Analyzing some equations concerning the "Classical Stability with Broken Supersymmetry" by Ramanujan's mathematics. Further possible mathematical connections with some parameters of Particle Physics and String Theory.

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Abstract

In this research thesis, we have analyzed and deepened some equations concerning the "Classical Stability with Broken Supersymmetry" by Ramanujan's mathematics and described new possible mathematical connections with some parameters of Particle Physics and String Theory.

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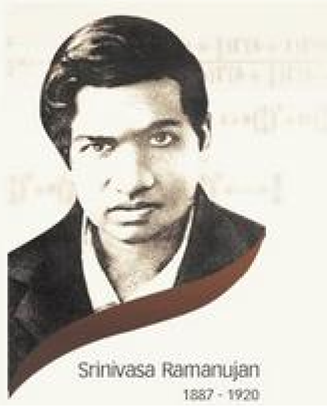
$$\sqrt{\frac{\pi e}{2}} = \cfrac{1}{1+\cfrac{1}{1+\cfrac{2}{1+\cfrac{3}{1+\cfrac{4}{1+\cfrac{5}{1+\cfrac{6}{1+\cfrac{7}{1+\cfrac{8}{\ddots}}}}}}}}} + \left\{1+\frac{1}{1\cdot 3}+\frac{1}{1\cdot 3\cdot 5}+\frac{1}{1\cdot 3\cdot 5\cdot 7}+\frac{1}{1\cdot 3\cdot 5\cdot 7\cdot 9}+\cdots\right\}$$



https://twitter.com/pickover/status/1056696709961650176

From:

Rotating strings confronting PDG mesons
Jacob Sonnenschein and Dorin Weissman - arXiv:1402.5603v1 [hep-ph] 23 Feb 2014

Traj.	N	m	α'	a
π/π_2	$4+3$	$m_{u/d} = 110 - 250$	$0.788 - 0.852$	$a_0 = (-0.22) - (-0.00)$ $a_2 = (-0.00) - 0.26$
a_1	4	$m_{u/d} = 0 - 390$	$0.783 - 0.849$	$(-0.18) - 0.21$
h_1	4	$m_{u/d} = 0 - 235$	$0.833 - 0.850$	$(-0.14) - (-0.02)$
ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$	$a_1 = 0.81 - 1.00$ $a_3 = 0.95 - 1.15$
ϕ	3	$m_s = 510 - 520$	$1.072 - 1.112$	1.00
Ψ	4	$m_c = 1380 - 1460$	$0.494 - 0.547$	$0.71 - 0.88$
Υ	6	$m_b = 4725 - 4740$	$0.455 - 0.471$	1.00
χ_b	3	$m_b = 4800$	0.499	0.58

Table 2. The results of the meson fits in the (n, M^2) plane. The ranges listed are those where χ^2 is within 10% of its optimal value. N is the number of data points in the trajectory.

Rogers-Ramanujan continued fraction

$$\cfrac{1}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-4\pi}}{1+\cfrac{e^{-6\pi}}{1+\cdots}}}} = e^{2\pi/5}\left(\sqrt{\Phi\sqrt{5}} - \Phi\right) = 0,9981360456\ \ldots$$

http://villemin.gerard.free.fr/Wwwgvmm/Nombre/FracRama.htm

With regard the Non-Supersymmetric Vacua, we have the following equations (5.33) and (5.34) concerning the scalar perturbations:

From:

On Classical Stability with Broken Supersymmetry
I. Basile, J. Mourad and A. Sagnotti - arXiv:1811.11448v2 [hep-th] 10 Jan 2019

Substituting these expressions in the first of eqs. (5.26) finally leads to a second–order eigenvalue equation for m^2:

$$A'' + A'\left(24\,\Omega' - \frac{2}{\phi'}\,e^{2\Omega}\,V_\phi\right) + A\left(m^2 - \frac{7}{4}\,e^{2\Omega}\,V - 14\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right) = 0\,. \qquad (5.33)$$

There is nothing else, since differentiating the third of eqs. (5.26) and using the background equations gives

$$\varphi'\,\phi' = -\,8\,A'' - 120\,A'\,\Omega' + 8\,e^{2\Omega}\,\frac{V_\phi}{\phi'}\,A' + 56\,e^{2\Omega}\,\frac{V_\phi}{\phi'}\,\Omega'\,A + 7\,e^{2\Omega}\,V\,A\,, \qquad (5.34)$$

Taking this result into account, one can verify that the last of eqs. (5.26) also leads to (5.33), whose properties we now turn to discuss.

From:

$$A'' + A'\left(24\,\Omega' - \frac{2}{\phi'}\,e^{2\Omega}\,V_\phi\right) + A\left(m^2 - \frac{7}{4}\,e^{2\Omega}\,V - 14\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right) = 0$$

We have that:

From:

Modular equations and approximations to π – *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

$$64g_{22}^{24} = e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots,$$
$$64g_{22}^{-24} = 4096e^{-\pi\sqrt{22}} + \cdots,$$

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}$$

We put:

$$\left(A'' + A'\left(24\,\Omega' - \frac{2}{\phi'}\,e^{2\Omega}\,V_\phi\right) \right) = e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots$$

$$\left(A\left(m^2 - \frac{7}{4}\,e^{2\Omega}\,V - 14\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right) \right) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots$$

Thence:

$$A'' + A'\left(24\,\Omega' - \frac{2}{\phi'}\,e^{2\Omega}\,V_\phi\right) + A\left(m^2 - \frac{7}{4}\,e^{2\Omega}\,V - 14\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right) = 0$$

e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22) + e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22)

Input:

$$e^{\pi\sqrt{22}} - 24 + 276\,e^{-\pi\sqrt{22}} + e^{\pi\sqrt{22}} - 24 + 4372\,e^{-\pi\sqrt{22}}$$

Exact result:

$$-48 + 4648\,e^{-\sqrt{22}\,\pi} + 2\,e^{\sqrt{22}\,\pi}$$

Decimal approximation:

$5.0178559983674152661015493193955702442327696756523747 0\ldots \times 10^6$

5017856

Property:

$-48 + 4648\, e^{-\sqrt{22}\,\pi} + 2\, e^{\sqrt{22}\,\pi}$ is a transcendental number

Alternate forms:

$$2\left(-24 + 2324\, e^{-\sqrt{22}\,\pi} + e^{\sqrt{22}\,\pi}\right)$$

$$2\, e^{-\sqrt{22}\,\pi}\left(2324 - 24\, e^{\sqrt{22}\,\pi} + e^{2\sqrt{22}\,\pi}\right)$$

Series representations:

$$e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}} + e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}} = 2\, e^{-\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}} + e^{2\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\right)$$

$$e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}} + e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}} = 2\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}} + \exp\left(2\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}} + e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}} = 2\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22 - z_0)^k z_0^{-k}}{k!}\right)\left(2324 - 24\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22 - z_0)^k z_0^{-k}}{k!}\right) + \exp\left(2\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22 - z_0)^k z_0^{-k}}{k!}\right)\right)$$

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

((((((e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22)))) + (((e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22)))))))^1/2

Input:

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)}$$

Exact result:

$$\sqrt{-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}}$$

Decimal approximation:

2240.057141763891536934239982228162035382247986130420471070...

2240.0571417… ≈ 2240 = 64*35

Property:

$\sqrt{-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}}$ is a transcendental number

Alternate forms:

$$\sqrt{2\left(-24+2324\,e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}\right)}$$

$$e^{-\sqrt{11/2}\,\pi}\sqrt{2\left(2324-24\,e^{\sqrt{22}\,\pi}+e^{2\sqrt{22}\,\pi}\right)}$$

All 2nd roots of -48 + 4648 e^(-sqrt(22) π) + 2 e^(sqrt(22) π):

$\sqrt{-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}}\;e^{0}\approx 2240.$ (real, principal root)

$\sqrt{-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}}\;e^{i\pi}\approx -2240.$ (real root)

Series representations:

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}=\sqrt{-49+4648\,e^{-\pi\sqrt{22}}+2\,e^{\pi\sqrt{22}}}\sum_{k=0}^{\infty}\left(-49+4648\,e^{-\pi\sqrt{22}}+2\,e^{\pi\sqrt{22}}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}=\sqrt{-49+4648\,e^{-\pi\sqrt{22}}+2\,e^{\pi\sqrt{22}}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-49+4648\,e^{-\pi\sqrt{22}}+2\,e^{\pi\sqrt{22}}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}=\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-48+4648\,e^{-\pi\sqrt{22}}+2\,e^{\pi\sqrt{22}}-z_0\right)^k z_0^{-k}}{k!}$$

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

Integral representation:

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

((((((e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22)))) + (((e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22)))))))^1/2 - 2*64

Input:

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\,e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\,e^{-\pi\sqrt{22}}\right)} - 2\times 64$$

Exact result:

$$\sqrt{-48 + 4648\,e^{-\sqrt{22}\,\pi} + 2\,e^{\sqrt{22}\,\pi}} - 128$$

Decimal approximation:

2112.057141763891536934239982228162035382247986130420471070...

2112.0571417… result practically equal to the rest mass of strange D meson 2112.3

Property:

$$-128 + \sqrt{-48 + 4648\,e^{-\sqrt{22}\,\pi} + 2\,e^{\sqrt{22}\,\pi}} \text{ is a transcendental number}$$

Alternate forms:

$$\sqrt{2\left(-24 + 2324\,e^{-\sqrt{22}\,\pi} + e^{\sqrt{22}\,\pi}\right)} - 128$$

$$e^{-\sqrt{11/2}\,\pi}\sqrt{2\left(2324 - 24\,e^{\sqrt{22}\,\pi} + e^{2\sqrt{22}\,\pi}\right)} - 128$$

$$e^{-\sqrt{11/2}\,\pi}\left(\sqrt{2\left(2324 - 24\,e^{\sqrt{22}\,\pi} + e^{2\sqrt{22}\,\pi}\right)} - 128\,e^{\sqrt{11/2}\,\pi}\right)$$

Series representations:

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2\times 64 = -128 + \sqrt{2}\sqrt{e^{-\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}} + e^{2\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\right)}$$

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2\times 64 = -128 + \sqrt{2}\sqrt{\left(\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}} + \exp\left(2\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)}$$

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2\times 64 = -128 + \sqrt{\left(-48 + 4648\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right) + 2\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)\right)}$$

2240.0571417 - 2112.0571417

Input interpretation:

2240.0571417 – 2112.0571417

Result:

128

128

((((((e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22)))) + (((e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22)))))))^1/2 - 2112.0571417 - Pi + 1/golden ratio

Input interpretation:

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2112.0571417 - \pi + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.4764414...

125.4764414... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Series representations:

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2112.05714170000 - \pi + \frac{1}{\phi} = \frac{1}{\phi} 1.4142135623731 \left(0.70710678118655 - 1493.4499271495\,\phi + 1.00000000000000 \sqrt{\left(e^{-\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}} + e^{2\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}\right)\right)}\,\phi - 0.70710678118655\,\phi\,\pi\right)$$

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\, e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\, e^{-\pi\sqrt{22}}\right)} - 2112.05714170000 - \pi + \frac{1}{\phi} = \frac{1}{\phi} 1.4142135623731 \left(0.70710678118655 - 1493.4499271495\,\phi + 1.00000000000000 \sqrt{\left(\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)\left(2324 - 24\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}} + \exp\left(2\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)}\,\phi - 0.70710678118655\,\phi\,\pi\right)$$

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}-2112.05714170000-\pi+\frac{1}{\phi}=\frac{1}{\phi}1.0000000000000\left(1.00000000000000-2112.0571417000\,\phi+1.00000000000000\sqrt{\left(-48+4648\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)+2\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)\right)}\,\phi-1.00000000000000\,\phi\,\pi\right)$$

((((((e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22)))) + (((e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22)))))))^1/2 - 2112.0571417 + 11 + 1/golden ratio

Input interpretation:

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}-2112.0571417+11+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.6180341...

