times (-0.0944570) + \sqrt{8 + 0.0944570 \, (0.0944570 + 8)}\right)$$

Result:

$4.44471... \times 10^{39}$

$4.44471...*10^{39}$

1/(((1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8)))))))))^1/4096

Input interpretation:

$$\frac{1}{\sqrt[4096]{\frac{1}{2} \times 13.12806 \times 10^{39} \left(-2 + 3 \times (-0.0944570) + \sqrt{8 + 0.0944570 \, (0.0944570 + 8)}\right)}}$$

Result:

0.977958331...

0.977958331... result very near to the dilaton value **$0.989117352243 = \phi$**

2sqrt[log base 0.977958331 (((1/(((1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8)))))))))))))]-PI+1/golden ratio

Input interpretation:

$$2 \sqrt{\log_{0.977958331}\left(1 \Big/ \left(\frac{1}{2} \times 13.12806 \times 10^{39} \left(-2 + 3 \times (-0.0944570) + \sqrt{8 + 0.0944570 \, (0.0944570 + 8)}\right)\right)\right)} - \pi + \frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764419089694860175182891095909141742594282883534397433...

125.4764419... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

1/4 * sqrt[log base 0.977958331 (((1/(((1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8)))))))))))))]+1/golden ratio

Input interpretation:

$$\frac{1}{4}\sqrt{\log_{0.977958331}\left(1\Big/\left(\frac{1}{2}\times 13.12806\times 10^{39}\left(-2+3\times(-0.0944570)+\sqrt{8+0.0944570\,(0.0944570+8)}\right)\right)\right)}+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

16.618034...

16.618034... result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

From which:

1/((((1/4 * sqrt[log base 0.977958331 (((1/(((1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8))))))))))))]+1/golden ratio))))^1/64

Input interpretation:

$$\frac{1}{\sqrt[64]{\frac{1}{4}\sqrt{\log_{0.977958331}\left(\frac{1}{\frac{1}{2}\times 13.12806\times 10^{39}\left(-2+3\times(-0.0944570)+\sqrt{8+0.0944570\,(0.0944570+8)}\right)}\right)}+\frac{1}{\phi}}}$$

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

ϕ is the golden ratio

Result:

0.957036371...

0.957036371.... result very near to the spectral index n_s , to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}}\approx 0.9568666373$$

From:

Astronomy & Astrophysics manuscript no. ms c ESO 2019 - September 24, 2019
Planck 2018 results. VI. Cosmological parameters

The primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index n_s = 0.965 ± 0.004, consistent with the predictions of slow-roll, single-field, inflation.

We know that α' is the Regge slope (string tension). With regard the Omega mesons, the values are:

ω	6	$m_{u/d} = 0 - 60$	$0.910 - 0.918$
ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$
ω/ω_3	$5+3$	$m_{u/d} = 240 - 345$	$0.937 - 1.000$

((((1/2*13.12806e+39((((-2-3*0.0944570+sqrt((8+0.0944570(0.0944570+8)))))))))))/3.38567

Input interpretation:

$$\frac{\frac{1}{2}\times 13.12806\times 10^{39}\left(-2+3\times(-0.0944570)+\sqrt{8+0.0944570\,(0.0944570+8)}\right)}{3.38567}$$

Result:

$1.3128021590839850068449757174271495304767592933833968\ldots \times 10^{39}$

$1.312802159\ldots*10^{39}$

Note that:

(x-golden ratio^2)^1/512 = 0.9994836497573

(where x must be equal to 3.385670000004919) where 0.9994836… is a result very near to the value of the following Rogers-Ramanujan continued fraction:

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

Input interpretation:

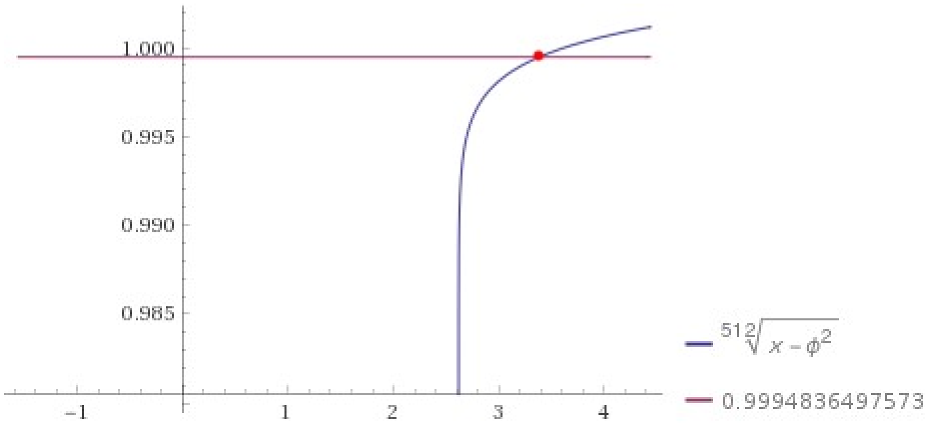
$$\sqrt[512]{x-\phi^2} = 0.9994836497573$$