139.6180341… result practically equal to the rest mass of Pion meson 139.57 MeV

Series representations:

$$\sqrt{\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}\right)+\left(e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)}-2112.05714170000+11+\frac{1}{\phi}=\frac{1}{\phi}1.4142135623731\left(0.70710678118655-1485.6717525565\,\phi+1.00000000000000\sqrt{\left(e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}\left(2324-24\,e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}+e^{2\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}\right)\right)}\,\phi\right)$$

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\,e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\,e^{-\pi\sqrt{22}}\right)} - 2112.05714170000 + 11 + \frac{1}{\phi} = \frac{1}{\phi}\,1.4142135623731\left(0.70710678118655 - 1485.6717525565\,\phi + 1.00000000000000\sqrt{\left(\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\left(2324 - 24\,e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}} + \exp\left(2\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\right)}\,\phi\right)$$

$$\sqrt{\left(e^{\pi\sqrt{22}} - 24 + 276\,e^{-\pi\sqrt{22}}\right) + \left(e^{\pi\sqrt{22}} - 24 + 4372\,e^{-\pi\sqrt{22}}\right)} - 2112.05714170000 + 11 + \frac{1}{\phi} = \frac{1}{\phi}\,1.0000000000000\left(1.00000000000000 - 2101.0571417000\,\phi + 1.00000000000000\sqrt{\left(-48 + 4648\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right) + 2\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)\right)}\,\phi\right)$$

We note that:

1/64(((e^(Pi*sqrt22) – 24 + 276*e^(-Pi*sqrt22) + e^(Pi*sqrt22) – 24 + 4372*e^(-Pi*sqrt22))))-64^2-728-89

where $728 = 9^3 - 1$ and 89 is a Fibonacci number

Input:

$$\frac{1}{64}\left(e^{\pi\sqrt{22}} - 24 + 276\,e^{-\pi\sqrt{22}} + e^{\pi\sqrt{22}} - 24 + 4372\,e^{-\pi\sqrt{22}}\right) - 64^2 - 728 - 89$$

Exact result:

$$\frac{1}{64}\left(-48 + 4648\,e^{-\sqrt{22}\,\pi} + 2\,e^{\sqrt{22}\,\pi}\right) - 4913$$

Decimal approximation:

73490.99997449086353283670811555578506613702618206835477081...

73490.999…

Property:

$$-4913+\frac{1}{64}\left(-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}\right)\text{ is a transcendental number}$$

Alternate forms:

$$\frac{1}{32}\left(-157240+2324\,e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}\right)$$

$$-\frac{19655}{4}+\frac{581}{8}\,e^{-\sqrt{22}\,\pi}+\frac{e^{\sqrt{22}\,\pi}}{32}$$

$$\frac{1}{32}\,e^{-\sqrt{22}\,\pi}\left(2324-157240\,e^{\sqrt{22}\,\pi}+e^{2\sqrt{22}\,\pi}\right)$$

Series representations:

$$\frac{1}{64}\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}+e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)-64^2-728-89=\frac{1}{32}\,e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}\left(2324-157240\,e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}+e^{2\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}\right)$$

$$\frac{1}{64}\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}+e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)-64^2-728-89=\frac{1}{32}\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\left(2324-157240\,e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}+\exp\left(2\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$\frac{1}{64}\left(e^{\pi\sqrt{22}}-24+276\,e^{-\pi\sqrt{22}}+e^{\pi\sqrt{22}}-24+4372\,e^{-\pi\sqrt{22}}\right)-64^2-728-89=\frac{1}{32}\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)\left(2324-157240\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)+\exp\left(2\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)\right)$$

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

Thence, we have the following mathematical connections:

$$\left(\frac{1}{64}\left(-48+4648\,e^{-\sqrt{22}\,\pi}+2\,e^{\sqrt{22}\,\pi}\right)-4913\right) = 73490.999\ldots \Rightarrow$$

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

$$-3927+2\sqrt[13]{2.2983717437\times10^{59}+2.0823329825883\times10^{59}}$$

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

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

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

$$= 73491.788325481187105491595720422205480251957265634133987\ldots$$

$$= 73491.7883254\ldots \Rightarrow$$

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

$$/(26\times4)^2-24 = \left(\frac{7.9313976505275\times10^8}{(26\times4)^2-24}\right) = 73493.30662\ldots$$

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.

From

$$\varphi' \phi' = -8A'' - 120A'\Omega' + 8e^{2\Omega}\frac{V_\phi}{\phi'}A' + 56e^{2\Omega}\frac{V_\phi}{\phi'}\Omega' A + 7e^{2\Omega}VA,$$

For ϕ' equal to the following Rogers-Ramanujan continued fraction

$$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\cdots}}}} = e^{2\pi/5}\left(\sqrt{\Phi\sqrt{5}} - \Phi\right) = 0,9981360456\ldots$$

$V_\phi = 138$, V = 0.57142857 and Ω' = π, we obtain:

-8-120Pi+8*e^(Pi*sqrt22)*(138/0.9981360456)+56*e^(Pi*sqrt22)*(138*Pi/0.9981360456)+7*0.57142857*e^(Pi*sqrt22)

Input interpretation:

$$-8 - 120\pi + 8e^{\pi\sqrt{22}} \times \frac{138}{0.9981360456} + 56e^{\pi\sqrt{22}}\left(138 \times \frac{\pi}{0.9981360456}\right) + 7 \times 0.57142857 e^{\pi\sqrt{22}}$$

Result:

$6.381175064\ldots \times 10^{10}$

$6.381175064*10^{10}$

Series representations:

$$-8-120\pi+\frac{\left(8\,e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56\,e^{\pi\sqrt{22}}\right)138\,\pi}{0.998136}+7\times 0.571429\,e^{\pi\sqrt{22}}=7742.43\left(-0.00103327+0.143374\,e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}-0.015499\,\pi+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}\pi\right)$$

$$-8-120\pi+\frac{\left(8\,e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56\,e^{\pi\sqrt{22}}\right)138\,\pi}{0.998136}+7\times 0.571429\,e^{\pi\sqrt{22}}=$$
$$-8\,(1+15\,\pi)+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(1110.06+7742.43\,\pi)$$

$$-8-120\pi+\frac{\left(8\,e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56\,e^{\pi\sqrt{22}}\right)138\,\pi}{0.998136}+7\times 0.571429\,e^{\pi\sqrt{22}}=$$
$$-8\,(1+15\,\pi)+\exp\left(\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(1110.06+7742.43\,\pi)$$

(((-8-120Pi+8*e^(Pi*sqrt22)*((x+13)/0.9981360456)+56*e^(Pi*sqrt22)*((x+13)*Pi/0.9981360456)+7*0.57142857*e^(Pi*sqrt22))))=6.381175064e+10

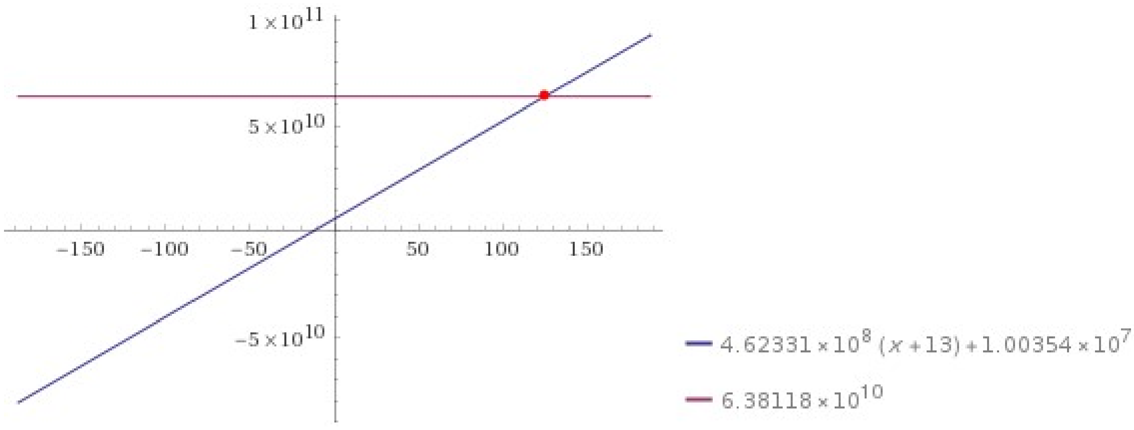
Input interpretation:

$$-8-120\pi+8\,e^{\pi\sqrt{22}}\times\frac{x+13}{0.9981360456}+56\,e^{\pi\sqrt{22}}\left((x+13)\times\frac{\pi}{0.9981360456}\right)+7\times 0.57142857\,e^{\pi\sqrt{22}}=6.381175064\times 10^{10}$$

Result:

$$4.62331\times 10^{8}\,(x+13)+1.00354\times 10^{7}=6.38118\times 10^{10}$$

Plot:



Alternate forms:

$$4.62331\times10^{8}(x+13.0217)=6.38118\times10^{10}$$

$$4.62331\times10^{8}x-5.77914\times10^{10}=0$$

$$4.62331\times10^{8}x+6.02034\times10^{9}=6.38118\times10^{10}$$

Solution:

$x\approx125.$

125 result practically equal to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

(((-8-120Pi+8*e^(Pi*sqrt22)*((x-golden ratio)/0.9981360456)+56*e^(Pi*sqrt22)*((x-golden ratio)*Pi/0.9981360456)+7*0.57142857*e^(Pi*sqrt22))))=6.381175064e+10

Input interpretation:

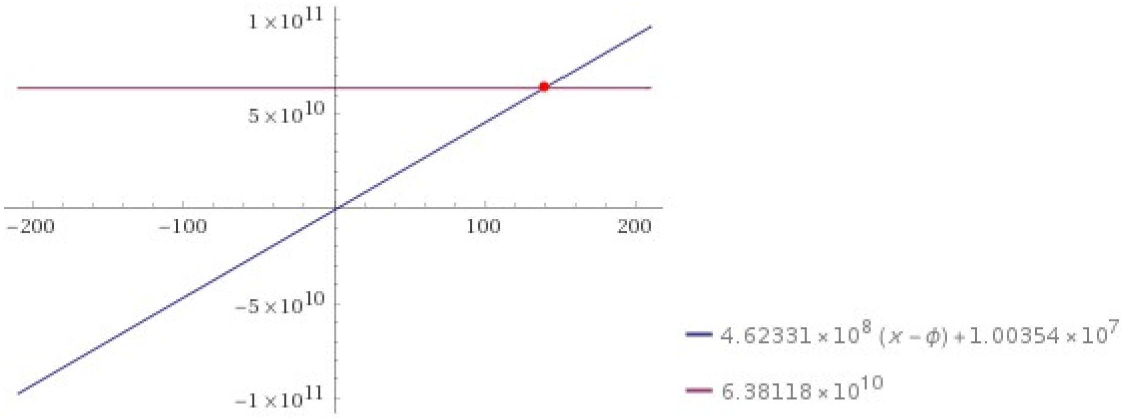
$$-8-120\pi+8e^{\pi\sqrt{22}}\times\frac{x-\phi}{0.9981360456}+56e^{\pi\sqrt{22}}\left((x-\phi)\times\frac{\pi}{0.9981360456}\right)+7\times0.57142857e^{\pi\sqrt{22}}=6.381175064\times10^{10}$$

ϕ is the golden ratio

Result:

$$4.62331\times10^{8}(x-\phi)+1.00354\times10^{7}=6.38118\times10^{10}$$

Plot:



Alternate forms:

$$4.62331\times10^8 (x-1.59633) = 6.38118\times10^{10}$$

$$4.62331\times10^8 x - 6.45498\times10^{10} = 0$$

$$4.62331\times10^8 x - 7.38032\times10^8 = 6.38118\times10^{10}$$

Solution:

$$x \approx 139.618$$

139.618 result practically equal to the rest mass of Pion meson 139.57 MeV

72*ln((((-8-120Pi+8*e^(Pi*sqrt22)*(138/0.9981360456)+56*e^(Pi*sqrt22)*(138*Pi/0.9981360456)+7*0.57142857*e^(Pi*sqrt22)))))-64+golden ratio

Input interpretation:

$$72 \log\left(-8 - 120\pi + 8 e^{\pi\sqrt{22}} \times \frac{138}{0.9981360456} + 56 e^{\pi\sqrt{22}} \left(138 \times \frac{\pi}{0.9981360456}\right) + 7 \times 0.57142857 e^{\pi\sqrt{22}}\right) - 64 + \phi$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1728.9206636...

1728.9206636…

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:

$$72 \log\left(-8 - 120\pi + \frac{\left(8 e^{\pi\sqrt{22}}\right)138}{0.998136} + \frac{\left(56 e^{\pi\sqrt{22}}\right)138\pi}{0.998136} + 7 \times 0.571429 e^{\pi\sqrt{22}}\right) - 64 + \phi = -64 + \phi + 72 \log_e\left(-8 - 120\pi + 4. e^{\pi\sqrt{22}} + \frac{1104 e^{\pi\sqrt{22}}}{0.998136} + \frac{7728\pi e^{\pi\sqrt{22}}}{0.998136}\right)$$

$$72 \log\left(-8 - 120\pi + \frac{\left(8 e^{\pi\sqrt{22}}\right)138}{0.998136} + \frac{\left(56 e^{\pi\sqrt{22}}\right)138\pi}{0.998136} + 7 \times 0.571429 e^{\pi\sqrt{22}}\right) - 64 + \phi = -64 + \phi + 72 \log(a) \log_a\left(-8 - 120\pi + 4. e^{\pi\sqrt{22}} + \frac{1104 e^{\pi\sqrt{22}}}{0.998136} + \frac{7728\pi e^{\pi\sqrt{22}}}{0.998136}\right)$$

$$72 \log\left(-8 - 120\pi + \frac{\left(8 e^{\pi\sqrt{22}}\right)138}{0.998136} + \frac{\left(56 e^{\pi\sqrt{22}}\right)138\pi}{0.998136} + 7 \times 0.571429 e^{\pi\sqrt{22}}\right) - 64 + \phi = -64 + \phi - 72 \operatorname{Li}_1\left(9 + 120\pi - 4. e^{\pi\sqrt{22}} - \frac{1104 e^{\pi\sqrt{22}}}{0.998136} - \frac{7728\pi e^{\pi\sqrt{22}}}{0.998136}\right)$$

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

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

Series representations:

$$72 \log\left(-8 - 120\pi + \frac{\left(8 e^{\pi\sqrt{22}}\right)138}{0.998136} + \frac{\left(56 e^{\pi\sqrt{22}}\right)138\pi}{0.998136} + 7 \times 0.571429 e^{\pi\sqrt{22}}\right) - 64 + \phi = -64 + \phi + 72 \log\left(-8(1 + 15\pi) + e^{\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}(1110.06 + 7742.43\pi)\right)$$

$$72 \log\left(-8 - 120\pi + \frac{\left(8 e^{\pi\sqrt{22}}\right)138}{0.998136} + \frac{\left(56 e^{\pi\sqrt{22}}\right)138\pi}{0.998136} + 7 \times 0.571429 e^{\pi\sqrt{22}}\right) - 64 + \phi = -64 + \phi + 72 \log\left(-3(3 + 40\pi) + e^{\pi\sqrt{22}}(1110.06 + 7742.43\pi)\right) - 72 \sum_{k=1}^{\infty} \frac{(-1)^k \left(-3(3 + 40\pi) + e^{\pi\sqrt{22}}(1110.06 + 7742.43\pi)\right)^{-k}}{k}$$

$$72\log\left(-8-120\pi+\frac{\left(8e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56e^{\pi\sqrt{22}}\right)138\pi}{0.998136}+7\times 0.571429e^{\pi\sqrt{22}}\right)-64+\phi=$$

$$-64+\phi+144i\pi\left\lfloor\frac{\arg\left(-8-120\pi+e^{\pi\sqrt{22}}(1110.06+7742.43\pi)-x\right)}{2\pi}\right\rfloor+72\log(x)-72\sum_{k=1}^{\infty}\frac{(-1)^k\left(-8-120\pi+e^{\pi\sqrt{22}}(1110.06+7742.43\pi)-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

Integral representations:

$$72\log\left(-8-120\pi+\frac{\left(8e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56e^{\pi\sqrt{22}}\right)138\pi}{0.998136}+7\times 0.571429e^{\pi\sqrt{22}}\right)-64+\phi=-64+\phi+72\int_1^{-8(1+15\pi)+e^{\pi\sqrt{22}}(1110.06+7742.43\pi)}\frac{1}{t}\,dt$$

$$72\log\left(-8-120\pi+\frac{\left(8e^{\pi\sqrt{22}}\right)138}{0.998136}+\frac{\left(56e^{\pi\sqrt{22}}\right)138\pi}{0.998136}+7\times 0.571429e^{\pi\sqrt{22}}\right)-64+\phi=-64+\phi+\frac{36}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-3(3+40\pi)+e^{\pi\sqrt{22}}(1110.06+7742.43\pi)\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

Now, we have that:

$$\beta^2\sigma_7+\frac{5\,\sigma_7}{2}+\frac{\tau_7}{2}+6\pm\frac{1}{2}\sqrt{(4\,\beta^4+40\,\beta^2+25)\,\sigma_7{}^2+4\,(\tau_7-12)\,(\beta^2-5/2)\,\sigma_7+(\tau_7-12)^2}\,.$$

$$\sigma_7\;=\;15\;,\qquad \tau_7\;=\;75\;,\qquad \beta\;=\;-1\qquad\qquad (4.30)-(4.31)$$

15+75/2+75/2+6+1/2 * sqrt((((4+40+25)15^2+4(75-12)(1-5/2)15+(75-12)^2)))

Input:

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\times 15^2+4(75-12)\left(1-\frac{5}{2}\right)\times 15+(75-12)^2}$$

Result:

$$96+24\sqrt{6}$$

Decimal approximation:

154.78775382679627435673481779294139340718273953576008308 23...

154.7877538…

Alternate form:

$$24\left(4+\sqrt{6}\right)$$

Minimal polynomial:

$$x^2-192x+5760$$

We have also:

15+75/2+75/2+6+1/2 * sqrt((((4+40+25)15^2+4(75-12)(1-5/2)15+(75-12)^2))) - 13 - golden ratio^2

Input:

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\times 15^2+4(75-12)\left(1-\frac{5}{2}\right)\times 15+(75-12)^2}-13-\phi^2$$

ϕ is the golden ratio

Result:

$$-\phi^2+83+24\sqrt{6}$$

Decimal approximation:

139.16971983804637950853023095857575528946243035595432022 02...

139.169719… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{2}\left(163-\sqrt{5}+48\sqrt{6}\right)$$

$$\frac{163}{2}-\frac{\sqrt{5}}{2}+24\sqrt{6}$$

$$\frac{1}{2}\left(163+\sqrt{13829-96\sqrt{30}}\right)$$

Minimal polynomial:

$$x^4-326x^3+32939x^2-1038310x+10126945$$

Series representations:

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)15^2+4(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-13-\phi^2=83-\phi^2+\frac{1}{2}\sqrt{13823}\sum_{k=0}^{\infty}13823^{-k}\binom{\frac{1}{2}}{k}$$

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)15^2+4(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-13-\phi^2=83-\phi^2+\frac{1}{2}\sqrt{13823}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{13823}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)15^2+4(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-13-\phi^2=83-\phi^2+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}13823^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{4\sqrt{\pi}}$$

And:

15+75/2+75/2+6+1/2 * sqrt((((4+40+25)15^2+4(75-12)(1-5/2)15+(75-12)^2))) - 29 - 1/golden ratio

Input:

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\times 15^2+4(75-12)\left(1-\frac{5}{2}\right)\times 15+(75-12)^2}-29-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$-\frac{1}{\phi}+67+24\sqrt{6}$$

Decimal approximation:

125.1697198380463795085302309585757552894624303559543202202...

125.1697198… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{2}\left(135-\sqrt{5}+48\sqrt{6}\right)$$

$$-\frac{\left(-67-24\sqrt{6}\right)\phi+1}{\phi}$$

$$\frac{1}{2}\left(135+\sqrt{13829-96\sqrt{30}}\right)$$

Minimal polynomial:

$$x^4-270x^3+20423x^2-296730x+1190521$$

Series representations:

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\,15^2+4(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-29-\frac{1}{\phi}=67-\frac{1}{\phi}+\frac{1}{2}\sqrt{13823}\sum_{k=0}^{\infty}13823^{-k}\binom{\frac{1}{2}}{k}$$

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\,15^2+4\,(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-29-\frac{1}{\phi}=67-\frac{1}{\phi}+\frac{1}{2}\sqrt{13\,823}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{13\,823}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$15+\frac{75}{2}+\frac{75}{2}+6+\frac{1}{2}\sqrt{(4+40+25)\,15^2+4\,(75-12)\left(1-\frac{5}{2}\right)15+(75-12)^2}-29-\frac{1}{\phi}=67-\frac{1}{\phi}+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}13\,823^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{4\sqrt{\pi}}$$

15+75/2+75/2+6-1/2 * sqrt((((4+40+25)15^2+4(75-12)(1-5/2)15+(75-12)^2)))

Input:

$$15+\frac{75}{2}+\frac{75}{2}+6-\frac{1}{2}\sqrt{(4+40+25)\times 15^2+4\,(75-12)\left(1-\frac{5}{2}\right)\times 15+(75-12)^2}$$

Result:

$96-24\sqrt{6}$

Decimal approximation:

37.21224617320372564326518220705860659281726046423991691761...

37.212246…

Alternate forms:

$24\left(4-\sqrt{6}\right)$

$-24\left(\sqrt{6}-4\right)$

Minimal polynomial:

$x^2-192\,x+5760$

Now, we have that:

$$\beta^2\sigma_3 + \frac{3\sigma_3}{2} + \frac{\tau_3}{2} + 2 \pm \frac{1}{2}\sqrt{4\,\beta^4\sigma_3{}^2 + 16\,\sigma_3\left(\sigma_3 + \frac{\tau_3}{4} - 1\right)\beta^2 + 9\left(\sigma_3 - \frac{\tau_3}{3} + \frac{4}{3}\right)^2}\;. \qquad (3.41)$$

There are regions of instability as one varies the parameters, but for the actual orientifold potential, where $(\beta, \sigma_3, \tau_3) = \left(1, \frac{3}{2}, \frac{9}{2}\right)$, the two eigenvalues,

3/2+3/2*3/2+9/2*1/2+2+1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))

Input:

$$\frac{3}{2} + \frac{3}{2}\times\frac{3}{2} + \frac{9}{2}\times\frac{1}{2} + 2 + \frac{1}{2}\sqrt{4\times\frac{9}{4} + 16\times\frac{3}{2}\left(\frac{3}{2} + \frac{9}{2}\times\frac{1}{4} - 1\right) + 9\left(\frac{3}{2} - \frac{9}{2}\times\frac{1}{3} + \frac{4}{3}\right)^2}$$

Exact result:

12

12

3/2+3/2*3/2+9/2*1/2+2-1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))

Input:

$$\frac{3}{2} + \frac{3}{2}\times\frac{3}{2} + \frac{9}{2}\times\frac{1}{2} + 2 - \frac{1}{2}\sqrt{4\times\frac{9}{4} + 16\times\frac{3}{2}\left(\frac{3}{2} + \frac{9}{2}\times\frac{1}{4} - 1\right) + 9\left(\frac{3}{2} - \frac{9}{2}\times\frac{1}{3} + \frac{4}{3}\right)^2}$$

Exact result:

4

4

((((3/2+3/2*3/2+9/2*1/2+2+1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))))))^2

Input:

$$\left(\frac{3}{2} + \frac{3}{2}\times\frac{3}{2} + \frac{9}{2}\times\frac{1}{2} + 2 + \frac{1}{2}\sqrt{4\times\frac{9}{4} + 16\times\frac{3}{2}\left(\frac{3}{2} + \frac{9}{2}\times\frac{1}{4} - 1\right) + 9\left(\frac{3}{2} - \frac{9}{2}\times\frac{1}{3} + \frac{4}{3}\right)^2}\right)^2$$

Exact result:

144

144

12*((((3/2+3/2*3/2+9/2*1/2+2+1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))))))^2

Input:

$$12\left(\frac{3}{2}+\frac{3}{2}\times\frac{3}{2}+\frac{9}{2}\times\frac{1}{2}+2+\frac{1}{2}\sqrt{4\times\frac{9}{4}+16\times\frac{3}{2}\left(\frac{3}{2}+\frac{9}{2}\times\frac{1}{4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2}\times\frac{1}{3}+\frac{4}{3}\right)^2}\right)^2$$

Exact result:

1728

1728

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

((((3/2+3/2*3/2+9/2*1/2+2+1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))))))^2 - 5 +1/golden ratio

Input:

$$\left(\frac{3}{2}+\frac{3}{2}\times\frac{3}{2}+\frac{9}{2}\times\frac{1}{2}+2+\frac{1}{2}\sqrt{4\times\frac{9}{4}+16\times\frac{3}{2}\left(\frac{3}{2}+\frac{9}{2}\times\frac{1}{4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2}\times\frac{1}{3}+\frac{4}{3}\right)^2}\right)^2-5+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+139$$

Decimal approximation:

139.6180339887498948482045868343656381177203091798057628621...