ϕ is the golden ratio

Result:

$$\sqrt[512]{x-\phi^2} = 0.9994836497573$$

Plot:



Alternate forms:

$$\sqrt[512]{x+\frac{1}{2}\left(-3-\sqrt{5}\right)} = 0.9994836497573$$

$$\sqrt[512]{x-\frac{1}{4}\left(1+\sqrt{5}\right)^2} = 0.9994836497573$$

$$\frac{\sqrt[512]{2x-\sqrt{5}-3}}{\sqrt[512]{2}} = 0.9994836497573$$

Solution:

$x \approx 3.385670000004919$

3.38567…

Appendix

From:

https://www.wired.it/scienza/lab/2019/11/20/quinta-forza-universo-bosone/?refresh_ce=

In recent years Hungarian researchers have sought further evidence of the new particle. And now - in an article published in arXiv and not yet subjected to peer review - they claim to have found them, this time observing the change of state of an excited helium nucleus: pairs of electrons and positrons separate at an angle different from that which theoretical models predict, around 115°. According to the authors the anomaly could be explained by the production by the helium atom of a different boson from all those we know, of short duration and with a mass of slightly less than 17 megaelectronvolts. Hence the name of X17. Of course it is very suggestive that several experiments aimed at finding out more about dark matter focused precisely on the existence of a hypothetical 17 megaelectronvolts (precisely 16.84 MeV - author's note) particle.

From:

New evidence supporting the existence of the hypothetic X17 particle

A.J. Krasznahorkay, M. Csatlos, L. Csige, J. Gulyas, M. Koszta, B. Szihalmi, and J. Timar
Institute of Nuclear Research (Atomki), P.O. Box 51, H-4001 Debrecen, Hungary
D.S. Firak, A. Nagy, and N.J. Sas
University of Debrecen, 4010 Debrecen, PO Box 105, Hungary
A. Krasznahorkay
CERN, Geneva, Switzerland and Institute of Nuclear Research, (Atomki), P.O. Box 51, H-4001 Debrecen, Hungary

We observed electron-positron pairs from the electro-magnetically forbidden M0 transition depopulating the 21.01 MeV 0^- state in ^{4}He. A peak was observed in their e^+e^- angular correlations at 115° with 7.2σ significance, and could be described by assuming the creation and subsequent decay of a light particle with mass of m_Xc^2=16.84±0.16($stat$) ± 0.20($syst$) MeV and Γ_X= 3.9 × 10^{-5} eV. According to the mass, it is likely the same X17 particle, which we recently suggested [Phys. Rev. Lett. 116, 052501 (2016)] for describing the anomaly observed in ^{8}Be.

Example of physical application of Ramanujan mock theta function: dilaton mass calculated as a type of Higgs boson

"**Mock modular form**" – from Wikipedia

We take the following order 5 mock theta function:

$$\psi_1(q) = \sum_{n\geq 0} q^{n(n+1)/2}(-q;q)_n$$

that is equivalent to:

psi_1(q) = sum(n>=0, q^(n*(n+1)/2) * prod(k=1..n, 1 + q^k))

(OEIS sequence A053261)

and also:

$$\psi_1(q) = \sum_{n=0}^{\infty} (-q)_n q^{\binom{n+1}{2}}$$

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

where

a(n) ~ sqrt(phi) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

thus:

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\sqrt{n}}$$

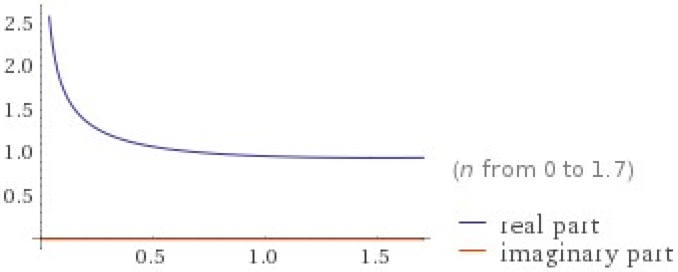
ϕ is the golden ratio

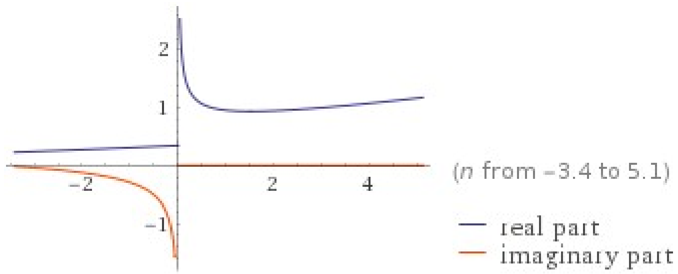
$$a(n) \sim \left(\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{n}{15}}\right)}{2 \sqrt[4]{5} \sqrt{n}} \right)$$

Exact result:

$$\frac{e^{(\pi \sqrt{n})/\sqrt{15}} \sqrt{\phi}}{2 \sqrt[4]{5} \sqrt{n}}$$

Plots:





Alternate form:

$$\frac{\sqrt{1+\sqrt{5}}\, e^{(\pi \sqrt{n})/\sqrt{15}}}{2 \sqrt{2} \sqrt[4]{5} \sqrt{n}}$$

Series expansion at n = 0:

$$\frac{\sqrt{\phi}}{2 \sqrt[4]{5} \sqrt{n}} + \frac{\pi \sqrt{\frac{\phi}{3}}}{2 \times 5^{3/4}} + \frac{\pi^2 \sqrt{n} \sqrt{\phi}}{60 \sqrt[4]{5}} + \frac{\pi^3 n \sqrt{\frac{\phi}{3}}}{180 \times 5^{3/4}} + \frac{\pi^4 n^{3/2} \sqrt{\phi}}{10800 \sqrt[4]{5}} + \frac{\pi^5 n^2 \sqrt{\frac{\phi}{3}}}{54000 \times 5^{3/4}} + \frac{\pi^6 n^{5/2} \sqrt{\phi}}{4860000 \sqrt[4]{5}} + O(n^3)$$

(Puiseux series)

Derivative:

$$\frac{d}{dn}\left(\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}}\right) = \frac{\sqrt{\frac{1}{2}\left(1+\sqrt{5}\right)}\,e^{\left(\pi\sqrt{n}\right)/\sqrt{15}}\left(\sqrt{3}\,\pi\sqrt{n}-3\sqrt{5}\right)}{12\times 5^{3/4}\,n^{3/2}}$$

Indefinite integral:

$$\int\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}}\,dn = \frac{\sqrt[4]{5}\,e^{\left(\pi\sqrt{n}\right)/\sqrt{15}}\sqrt{3\,\phi}}{\pi} + \text{constant}$$

Global minimum:

$$\min\left\{\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}}\right\} = \frac{e\,\pi\sqrt{\frac{\phi}{3}}}{2\times 5^{3/4}} \quad \text{at } n = \frac{15}{\pi^2}$$

Limit:

$$\lim_{n\to-\infty}\frac{e^{\left(\sqrt{n}\,\pi\right)/\sqrt{15}}\sqrt{\phi}}{2\sqrt[4]{5}\,\sqrt{n}} = 0$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}} = \frac{\sqrt{\frac{1}{2}\left(1+\sqrt{5}\right)}\,\sum_{k=0}^{\infty}\frac{15^{-k/2}\,n^{k/2}\,\pi^k}{k!}}{2\sqrt[4]{5}\,\sqrt{n}}$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}} = \frac{\sqrt{\frac{1}{2}\left(1+\sqrt{5}\right)}\,\sum_{k=-\infty}^{\infty}I_k\left(\frac{\sqrt{n}\,\pi}{\sqrt{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}}$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{n}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{n}} = \frac{\sqrt{\frac{1}{2}\left(1+\sqrt{5}\right)}\,\sum_{k=0}^{\infty}\frac{15^{-k}\,n^k\,\pi^{2k}\left(1+2k+\frac{\sqrt{n}\,\pi}{\sqrt{15}}\right)}{(1+2k)!}}{2\sqrt[4]{5}\,\sqrt{n}}$$

For n = 96.268 the above formula is very near to 124. Indeed, we have:

sqrt(golden ratio) * exp(Pi*sqrt(96.268/15)) / (2*5^(1/4)*sqrt(96.268))

Input interpretation:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{96.268}{15}}\right)}{2 \sqrt[4]{5} \sqrt{96.268}}$$

ϕ is the golden ratio

Result:

124.001...