139.61803398…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{2}\left(277+\sqrt{5}\right)$$

$$\frac{139\,\phi+1}{\phi}$$

$$\frac{\sqrt{5}}{2}+\frac{277}{2}$$

Series representations:

$$\left(\frac{3}{2}+\frac{3\times 3}{2\times 2}+\frac{9}{2\times 2}+2+\frac{1}{2}\sqrt{\frac{4\times 9}{4}+\frac{16}{2}\times 3\left(\frac{3}{2}+\frac{9}{2\times 4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times 3}+\frac{4}{3}\right)^2}\right)^2-5+\frac{1}{\phi}=-5+\frac{1}{\phi}+\left(8+\frac{1}{2}\sqrt{63}\sum_{k=0}^{\infty}63^{-k}\binom{\frac{1}{2}}{k}\right)^2$$

$$\left(\frac{3}{2}+\frac{3\times 3}{2\times 2}+\frac{9}{2\times 2}+2+\frac{1}{2}\sqrt{\frac{4\times 9}{4}+\frac{16}{2}\times 3\left(\frac{3}{2}+\frac{9}{2\times 4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times 3}+\frac{4}{3}\right)^2}\right)^2-5+\frac{1}{\phi}=-5+\frac{1}{\phi}+\left(8+\frac{1}{2}\sqrt{63}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{63}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

$$\left(\frac{3}{2}+\frac{3\times 3}{2\times 2}+\frac{9}{2\times 2}+2+\frac{1}{2}\sqrt{\frac{4\times 9}{4}+\frac{16}{2}\times 3\left(\frac{3}{2}+\frac{9}{2\times 4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times 3}+\frac{4}{3}\right)^2}\right)^2-5+\frac{1}{\phi}=-5+\frac{1}{\phi}+\left(8+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}63^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{4\sqrt{\pi}}\right)^2$$

((((3/2+3/2*3/2+9/2*1/2+2+1/2*sqrt(((4*9/4+16*3/2(3/2+9/2*1/4-1)+9(3/2-9/2*1/3+4/3)^2)))))))^2 - 18 - 1/golden ratio

Input:

$$\left(\frac{3}{2}+\frac{3}{2}\times\frac{3}{2}+\frac{9}{2}\times\frac{1}{2}+2+\frac{1}{2}\sqrt{4\times\frac{9}{4}+16\times\frac{3}{2}\left(\frac{3}{2}+\frac{9}{2}\times\frac{1}{4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2}\times\frac{1}{3}+\frac{4}{3}\right)^2}\right)^2 - 18 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$126 - \frac{1}{\phi}$$

Decimal approximation:

125.3819660112501051517954131656343618822796908201942371378...

125.381966…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{2}\left(253-\sqrt{5}\right)$$

$$\frac{126\,\phi-1}{\phi}$$

$$-\frac{1-126\,\phi}{\phi}$$

Series representations:

$$\left(\frac{3}{2}+\frac{3\times3}{2\times2}+\frac{9}{2\times2}+2+\frac{1}{2}\sqrt{\frac{4\times9}{4}+\frac{16}{2}\times3\left(\frac{3}{2}+\frac{9}{2\times4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times3}+\frac{4}{3}\right)^2}\right)^2 - 18 - \frac{1}{\phi} = -18 - \frac{1}{\phi} + \left(8+\frac{1}{2}\sqrt{63}\sum_{k=0}^{\infty}63^{-k}\binom{\frac{1}{2}}{k}\right)^2$$

$$\left(\frac{3}{2}+\frac{3\times3}{2\times2}+\frac{9}{2\times2}+2+\frac{1}{2}\sqrt{\frac{4\times9}{4}+\frac{16}{2}\times3\left(\frac{3}{2}+\frac{9}{2\times4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times3}+\frac{4}{3}\right)^2}\right)^2-$$

$$18-\frac{1}{\phi}=-18-\frac{1}{\phi}+\left(8+\frac{1}{2}\sqrt{63}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{63}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

$$\left(\frac{3}{2}+\frac{3\times3}{2\times2}+\frac{9}{2\times2}+2+\frac{1}{2}\sqrt{\frac{4\times9}{4}+\frac{16}{2}\times3\left(\frac{3}{2}+\frac{9}{2\times4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2\times3}+\frac{4}{3}\right)^2}\right)^2-$$

$$18-\frac{1}{\phi}=-18-\frac{1}{\phi}+\left(8+\frac{\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}63^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{4\sqrt{\pi}}\right)^2$$

We note that:

from: **Manuscript Book 1 of Srinivasa Ramanujan**

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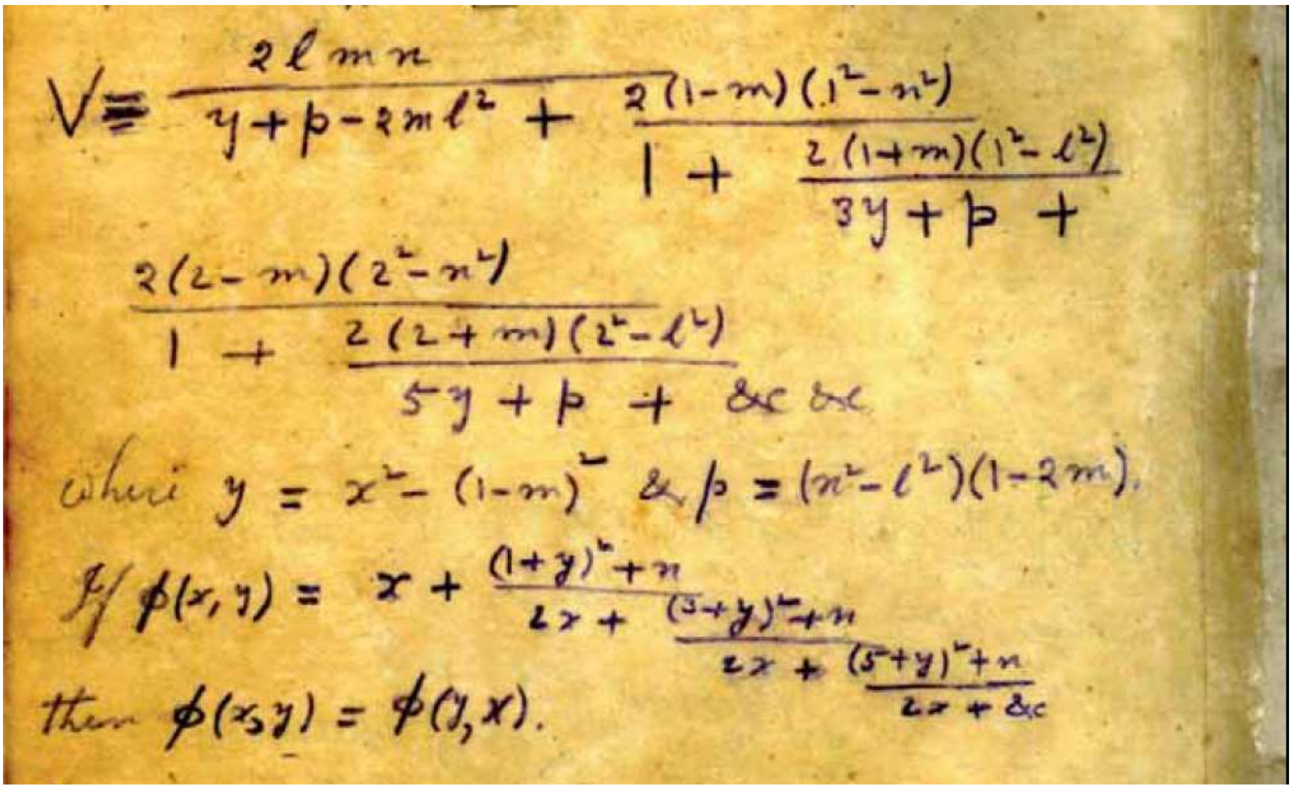


$$V=\frac{2lmn}{y+p-2ml^2+\frac{2(1-m)(1^2-n^2)}{1+\frac{2(1+m)(1^2-l^2)}{3y+p+\frac{2(2-m)(2^2-n^2)}{1+\frac{2(2+m)(2^2-l^2)}{5y+p+\ \&c\ \&c}}}}}$$

where $y=x^2-(1-m)^2$ & $p=(n^2-l^2)(1-2m)$.

If $\phi(x,y)=x+\frac{(1+y)^2+n}{2x+\frac{(3+y)^2+n}{2x+\frac{(5+y)^2+n}{2x+\&c}}}$

then $\phi(x,y)=\phi(y,x)$.

For x = 2, l = 3, m = 5, n = 8

y = 2^2-(1-5)^2 = -12

p = (8^2-3^2)(1-2*5) = - 495

2*3*5*8/((((-12-495-2*5*3^2)+(((2(1-5)(1-8^2))/(1+(((((((-96/(-36-495+(2(2-5)(4-64))/(1+((((((-70)/(-60-495))))))))))))))))

Input:

$$\frac{2\times 3\times 5\times 8}{\left(-12-495-2\times 5\times 3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}$$

Exact result:

$$-\frac{204880}{213791}$$

Decimal approximation:

−0.95831910604281751804332268430382944090256371877207178973...

-0.958319106…

Continued fraction:

$$\frac{1}{-1+\frac{1}{-22+\frac{1}{-1+\frac{1}{-121+\frac{1}{-14+\frac{1}{-1+\frac{1}{-1+-\frac{1}{2}}}}}}}}$$

[-(2*3*5*8)/((((-12-495-2*5*3^2)+(((2(1-5)(1-8^2))/(1+(((((((-96/(-36-495+(2(2-5)(4-64))/(1+((((((-70)/(-60-495))))))))))))))))))))))]^1/64

Input:

$$\sqrt[64]{-\frac{2\times3\times5\times8}{(-12-495-2\times5\times3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}}$$

Result:

$$\sqrt[64]{\frac{12\,805}{213\,791}}\sqrt[16]{2}$$

Decimal approximation:

0.999334995270014233707606973481877009422036043201135085501...

0.999334995… 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 $\mathbf{0.989117352243 = \phi}$

Alternate forms:

$$\frac{\sqrt[16]{2}\,\sqrt[64]{12\,805}\;213\,791^{63/64}}{213\,791}$$

root of $213\,791\,x^{64}-204\,880$ near $x=0.999335$

2log base 0.99933499527[-(2*3*5*8)/((((-12-495-2*5*3^2)+(((2(1-5)(1-8^2))/(1+((((((-96/(-36-495+(2(2-5)(4-64))/(1+((((((-70)/(-60-495))))))))))))))))))]-Pi+1/golden ratio

Input interpretation:

$$2\log_{0.99933499527}\left(-\frac{2\times3\times5\times8}{(-12-495-2\times5\times3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.47644...

125.47644…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representation:

$$2\log_{0.999334995270000}\left(-\frac{2\times3\times5\times8}{(-12-495-2\times5\times3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{2\log\left(-\frac{240}{-597-\frac{8(1-8^2)}{1-\frac{96}{-531+\frac{360}{1--\frac{70}{555}}}}}\right)}{\log(0.999334995270000)}$$

Series representations:

$$2 \log_{0.999334995270000}\left(-\frac{2\times 3\times 5\times 8}{\left(-12-495-2\times 5\times 3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)-\pi+\frac{1}{\phi} =$$

$$\frac{1}{\phi}-\pi-\frac{2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{8911}{213\,791}\right)^k}{k}}{\log(0.999334995270000)}$$

$$2 \log_{0.999334995270000}\left(-\frac{2\times 3\times 5\times 8}{\left(-12-495-2\times 5\times 3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)-\pi+\frac{1}{\phi} =$$

$$\frac{1}{\phi}-1.00000000000\,\pi-3006.49740532\log\left(\frac{204\,880}{213\,791}\right)-2\log\left(\frac{204\,880}{213\,791}\right)\sum_{k=0}^{\infty}(-0.000665004730000)^k\,G(k)$$

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

2log base 0.99933499527[-(2*3*5*8)/((((-12-495-2*5*3^2)+(((2(1-5)(1-8^2))/(1+(((((((-96/(-36-495+(2(2-5)(4-64))/(1+((((((-70)/(-60-495)))))))))))))))))))))]+11+1/golden ratio

Input interpretation:

$$2 \log_{0.99933499527}\left(-\frac{2\times 3\times 5\times 8}{\left(-12-495-2\times 5\times 3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)+11+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

139.61803...

139.61803…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representation:

$$2\log_{0.999334995270000}\left(-\frac{2\times 3\times 5\times 8}{(-12-495-2\times 5\times 3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\frac{2\log\left(-\frac{240}{-597-\frac{8(1-8^2)}{1-\frac{96}{-531+\frac{360}{1--\frac{70}{555}}}}}\right)}{\log(0.999334995270000)}$$

Series representations:

$$2\log_{0.999334995270000}\left(-\frac{2\times 3\times 5\times 8}{(-12-495-2\times 5\times 3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}-\frac{2\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{8911}{213\,791}\right)^k}{k}}{\log(0.999334995270000)}$$

$$2\log_{0.999334995270000}\left(-\frac{2\times3\times5\times8}{(-12-495-2\times5\times3^2)+\frac{2(1-5)(1-8^2)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}}\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}-3006.49740532\log\left(\frac{204880}{213791}\right)-$$

$$2\log\left(\frac{204880}{213791}\right)\sum_{k=0}^{\infty}(-0.000665004730000)^k\,G(k)$$

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

Thence, we have the following mathematical connections:

$$\left[\left(\frac{3}{2}+\frac{3}{2}\times\frac{3}{2}+\frac{9}{2}\times\frac{1}{2}+2+\frac{1}{2}\sqrt{4\times\frac{9}{4}+16\times\frac{3}{2}\left(\frac{3}{2}+\frac{9}{2}\times\frac{1}{4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2}\times\frac{1}{3}+\frac{4}{3}\right)^2}\right)^2-18-\frac{1}{\phi}\right]=125.381966..\Rightarrow$$

$$\Rightarrow \left[2\log_{0.99933499527}\left(-\frac{2\times3\times5\times8}{\left(-12-495-2\times5\times3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}} \right) - \pi + \frac{1}{\phi} \right] = 125.47644\ldots.$$

$$\left[\left(\frac{3}{2}+\frac{3}{2}\times\frac{3}{2}+\frac{9}{2}\times\frac{1}{2}+2+\frac{1}{2}\sqrt{4\times\frac{9}{4}+16\times\frac{3}{2}\left(\frac{3}{2}+\frac{9}{2}\times\frac{1}{4}-1\right)+9\left(\frac{3}{2}-\frac{9}{2}\times\frac{1}{3}+\frac{4}{3}\right)^2} \right)^2 - 5 + \frac{1}{\phi} \right] = 139.61803398 \Rightarrow$$

$$\Rightarrow \left[2\log_{0.99933499527}\left(-\frac{2\times3\times5\times8}{\left(-12-495-2\times5\times3^2\right)+\frac{2(1-5)\left(1-8^2\right)}{1-\frac{96}{-36-495+\frac{2(2-5)(4-64)}{1-\frac{70}{-60-495}}}}} \right) + 11 + \frac{1}{\phi} \right] = 139.61803\ldots.$$

Now, we have that:

Einstein frame this translates into the dilaton potential [10]

$$V = T\, e^{\frac{5}{2}\phi}\,. \qquad (1.2)$$

In the heterotic case $V \sim e^{\frac{5}{2}\phi}$, and

$$b = \frac{7}{4} e^{2\Omega} V \left(1 + 20\,\frac{\Omega'}{\phi'}\right)\,. \qquad (5.45)$$

For the (1.2) and T = 1, we obtain:

exp(-5/2*0.9981360456)

Input interpretation:

$$\exp\left(-\frac{5}{2} \times 0.9981360456\right)$$

Result:

0.08246839796...

0.08246839796...

From the (5.45), we obtain:

7/4* e^(Pi*sqrt22) * 0.08246839796 (1+20*(Pi/0.9981360456))

Input interpretation:

$$\frac{7}{4} e^{\pi \sqrt{22}} \times 0.08246839796 \left(1 + 20 \times \frac{\pi}{0.9981360456}\right)$$

Result:

$2.315543744... \times 10^7$

$2.315543744...*10^7$

Series representations:

$$\frac{1}{4} e^{\pi \sqrt{22}}\, 7 \times 0.0824684 \left(1 + \frac{20\,\pi}{0.998136}\right) = 0.14432\, e^{\pi \sqrt{21} \sum_{k=0}^{\infty} 21^{-k} \binom{1/2}{k}} (1 + 20.0373\,\pi)$$

$$\frac{1}{4} e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right) = 0.14432\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(1+20.0373\pi)$$

$$\frac{1}{4} e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right) = 0.14432\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(1+20.0373\pi)$$

((((1/64^2(((7/4* e^(Pi*sqrt22) * 0.08246839796 (1+20*(Pi/0.9981360456))))))))

Input interpretation:

$$\frac{1}{64^2}\left(\frac{7}{4} e^{\pi\sqrt{22}}\times 0.08246839796\left(1+20\times\frac{\pi}{0.9981360456}\right)\right)$$

Result:

5653.182970...

5653.18297…

Series representations:

$$\frac{e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2} = 0.0000352343\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(1+20.0373\pi)$$

$$\frac{e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2} = 0.0000352343\, e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(1+20.0373\pi)$$

$$\frac{e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2} = 0.0000352343\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(1+20.0373\pi)$$

((((1/64^2(((7/4* e^(Pi*sqrt22) * 0.08246839796 (1+20*(Pi/0.9981360456))))))))+123+11

Input interpretation:

$$\frac{1}{64^2}\left(\frac{7}{4}\,e^{\pi\sqrt{22}}\times 0.08246839796\left(1+20\times\frac{\pi}{0.9981360456}\right)\right)+123+11$$

Result:

5787.182970...

5787.18297… result practically equal to the rest mass of bottom Xi baryon 5787.8

Series representations:

$$\frac{e^{\pi\sqrt{22}}\;7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2}+123+11=134+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(0.0000352343+0.000706002\,\pi)$$

$$\frac{e^{\pi\sqrt{22}}\;7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2}+123+11=134+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(0.0000352343+0.000706002\,\pi)$$

$$\frac{e^{\pi\sqrt{22}}\;7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)}{4\times 64^2}+123+11=134+\exp\left(\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(0.0000352343+0.000706002\,\pi)$$

(29+2)/10^2*1/(64)^2(((7/4* e^(Pi*sqrt22) * 0.08246839796 (1+20*(Pi/0.9981360456))))) – 24

Input interpretation:

$$\frac{29+2}{10^2}\times\frac{1}{64^2}\left(\frac{7}{4}\,e^{\pi\sqrt{22}}\times 0.08246839796\left(1+20\times\frac{\pi}{0.9981360456}\right)\right)-24$$

Result:

1728.486721...

1728.486721…

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

Series representations:

$$\frac{\left(e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)\right)(29+2)}{(64^2\times 4)\,10^2}-24 = -24+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(0.0000109226+0.000218861\,\pi)$$

$$\frac{\left(e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)\right)(29+2)}{(64^2\times 4)\,10^2}-24 = -24+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(0.0000109226+0.000218861\,\pi)$$

$$\frac{\left(e^{\pi\sqrt{22}}\ 7\times 0.0824684\left(1+\frac{20\pi}{0.998136}\right)\right)(29+2)}{(64^2\times 4)\,10^2}-24 = -24+\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(0.0000109226+0.000218861\,\pi)$$

Now, we have that:

$AdS_3 \times S^7$ background. In addition, the zeroth–order dilaton equation gives

$$V_0' \; = \; \frac{\beta}{2}\, \widetilde{h}^{\,2}\, e^{\beta\,\phi_0} \; , \tag{3.5}$$

which links the three–form flux, sized by $\widetilde{h}$, to the derivative of the scalar potential. Notice that the allowed signs of V_0' and β must coincide, a condition that holds for the perturbative orientifold vacuum, where $\beta = 1$. The Einstein equations translate into

$$\frac{21}{R^2} \; - \; \frac{1}{R^2_{AdS}} \; = \; \frac{1}{4}\, e^{\beta\,\phi_0}\, \widetilde{h}^2 \; + \; \frac{1}{2}\, V_0 \; , \tag{3.6}$$

$$\frac{15}{R^2} \; - \; \frac{3}{R^2_{AdS}} \; = \; -\, \frac{1}{4}\, e^{\beta\,\phi_0}\, \widetilde{h}^2 \; + \; \frac{1}{2}\, V_0 \; , \tag{3.7}$$

and it is convenient to define the two variables

$$\sigma_3 \; = \frac{R^2_{AdS}}{2\,\beta}\, V_0' \; = \; 1 \; + \; 3\, \frac{R^2_{AdS}}{R^2} \; , \qquad \tau_3 \; = \; R^2_{AdS}\, V_0'' \; , \tag{3.8}$$

which will often appear in the next section. Notice that $\sigma_3 \geq 1$ and

$$R^2_{AdS}\, V_0 \; = \; 12 \left(\sigma_3 \; - \; \frac{4}{3} \right) \; , \tag{3.9}$$

so that the value $\sigma_3 = \frac{4}{3}$ separates negative and positive values of V_0 for these generalized $AdS_3 \times S^7$ vacua, and for the *(projective)disk–level* orientifold potential

$$\sigma_3 \; = \; \frac{3}{2} \; , \qquad \tau_3 \; = \; \frac{9}{2} \; . \tag{3.10}$$

From eq. (3.9), we have:

12(3/2-4/3)

$$12\left(\frac{3}{2} - \frac{4}{3}\right)$$

2

Thence $V_0 = 2$

From eq. (3.6), we obtain:

$$\frac{21}{R^2} \; - \; \frac{1}{R^2_{AdS}} \; = \; \frac{1}{4}\, e^{\beta\,\phi_0}\, \widetilde{h}^2 \; + \; \frac{1}{2}\, V_0$$

For $R^2_{ADS} = 1$; $R^2 = 1$, and $e^{\pi\sqrt{22}} - 24 + 276 e^{-\pi\sqrt{22}} - \cdots$

we obtain:

(21-1)x = 1/4 * e^-(Pi*sqrt22) * 276^2 + 1

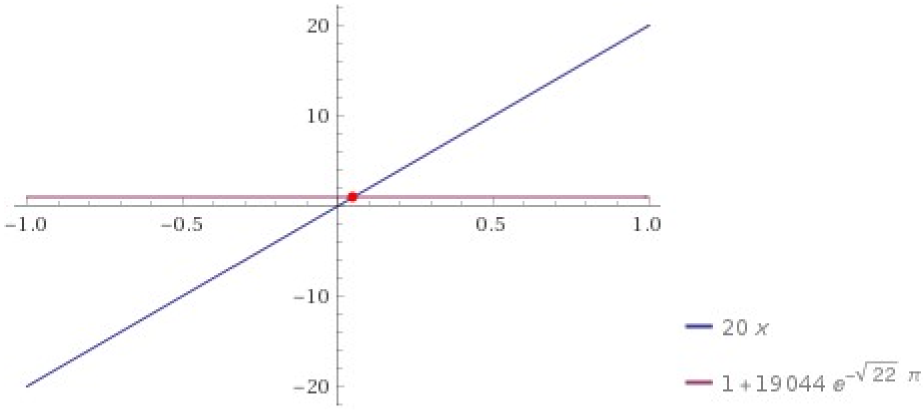
Input:

$$(21-1)\,x = \frac{1}{4}\,e^{-\left(\pi\sqrt{22}\right)} \times 276^2 + 1$$

Exact result:

$$20\,x = 1 + 19\,044\,e^{-\sqrt{22}\,\pi}$$

Plot:



Alternate forms:

$$20\,x - 19\,044\,e^{-\sqrt{22}\,\pi} - 1 = 0$$

$$20\,x = e^{-\sqrt{22}\,\pi}\left(19\,044 + e^{\sqrt{22}\,\pi}\right)$$

Solution:

$$x = \frac{1}{20} + \frac{4761}{5}\,e^{-\sqrt{22}\,\pi}$$

Input:

$$\frac{1}{20} + \frac{4761}{5}\,e^{-\sqrt{22}\,\pi}$$

Decimal approximation:

0.0503795210114268204528061792070435384427007699781010130 02...