124.001

Series representations:

$$\frac{\sqrt{\phi} \exp\left(\pi \sqrt{\frac{96.268}{15}}\right)}{2 \sqrt[4]{5} \sqrt{96.268}} = \frac{\exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (6.41787-z_0)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi-z_0)^k z_0^{-k}}{k!}}{2 \sqrt[4]{5} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (96.268-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi} \exp\left(\pi \sqrt{\frac{96.268}{15}}\right)}{2 \sqrt[4]{5} \sqrt{96.268}} = \left(\exp\left(i \pi \left\lfloor \frac{\arg(\phi - x)}{2 \pi} \right\rfloor\right) \exp\left(\pi \exp\left(i \pi \left\lfloor \frac{\arg(6.41787 - x)}{2 \pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k (6.41787 - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k (\phi - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) / \left(2 \sqrt[4]{5} \exp\left(i \pi \left\lfloor \frac{\arg(96.268 - x)}{2 \pi} \right\rfloor\right) \sum_{k=0}^{\infty} \frac{(-1)^k (96.268 - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{96.268}{15}}\right)}{2\sqrt[4]{5}\sqrt{96.268}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(6.41787-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(6.41787-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(6.41787-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(96.268-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(96.268-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.268-z_0)^k z_0^{-k}}{k!}\right)$$

While, for n = 96.458786 we obtain a result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

sqrt(golden ratio) * exp(Pi*sqrt(96.458786/15)) / (2*5^(1/4)*sqrt(96.458786))

Input interpretation:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{96.458786}{15}}\right)}{2\sqrt[4]{5}\sqrt{96.458786}}$$

ϕ is the golden ratio

Result:

124.8584...

124.8584….

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\sqrt{96.4588}} = \frac{\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(6.43059-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}}{2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.4588}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\right.$$

$$\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(6.43059-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(6.43059-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\,(\phi-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$

$$\left(2\sqrt[4]{5}\,\exp\left(i\pi\left\lfloor\frac{\arg(96.4588-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(96.4588-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.4588}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(6.43059-z_0)/(2\pi)\rfloor}\right.\right.$$

$$\left.z_0^{1/2(1+\lfloor\arg(6.43059-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(6.43059-z_0)^k\,z_0^{-k}}{k!}\right)$$

$$\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}$$

$$\left.z_0^{-1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k\,z_0^{-k}}{k!}\right)\Big/$$

$$\left(2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k\,z_0^{-k}}{k!}\right)$$

And:

sqrt(golden ratio) * exp(Pi*sqrt(96.458786/15)) / (2*5^(1/4)*sqrt(96.458786)) + 1/(golden ratio)

Input interpretation:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{96.458786}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.458786}}+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.4764...

125.4764…

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.4588}}+\frac{1}{\phi}=\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k z_0^{-k}}{k!}+5^{3/4}\,\phi\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(6.43059-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k z_0^{-k}}{k!}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.4588}}+\frac{1}{\phi}=\left(10\exp\left(i\pi\left\lfloor\frac{\arg(96.4588-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(96.4588-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(6.43059-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(6.43059-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(10\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(96.4588-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(96.4588-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{96.4588}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{96.4588}}+\frac{1}{\phi}=$$

$$\begin{aligned}
&\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor}\left(10\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor}\right.\right.\\
&\qquad z_0^{1/2\lfloor\arg(96.4588-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k z_0^{-k}}{k!}+\\
&\qquad 5^{3/4}\,\phi\,\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(6.43059-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(6.43059-z_0)/(2\pi)\rfloor)}\right.\\
&\qquad\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(6.43059-z_0)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\\
&\qquad\left.\left.z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\\
&\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(96.4588-z_0)^k z_0^{-k}}{k!}\right)
\end{aligned}$$

The two results 124.8584 and 125.4764 are the same of 124.858407….125.47644, results very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0

Indeed, we have that:

From:

Received: April 10, 2019 - Revised: July 9, 2019 - Accepted: October 1, 2019
Published: October 18, 2019

Gravitational waves from walking technicolor

Kohtaroh Miura, Hiroshi Ohki, Saeko Otani and Koichi Yamawaki

Now, we have that:

$$m_{p^a}^2(s^0,\Delta m_p)=(\Delta m_p)^2, \qquad (2.24)$$

$$V_{\rm eff} = \frac{N_f^2 - 1}{64\pi^2} m_{s^i}^4(s^0)\left(\ln\frac{m_{s^i}^2(s^0)}{\mu_{GW}^2} - \frac{3}{2}\right) + C, \tag{2.36}$$

Using the mass functions given in eq. (2.24), the total effective potential $V_{\rm eff}(s^0, T)$ with the daisy diagrams is given as

$$\begin{aligned} V_{\rm eff}(s^0, T) = {} & \frac{N_f^2 - 1}{64\pi^2}\mathcal{M}_{s^i}^4(s^0, \Delta m_p, T)\left(\ln\frac{\mathcal{M}_{s^i}^2(s^0, \Delta m_p, T)}{\mu_{GW}^2} - \frac{3}{2}\right) \\ & + \frac{T^4}{2\pi^2}(N_f^2 - 1) J_B\left(\mathcal{M}_{s^i}^2(s^0, \Delta m_p, T)/T^2\right) + C(T)\,. \end{aligned} \tag{3.4}$$

$$\Pi(T) = \frac{T^2}{6}\left((N_f^2 + 1) f_1 + 2 N_f f_2\right)\Big|_{f_1 = -f_2/N_f}, \tag{3.3}$$

is the one-loop self-energy in the infrared limit in the leading order of the high temperature expansion $\propto T^2$ [48]. (For a pedagogical review, see [49]).

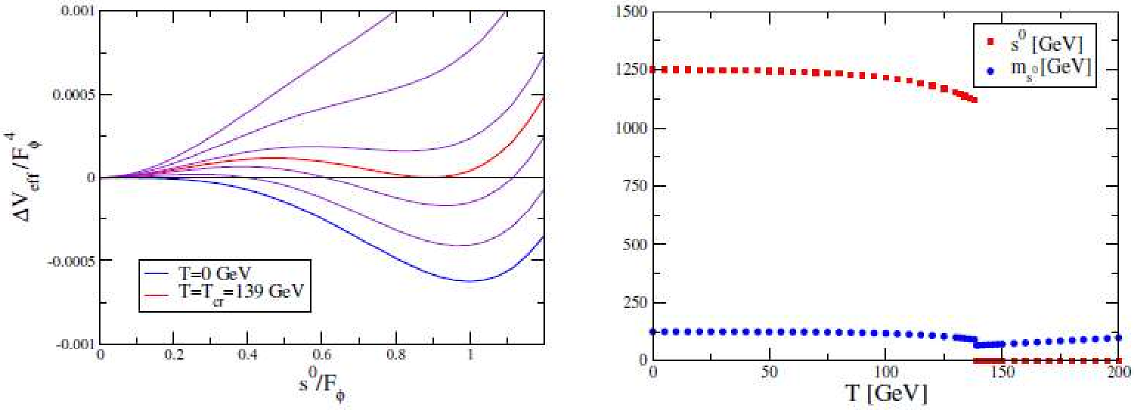


Figure 2. (Left) Effective potential ($\Delta V_{\rm eff} \equiv V_{\rm eff}(s^0, T) - V_{\rm eff}(0, T)$) for various temperature. The red and blue lines represent the potential at $T = T_{\rm cr} = 139$ GeV and zero temperature, respectively. (Right) The vev $\langle s^0 \rangle$ (red squares) and dilaton mass m_{s^0} (blue circles) determined at the potential minimum as a function of temperature.

The dilaton mass m_{s^0} (blue points in the right panel) is 125 GeV at $T = 0$, and decreases for larger T in the broken phase, and shows a singular behavior at the critical temperature $T_{\rm cr}$. In the symmetric phase, m_{s^0} starts increasing due to the thermal mass effects $\Pi(T)$ given in eq. (3.3).

Thence, the dilaton mass is calculated as a type of Higgs boson: 125 GeV for T = 0

Acknowledgments

I would like to thank Prof. **George E. Andrews** Evan Pugh Professor of Mathematics at Pennsylvania State University for his great availability and kindness towards me

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