0.050379521…

Property:

$\frac{1}{20}+\frac{4761}{5}e^{-\sqrt{22}\,\pi}$ is a transcendental number

Alternate forms:

$$\frac{1}{20}\left(1+19044\,e^{-\sqrt{22}\,\pi}\right)$$

$$\frac{1}{20}e^{-\sqrt{22}\,\pi}\left(19044+e^{\sqrt{22}\,\pi}\right)$$

Series representations:

$$\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761=\frac{1}{20}+\frac{4761}{5}e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}$$

$$\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761=\frac{1}{20}+\frac{4761}{5}\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761=\frac{1}{20}+\frac{4761}{5}\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

7/(((1/20 + 4761/5 e^(-sqrt(22) π))))+1/golden ratio

Input:

$$\frac{7}{\frac{1}{20}+\frac{4761}{5}e^{-\sqrt{22}\,\pi}}+\frac{1}{\phi}$$

ϕ is the golden ratio

Decimal approximation:

139.5633804205330885306347895826403715652757127044088743680…

139.56338042… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$$\frac{7}{\frac{1}{20}+\frac{4761}{5}e^{-\sqrt{22}\,\pi}}+\frac{1}{\phi}$$ is a transcendental number

Alternate forms:

$$\frac{1}{\phi}+\frac{140}{1+19\,044\,e^{-\sqrt{22}\,\pi}}$$

$$\frac{1}{2}\left(\sqrt{5}-1\right)+\frac{7}{\frac{1}{20}+\frac{4761}{5}e^{-\sqrt{22}\,\pi}}$$

$$\frac{140\,\phi+1+19\,044\,e^{-\sqrt{22}\,\pi}}{\left(1+19\,044\,e^{-\sqrt{22}\,\pi}\right)\phi}$$

Series representations:

$$\frac{7}{\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761}+\frac{1}{\phi}=\frac{7}{\frac{1}{20}+\frac{4761}{5}e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}}+\frac{1}{\phi}$$

$$\frac{7}{\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761}+\frac{1}{\phi}=\frac{7}{\frac{1}{20}+\frac{4761}{5}\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}+\frac{1}{\phi}$$

$$\frac{7}{\frac{1}{20}+\frac{1}{5}e^{-\sqrt{22}\,\pi}\,4761}+\frac{1}{\phi}=\frac{7}{\frac{1}{20}+\frac{4761}{5}\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)}+\frac{1}{\phi}$$

From eq. (3.7), we obtain:

(15-3)x = -1/4 * e^-(Pi*sqrt22) * 276^2 + 1

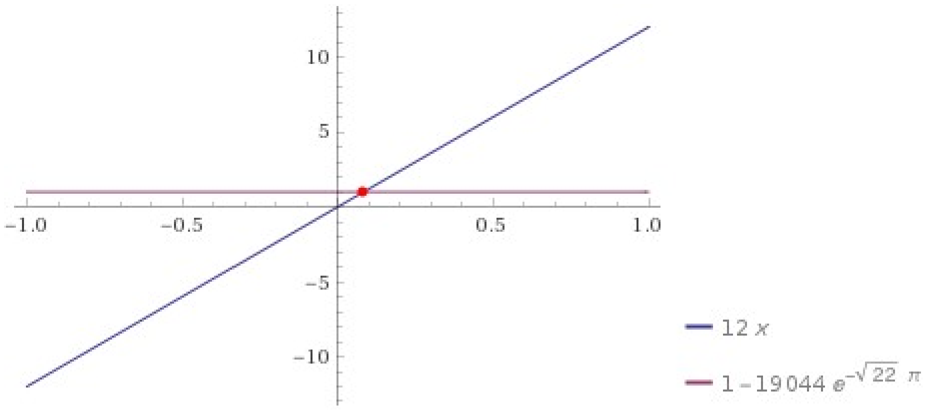
Input:

$$(15-3)\,x=-\frac{1}{4}\,e^{-\left(\pi\sqrt{22}\right)}\times 276^2+1$$

Exact result:

$$12\,x=1-19\,044\,e^{-\sqrt{22}\,\pi}$$

Plot:



Alternate forms:

$$12\left(x + 1587 e^{-\sqrt{22}\,\pi}\right) = 1$$

$$12x + 19044 e^{-\sqrt{22}\,\pi} - 1 = 0$$

$$12x = e^{-\sqrt{22}\,\pi}\left(e^{\sqrt{22}\,\pi} - 19044\right)$$

Solution:

$$x = \frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}$$

1/12 - 1587 e^(-sqrt(22) π)

Input:

$$\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}$$

Decimal approximation:

0.082700798314288632578656367988260769262165383369831644995...

0.0827007983…

Property:

$\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}$ is a transcendental number

Alternate forms:

$$\frac{1}{12}\left(1 - 19044 e^{-\sqrt{22}\,\pi}\right)$$

$$\frac{1}{12} e^{-\sqrt{22}\,\pi}\left(e^{\sqrt{22}\,\pi} - 19044\right)$$

Series representations:

$$\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi} = \frac{1}{12} - 1587 e^{-\pi \sqrt{21} \sum_{k=0}^{\infty} 21^{-k} \binom{1/2}{k}}$$

$$\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi} = \frac{1}{12} - 1587 \exp\left(-\pi \sqrt{21} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi} = \frac{1}{12} - 1587 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\, \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2 \sqrt{\pi}}\right)$$

11/(((1/12 - 1587 e^(-sqrt(22) π))))+5+golden ratio

Input:

$$\frac{11}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} + 5 + \phi$$

ϕ is the golden ratio

Decimal approximation:

139.6276327376833100900013364247870846143606714913243368267...

139.6276327… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$5 + \frac{11}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} + \phi$ is a transcendental number

Alternate forms:

$$\phi + 5 - \frac{132}{19044 e^{-\sqrt{22}\,\pi} - 1}$$

$$\frac{1}{2}\left(275 + \sqrt{5}\right) + \frac{2513808}{e^{\sqrt{22}\,\pi} - 19044}$$

$$\frac{1}{2}\left(11 + \sqrt{5}\right) + \frac{11}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}}$$

Series representations:

$$\frac{11}{\frac{1}{12}-1587 e^{-\sqrt{22}\,\pi}}+5+\phi=5+\frac{11}{\frac{1}{12}-1587 e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}}+\phi$$

$$\frac{11}{\frac{1}{12}-1587 e^{-\sqrt{22}\,\pi}}+5+\phi=5+\frac{11}{\frac{1}{12}-1587 \exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}+\phi$$

$$\frac{11}{\frac{1}{12}-1587 e^{-\sqrt{22}\,\pi}}+5+\phi=5+\frac{11}{\frac{1}{12}-1587 \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)}+\phi$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

11/(((1/12 - 1587 e^(-sqrt(22) π))))-7-1/golden ratio

Input:

$$\frac{11}{\frac{1}{12}-1587 e^{-\sqrt{22}\,\pi}}-7-\frac{1}{\phi}$$

ϕ is the golden ratio

Decimal approximation:

125.3915647601835203935921627560558083789200531317128111024...

125.39156476… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$$-7+\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}-\frac{1}{\phi}$$ is a transcendental number

Alternate forms:

$$-\frac{1}{\phi}-7-\frac{132}{19\,044\,e^{-\sqrt{22}\,\pi}-1}$$

$$-7-\frac{2}{1+\sqrt{5}}+\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}$$

$$\frac{1}{2}\left(-13-\sqrt{5}\right)+\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}$$

Series representations:

$$\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}-7-\frac{1}{\phi}=-7+\frac{11}{\frac{1}{12}-1587\,e^{-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}}-\frac{1}{\phi}$$

$$\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}-7-\frac{1}{\phi}=-7+\frac{11}{\frac{1}{12}-1587\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}-\frac{1}{\phi}$$

$$\frac{11}{\frac{1}{12}-1587\,e^{-\sqrt{22}\,\pi}}-7-\frac{1}{\phi}=-7+\frac{11}{\frac{1}{12}-1587\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)}-\frac{1}{\phi}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

64/(((1/12 - 1587 e^(-sqrt(22) π))))-7-1/golden ratio + 16

Input:

$$\frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} - 7 - \frac{1}{\phi} + 16$$

ϕ is the golden ratio

Exact result:

$$-\frac{1}{\phi} + 9 + \frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}}$$

Decimal approximation:

782.2559950959536120131583198735409596809145260872113947502...

782.25599509… result practically equal to the rest mass of Omega meson 782.65

Property:

$9 + \frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} - \frac{1}{\phi}$ is a transcendental number

Alternate forms:

$$-\frac{1}{\phi} + 9 - \frac{768}{19\,044 e^{-\sqrt{22}\,\pi} - 1}$$

$$9 - \frac{2}{1 + \sqrt{5}} + \frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}}$$

$$\frac{1}{2}\left(19 - \sqrt{5}\right) + \frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}}$$

Series representations:

$$\frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} - 7 - \frac{1}{\phi} + 16 = 9 + \frac{64}{\frac{1}{12} - 1587 e^{-\pi \sqrt{21} \sum_{k=0}^{\infty} 21^{-k} \binom{1/2}{k}}} - \frac{1}{\phi}$$

$$\frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\,\pi}} - 7 - \frac{1}{\phi} + 16 = 9 + \frac{64}{\frac{1}{12} - 1587 \exp\left(-\pi \sqrt{21} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)} - \frac{1}{\phi}$$

$$\frac{64}{\frac{1}{12} - 1587 e^{-\sqrt{22}\pi}} - 7 - \frac{1}{\phi} + 16 =$$

$$9 + \frac{64}{\frac{1}{12} - 1587 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 2^{1-s} \Gamma\left(-\frac{1}{2}-s\right) \Gamma(s)}{2\sqrt{\pi}}\right)} - \frac{1}{\phi}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

144/(((1/12 - 1587 e^(-sqrt(22) π))))-11-golden ratio

Input:

$$\frac{144}{\frac{1}{12} - 1587 e^{-\sqrt{22}\pi}} - 11 - \phi$$

ϕ is the golden ratio

Decimal approximation:

1728.598531451832995589861953258424206929208070170982841765...

1728.5985314…

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

Property:

$$-11 + \frac{144}{\frac{1}{12} - 1587 e^{-\sqrt{22}\pi}} - \phi \text{ is a transcendental number}$$

Alternate forms:

$$-\phi - 11 - \frac{1728}{19\,044\, e^{-\sqrt{22}\,\pi} - 1}$$

$$\frac{1}{2}\left(3433 - \sqrt{5}\right) + \frac{32\,908\,032}{e^{\sqrt{22}\,\pi} - 19\,044}$$

$$\frac{1}{2}\left(-23 - \sqrt{5}\right) + \frac{144}{\frac{1}{12} - 1587\, e^{-\sqrt{22}\,\pi}}$$

Series representations:

$$\frac{144}{\frac{1}{12} - 1587\, e^{-\sqrt{22}\,\pi}} - 11 - \phi = -11 + \frac{144}{\frac{1}{12} - 1587\, e^{-\pi \sqrt{21} \sum_{k=0}^{\infty} 21^{-k} \binom{1/2}{k}}} - \phi$$

$$\frac{144}{\frac{1}{12} - 1587\, e^{-\sqrt{22}\,\pi}} - 11 - \phi = -11 + \frac{144}{\frac{1}{12} - 1587 \exp\left(-\pi \sqrt{21} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{21}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)} - \phi$$

$$\frac{144}{\frac{1}{12} - 1587\, e^{-\sqrt{22}\,\pi}} - 11 - \phi = -11 + \frac{144}{\frac{1}{12} - 1587 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\, \Gamma\left(-\frac{1}{2}-s\right) \Gamma(s)}{2\sqrt{\pi}}\right)} - \phi$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

From (3.5), we obtain:

1/2 * 276^2 * e^-(Pi*sqrt22)

Input:

$$\frac{1}{2} \times 276^2\, e^{-\left(\pi \sqrt{22}\right)}$$

Exact result:

$38\,088\, e^{-\sqrt{22}\,\pi}$

Decimal approximation:

0.015180840457072818112247168281741537708030799124040520108...

0.01518084…

Property:

$38\,088\, e^{-\sqrt{22}\,\pi}$ is a transcendental number

Series representations:

$$\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)} = 38\,088\, e^{-\pi\sqrt{21}\,\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}$$

$$\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)} = 38\,088\, \exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)} = 38\,088\, \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\, 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

2/(1/2 * 276^2 * e^-(Pi*sqrt22))+8

Input:

$$\frac{2}{\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)}} + 8$$

Exact result:

$$8+\frac{e^{\sqrt{22}\,\pi}}{19\,044}$$

Decimal approximation:

139.74501146069231606624286883646750485593419107688544611 05...

139.74501146… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$8+\frac{e^{\sqrt{22}\,\pi}}{19\,044}$ is a transcendental number

Alternate form:

$$\frac{152\,352+e^{\sqrt{22}\,\pi}}{19\,044}$$

Series representations:

$$\frac{2}{\frac{1}{2}\times 276^2\,e^{-\left(\pi\sqrt{22}\right)}}+8=8+\frac{e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}}{19\,044}$$

$$\frac{2}{\frac{1}{2}\times 276^2\,e^{-\left(\pi\sqrt{22}\right)}}+8=8+\frac{e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}}{19\,044}$$

$$\frac{2}{\frac{1}{2}\times 276^2\,e^{-\left(\pi\sqrt{22}\right)}}+8=8+\frac{\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)}{19\,044}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

2/(1/2 * 276^2 * e^-(Pi*sqrt22)) - 7 + 1/golden ratio

Input:

$$\frac{2}{\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)}} - 7 + \frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi} - 7 + \frac{e^{\sqrt{22}\,\pi}}{19\,044}$$

Decimal approximation:

125.3630454494422109144474556708331429736545002566912089727...

125.36304544… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$$-7 + \frac{e^{\sqrt{22}\,\pi}}{19\,044} + \frac{1}{\phi} \text{ is a transcendental number}$$

Alternate forms:

$$\frac{1}{2}\left(\sqrt{5} - 15\right) + \frac{e^{\sqrt{22}\,\pi}}{19\,044}$$

$$\frac{19\,044\,(1 - 7\,\phi) + e^{\sqrt{22}\,\pi}\,\phi}{19\,044\,\phi}$$

$$-7 + \frac{2}{1+\sqrt{5}} + \frac{e^{\sqrt{22}\,\pi}}{19\,044}$$

Series representations:

$$\frac{2}{\frac{1}{2}\times 276^2\, e^{-\left(\pi\sqrt{22}\right)}} - 7 + \frac{1}{\phi} = -7 + \frac{e^{\pi\sqrt{21}\sum_{k=0}^{\infty} 21^{-k}\binom{1/2}{k}}}{19\,044} + \frac{1}{\phi}$$

$$\frac{2}{\frac{1}{2}\times 276^2 e^{-(\pi\sqrt{22})}} - 7 + \frac{1}{\phi} = -7 + \frac{e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}}{19\,044} + \frac{1}{\phi}$$

$$\frac{2}{\frac{1}{2}\times 276^2 e^{-(\pi\sqrt{22})}} - 7 + \frac{1}{\phi} = -7 + \frac{\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)}{19\,044} + \frac{1}{\phi}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

Now, we have that:

$$\sigma_3 = \frac{3}{2}, \qquad \tau_3 = \frac{9}{2}. \quad (\ell \geq 2)$$

The eigenvalues of the mass matrix are thus

$$(\sigma_3 - 1)\,\frac{\ell(\ell+6)+5}{3} \pm 2\sqrt{1 + \sigma_3(\sigma_3-1)\,\frac{\ell(\ell+6)+5}{3}}\,. \qquad (3.28)$$

(3/2-1)*1/3((2(2+6)+5))+2sqrt((((1+3/2(3/2-1)*1/3((2(2+6)+5))))

Input:

$$\left(\frac{3}{2}-1\right)\times\frac{1}{3}(2(2+6)+5)+2\sqrt{1+\frac{3}{2}\left(\frac{3}{2}-1\right)\times\frac{1}{3}(2(2+6)+5)}$$

Exact result:

$$\frac{17}{2}$$

Decimal form:

8.5

8.5

And:

(3/2-1)*1/3((2(2+6)+5))-2sqrt((((1+3/2(3/2-1)*1/3((2(2+6)+5))))))

Input:

$$\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(2\,(2+6)+5)-2\,\sqrt{1+\frac{3}{2}\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(2\,(2+6)+5)}$$

Exact result:

$$-\frac{3}{2}$$

Decimal form:

$$-1.5$$

-1.5

For ℓ = 11, we obtain:

(3/2-1)*1/3((11(11+6)+5))+2sqrt((((1+3/2(3/2-1)*1/3((11(11+6)+5))))))

Input:

$$\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(11\,(11+6)+5)+2\,\sqrt{1+\frac{3}{2}\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(11\,(11+6)+5)}$$

Exact result:

$$46$$

46

From which:

3*(((((3/2-1)*1/3((11(11+6)+5))+2sqrt((((1+3/2(3/2-1)*1/3((11(11+6)+5))))))))))+golden ratio

Input:

$$3\left(\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(11\,(11+6)+5)+2\,\sqrt{1+\frac{3}{2}\left(\frac{3}{2}-1\right)\times\frac{1}{3}\,(11\,(11+6)+5)}\right)+\phi$$

ϕ is the golden ratio

Result:

$$\phi+138$$

Decimal approximation:

139.6180339887498948482045868343656381177203091798057628621...

139.6180339887… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{2}\left(277+\sqrt{5}\right)$$

$$\frac{277}{2}+\frac{\sqrt{5}}{2}$$

$$138+\frac{1}{2}\left(1+\sqrt{5}\right)$$

Series representations:

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)(11(11+6)+5)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3(11(11+6)+5)}{2\times 3}}\right)+\phi = 96+\phi+6\sqrt{48}\sum_{k=0}^{\infty}48^{-k}\binom{\frac{1}{2}}{k}$$

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)(11(11+6)+5)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3(11(11+6)+5)}{2\times 3}}\right)+\phi = 96+\phi+6\sqrt{48}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{48}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)(11(11+6)+5)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3(11(11+6)+5)}{2\times 3}}\right)+\phi = 96+\phi+\frac{3\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}48^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

3*(((((3/2-1)*1/3((11(11+6)+5))+2sqrt((((1+3/2(3/2-1)*1/3((11(11+6)+5)))))))))-13+1/golden ratio

Input:

$$3\left(\left(\frac{3}{2}-1\right)\times\frac{1}{3}\left(11\left(11+6\right)+5\right)+2\sqrt{1+\frac{3}{2}\left(\frac{3}{2}-1\right)\times\frac{1}{3}\left(11\left(11+6\right)+5\right)}\right)-13+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+125$$

Decimal approximation:

125.6180339887498948482045868343656381177203091798057628621...

125.6180339887… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{2}\left(249+\sqrt{5}\right)$$

$$\frac{125\,\phi+1}{\phi}$$

$$\frac{\sqrt{5}}{2}+\frac{249}{2}$$

Series representations:

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)\left(11\left(11+6\right)+5\right)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3\left(11\left(11+6\right)+5\right)}{2\times3}}\right)-13+\frac{1}{\phi}=$$

$$83+\frac{1}{\phi}+6\sqrt{48}\sum_{k=0}^{\infty}48^{-k}\binom{\frac{1}{2}}{k}$$

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)(11(11+6)+5)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3(11(11+6)+5)}{2\times 3}}\right)-13+\frac{1}{\phi}=$$

$$83+\frac{1}{\phi}+6\sqrt{48}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{48}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$3\left(\frac{1}{3}\left(\frac{3}{2}-1\right)(11(11+6)+5)+2\sqrt{1+\frac{\left(\frac{3}{2}-1\right)3(11(11+6)+5)}{2\times 3}}\right)-13+\frac{1}{\phi}=$$

$$83+\frac{1}{\phi}+\frac{3\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}48^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

Now, we have that:

which changes sign at $\sigma_7 = 12$, and finally for the *torus–level* heterotic potential

$$\sigma_7 = 15\,, \qquad \tau_7 = 75\,. \tag{4.9}$$

$$(\ell+1)^2(\sigma_7-3) \pm 2\sqrt{\sigma_7(\sigma_7-3)(\ell+1)^2+9}\,. \tag{4.18}$$

(3+1)^2(15-3)+2sqrt((((15(15-3)(3+1)^2+9))))

Input:

$$(3+1)^2(15-3)+2\sqrt{15(15-3)(3+1)^2+9}$$

Result:

$$192+6\sqrt{321}$$

Decimal approximation:

299.4988372030135031078778906039125523416602879422205287241...

299.498837203…

Alternate form:

$6\left(32+\sqrt{321}\right)$

Minimal polynomial:

$x^2 - 384x + 25308$

1/2((((3+1)^2(15-3)+2sqrt((((15(15-3)(3+1)^2+9)))))))-11+1/golden ratio

Input:

$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15 (15-3) (3+1)^2 + 9}\right) - 11 + \frac{1}{\phi}$

ϕ is the golden ratio

Result:

$\frac{1}{\phi} - 11 + \frac{1}{2}\left(192 + 6\sqrt{321}\right)$

Decimal approximation:

139.3674525902566464021435321363219142885504531509160272242...

139.36745259… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$\frac{1}{2}\left(169 + \sqrt{5} + 6\sqrt{321}\right)$

$\frac{1}{\phi} + 85 + 3\sqrt{321}$

$\frac{\left(85 + 3\sqrt{321}\right)\phi + 1}{\phi}$

Minimal polynomial:

$x^4 - 338x^3 + 37061x^2 - 1436500x + 18048055$

Series representations:

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2+9}\right) - 11 + \frac{1}{\phi} = 85 + \frac{1}{\phi} + \sqrt{2888}\sum_{k=0}^{\infty} 2888^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2+9}\right) - 11 + \frac{1}{\phi} = 85 + \frac{1}{\phi} + \sqrt{2888}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2888}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2+9}\right) - 11 + \frac{1}{\phi} = 85 + \frac{1}{\phi} + \frac{\sum_{j=0}^{\infty} \text{Res}_{s=-\frac{1}{2}+j}\, 2888^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

1/2((((3+1)^2(15-3)+2sqrt((((15(15-3)(3+1)^2+9)))))))-29+Pi+golden ratio

Input:

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2+9}\right) - 29 + \pi + \phi$$

ϕ is the golden ratio

Result:

$$\phi - 29 + \frac{1}{2}\left(192 + 6\sqrt{321}\right) + \pi$$

Decimal approximation:

125.5090452438464396406061755196014171727476225502911330451...

125.5090452… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$-29 + \frac{1}{2}\left(192 + 6\sqrt{321}\right) + \phi + \pi$ is a transcendental number

Alternate forms:

$$\frac{1}{2}\left(135 + \sqrt{5} + 6\sqrt{321} + 2\pi\right)$$

$$\phi + 67 + 3\sqrt{321} + \pi$$

$$\frac{135}{2} + \frac{\sqrt{5}}{2} + 3\sqrt{321} + \pi$$

Series representations:

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2 + 9}\right) - 29 + \pi + \phi = 67 + \phi + \pi + \sqrt{2888}\sum_{k=0}^{\infty} 2888^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2 + 9}\right) - 29 + \pi + \phi = 67 + \phi + \pi + \sqrt{2888}\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{2888}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{1}{2}\left((3+1)^2 (15-3) + 2\sqrt{15(15-3)(3+1)^2 + 9}\right) - 29 + \pi + \phi = 67 + \phi + \pi + \frac{\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 2888^{-s}\,\Gamma\left(-\frac{1}{2} - s\right)\Gamma(s)}{2\sqrt{\pi}}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

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

Now, we have that:

with $\alpha > 0$ for $d > 10$ and $\alpha < 0$ for $d < 10$.

$$\varphi = -\frac{(d-2)^2}{8\,\phi'}\left[A' + (d-3)\,A\,\Omega'\right] . \qquad (6.11)$$

$$A'' + A'\left[3(d-2)\,\Omega' - \frac{(d-2)}{4\,\phi'}\,e^{2\Omega}\,V_\phi\right] + A\left[m^2 - \frac{2(d-3)}{(d-2)}\,e^{2\Omega}\,V - \frac{(d-2)(d-3)}{4}\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right] = 0\,, \qquad (6.10)$$

For ϕ' equal to the following Rogers-Ramanujan continued fraction, with minus sign:

$$\frac{1}{1+\frac{e^{-2\pi}}{1+\frac{e^{-4\pi}}{1+\frac{e^{-6\pi}}{1+\cdots}}}} = e^{2\pi/5}\left(\sqrt{\Phi\sqrt{5}-\Phi}\right) = 0,9981360456\ \ldots$$

$V_\phi = 138$, V = 0.57142857, Ω’ = π and d = 7, we obtain:

-(7-2)^2 / (8*-0.9981360456) * (1+(7-3)*Pi)

Input interpretation:

$$-\frac{(7-2)^2}{8\times(-0.9981360456)}\,(1+(7-3)\,\pi)$$

Result:

42.47407791...

42.47407791…

Alternative representations:

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = \frac{-(1+720\,°)\,5^2}{-7.98509}$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = \frac{-(1-4\,i\log(-1))\,5^2}{-7.98509}$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = \frac{-\left(1+4\cos^{-1}(-1)\right)5^2}{-7.98509}$$

Series representations:

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = 3.13084 + 50.0934\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = -21.9159 + 25.0467\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = 3.13084 + 12.5233\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = 3.13084 + 25.0467\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = 3.13084 + 50.0934\int_0^{1}\sqrt{1-t^2}\,dt$$

$$\frac{(1+(7-3)\pi)\left(-(7-2)^2\right)}{8(-0.998136)} = 3.13084 + 25.0467\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

3*(((-(7-2)^2 / (8*-0.9981360456) * (1+(7-3)*Pi))))-golden ratio

Input interpretation:

$$3\left(-\frac{(7-2)^2}{8\times(-0.9981360456)}(1+(7-3)\pi)\right)-\phi$$

ϕ is the golden ratio

Result:

125.8041998...

125.8041998... result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=2\cos(216\,°)--\frac{3(1+4\pi)5^2}{7.98509}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=2\cos(216\,°)--\frac{3(1+720\,°)5^2}{7.98509}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=-2\cos\left(\frac{\pi}{5}\right)--\frac{3(1+4\pi)5^2}{7.98509}$$

Series representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=9.39251-\phi+150.28\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=-65.7476-\phi+75.1401\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=9.39251-\phi+37.57\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}-\phi=9.39251-\phi+75.1401\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} - \phi = 9.39251 - \phi + 150.28 \int_0^1 \sqrt{1-t^2}\, dt$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} - \phi = 9.39251 - \phi + 75.1401 \int_0^\infty \frac{\sin(t)}{t}\, dt$$

3*(((-(7-2)^2 / (8*-0.9981360456) * (1+(7-3)*Pi)))) +11+3-golden ratio

Input interpretation:

$$3\left(-\frac{(7-2)^2}{8\times(-0.9981360456)}(1+(7-3)\pi)\right)+11+3-\phi$$

ϕ is the golden ratio

Result:

139.8041998...

139.8041998… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} + 11 + 3 - \phi = 14 + 2\cos(216\,°) - -\frac{3(1+4\pi)5^2}{7.98509}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} + 11 + 3 - \phi = 14 + 2\cos(216\,°) - -\frac{3(1+720\,°)5^2}{7.98509}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} + 11 + 3 - \phi = 14 - 2\cos\left(\frac{\pi}{5}\right) - -\frac{3(1+4\pi)5^2}{7.98509}$$

Series representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} + 11 + 3 - \phi = 23.3925 - \phi + 150.28 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)} + 11 + 3 - \phi = -51.7476 - \phi + 75.1401 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}+11+3-\phi=23.3925-\phi+37.57\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}+11+3-\phi=23.3925-\phi+75.1401\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}+11+3-\phi=23.3925-\phi+150.28\int_0^{1}\sqrt{1-t^2}\,dt$$

$$\frac{3\left(-(7-2)^2\right)(1+(7-3)\pi)}{8(-0.998136)}+11+3-\phi=23.3925-\phi+75.1401\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

With regard

$$A'' + A'\left[3(d-2)\,\Omega' - \frac{(d-2)}{4\,\phi'}\,e^{2\Omega}\,V_\phi\right] + A\left[m^2 - \frac{2(d-3)}{(d-2)}\,e^{2\Omega}\,V - \frac{(d-2)(d-3)}{4}\,e^{2\Omega}\,\Omega'\,\frac{V_\phi}{\phi'}\right] = 0\,, \qquad (6.10)$$

and

$$m^2 > \frac{(d-2)^2\,a^2}{4}\,.$$

For a = 2, $m^2 > 25$; $m^2 = 34$

$V_\phi = 138$, V = 0.57142857, Ω’ = π, d = 7,

-2(((((15*Pi-5/(4*0.9981360456)* e^(Pi*sqrt22) * 138))) + (((((34-8/5*e^(Pi*sqrt22) * 0.57142857 – 5 * e^(Pi*sqrt22) * Pi * 138/0.9981360456)))))

Input interpretation:

$$-2\left(\left(15\pi-\frac{5}{4\times 0.9981360456}\,e^{\pi\sqrt{22}}\times 138\right)+\left(34+\frac{8}{5}\,e^{\pi\sqrt{22}}\times(-0.57142857)-5\,e^{\pi\sqrt{22}}\,\pi\times\frac{138}{0.9981360456}\right)\right)$$

Result:

$$1.176941030\ldots\times 10^{10}$$

1.176941030…*10^{10}

Series representations:

$$-2\left(\left(15\pi-\frac{5\,e^{\pi\sqrt{22}}\,138}{4\times 0.998136}\right)+\left(34-\frac{8}{5}\,e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times 5)\,e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)=-68-30\pi+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(347.473+1382.58\pi)$$

$$-2\left(\left(15\pi-\frac{5\,e^{\pi\sqrt{22}}\,138}{4\times 0.998136}\right)+\left(34-\frac{8}{5}\,e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times 5)\,e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)=-68-30\pi+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}(347.473+1382.58\pi)$$

$$-2\left(\left(15\pi-\frac{5\,e^{\pi\sqrt{22}}\,138}{4\times 0.998136}\right)+\left(34-\frac{8}{5}\,e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times 5)\,e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)=-68-30\pi+\exp\left(\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}21^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)(347.473+1382.58\pi)$$

2Pi*ln[((-2(((((15*Pi-5/(4*0.9981360456)* e^(Pi*sqrt22) * 138))) + (((((34-8/5*e^(Pi*sqrt22) * 0.57142857 – 5 * e^(Pi*sqrt22) * Pi * 138/0.9981360456))))))))]-7+1/golden ratio

Input interpretation:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5}{4\times 0.9981360456}\,e^{\pi\sqrt{22}}\times 138\right)+\left(34+\frac{8}{5}\,e^{\pi\sqrt{22}}\times(-0.57142857)-5\,e^{\pi\sqrt{22}}\,\pi\times\frac{138}{0.9981360456}\right)\right)\right)-7+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

139.31737078...

139.31737078… result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=$$
$$-7+2\pi\log_e\left(-2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=-7+2\pi\log(a)$$
$$\log_a\left(-2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=$$
$$-7-2\pi\,\mathrm{Li}_1\left(1+2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=-7+\frac{1}{\phi}+2\pi\log\left(-68-30\pi+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(347.473+1382.58\pi)\right)$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=-7+\frac{1}{\phi}+2\pi\log\left(-69-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)\right)-2\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-69-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)\right)^{-k}}{k}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=$$

$$-7+\frac{1}{\phi}+4i\pi^2\left\lfloor\frac{\arg\left(-68-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)-x\right)}{2\pi}\right\rfloor+2\pi\log(x)-2\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-68-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

Integral representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=-7+\frac{1}{\phi}+2\pi\int_1^{-68-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)}\frac{1}{t}\,dt$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-7+\frac{1}{\phi}=$$

$$-7+\frac{1}{\phi}+\frac{1}{i}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-69-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\,\pi)\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

2Pi*ln[((-2(((((15*Pi-5/(4*0.9981360456)* e^(Pi*sqrt22) * 138))) + (((((34-8/5*e^(Pi*sqrt22) * 0.57142857 – 5 * e^(Pi*sqrt22) * Pi * 138/0.9981360456)))))))))]-21+1/golden ratio

Input interpretation:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5}{4\times0.9981360456}e^{\pi\sqrt{22}}\times138\right)+\left(34+\frac{8}{5}e^{\pi\sqrt{22}}\times(-0.57142857)-5e^{\pi\sqrt{22}}\pi\times\frac{138}{0.9981360456}\right)\right)\right)-21+\frac{1}{\phi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

125.31737078...

125.31737078… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=$$
$$-21+2\pi\log_e\left(-2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=-21+2\pi\log(a)$$
$$\log_a\left(-2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=$$
$$-21-2\pi\,\mathrm{Li}_1\left(1+2\left(34+15\pi-\frac{690\pi e^{\pi\sqrt{22}}}{0.998136}-\frac{690e^{\pi\sqrt{22}}}{3.99254}-\frac{1}{5}\times4.57143e^{\pi\sqrt{22}}\right)\right)+\frac{1}{\phi}$$

Series representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+2\pi\log\left(-68-30\pi+e^{\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{1/2}{k}}(347.473+1382.58\pi)\right)$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+2\pi\log\left(-69-30\pi+e^{\pi\sqrt{22}}(347.473+1382.58\pi)\right)-2\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-69-30\pi+e^{\pi\sqrt{22}}(347.473+1382.58\pi)\right)^{-k}}{k}$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=$$
$$-21+\frac{1}{\phi}+4i\pi^2\left\lfloor\frac{\arg\left(-68-30\pi+e^{\pi\sqrt{22}}(347.473+1382.58\pi)-x\right)}{2\pi}\right\rfloor+2\pi\log(x)-2\pi\sum_{k=1}^{\infty}\frac{(-1)^k\left(-68-30\pi+e^{\pi\sqrt{22}}(347.473+1382.58\pi)-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

Integral representations:

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+2\pi\int_1^{-68-30\pi+e^{\pi\sqrt{22}}(347.473+1382.58\pi)}\frac{1}{t}\,dt$$

$$2\pi\log\left(-2\left(\left(15\pi-\frac{5e^{\pi\sqrt{22}}\,138}{4\times 0.998136}\right)+\left(34-\frac{8}{5}e^{\pi\sqrt{22}}\,0.571429-\frac{(138\times 5)e^{\pi\sqrt{22}}\,\pi}{0.998136}\right)\right)\right)-21+\frac{1}{\phi}=-21+\frac{1}{\phi}+\frac{1}{i}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-69-30\pi+e^{\pi\sqrt{22}}\,(347.473+1382.58\pi)\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds$$

for $-1<\gamma<0$

Now, we have that:

$$h_{ij}\;=\;A_{ij}\;+\;B_{ij}\;\log\left[\tanh\left(\sqrt{\alpha_{O,H}}\,t\sqrt{\frac{d-1}{2(d-2)}}\sqrt{1\;-\;\left(\frac{\widetilde{\gamma}}{\gamma^{(c)}}\right)^2}\right)\right]\;, \qquad (8.20)$$

with $\alpha>0$ for $d>10$ and $\alpha<0$ for $d<10$.

$$\frac{\gamma_d}{\gamma^{(c)}}=\frac{1}{2}$$

A = 2, B = 3, α = 5, d = 11

2+3 ln (tanh(((sqrt5*sqrt(10/18)*sqrt(1-1/4)))))

Input:

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)$$

$\tanh(x)$ is the hyperbolic tangent function

$\log(x)$ is the natural logarithm

Exact result:

$$2+3\log\left(\tanh\left(\frac{5}{2\sqrt{3}}\right)\right)$$

Decimal approximation:

1.6651103468428907659454206493015239076158033594592729669 95...

1.6651103468…

Alternate forms:

$$2+3\log\left(\frac{\sinh\left(\frac{5}{2\sqrt{3}}\right)}{\cosh\left(\frac{5}{2\sqrt{3}}\right)}\right)$$

$$2+3\log\left(e^{5/\sqrt{3}}-1\right)-3\log\left(1+e^{5/\sqrt{3}}\right)$$

$$2+3\log\left(\frac{e^{5/(2\sqrt{3})}-e^{-5/(2\sqrt{3})}}{e^{-5/(2\sqrt{3})}+e^{5/(2\sqrt{3})}}\right)$$

Alternative representations:

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2+3\log_e\left(\tanh\left(\sqrt{5}\sqrt{1-\frac{1}{4}}\sqrt{\frac{10}{18}}\right)\right)$$

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2+3\log(a)\log_a\left(\tanh\left(\sqrt{5}\sqrt{1-\frac{1}{4}}\sqrt{\frac{10}{18}}\right)\right)$$

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2+3\log\left(i\cot\left(\frac{\pi}{2}+i\sqrt{5}\sqrt{1-\frac{1}{4}}\sqrt{\frac{10}{18}}\right)\right)$$

Series representation:

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2-3\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\tanh\left(\frac{5}{2\sqrt{3}}\right)\right)^k}{k}$$

Integral representations:

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2+3\int_1^{\tanh\left(\frac{5}{2\sqrt{3}}\right)}\frac{1}{t}\,dt$$

$$2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)=2+3\log\left(\int_0^{\frac{5}{2\sqrt{3}}}\operatorname{sech}^2(t)\,dt\right)$$

From which:

(((2+3 ln (tanh(((sqrt5*sqrt(10/18)*sqrt(1-1/4))))))))-47/10^3

Input:

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\,\sqrt{\frac{10}{18}}\,\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}$$

$\tanh(x)$ is the hyperbolic tangent function

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1953}{1000}+3\log\left(\tanh\left(\frac{5}{2\sqrt{3}}\right)\right)$$

Decimal approximation:

1.618110346842890765945420649301523907615803359459272966995...

1.61811034684… result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{3\left(651+1000\log\left(\tanh\left(\frac{5}{2\sqrt{3}}\right)\right)\right)}{1000}$$

$$\frac{1953}{1000}+3\log\left(\frac{\sinh\left(\frac{5}{2\sqrt{3}}\right)}{\cosh\left(\frac{5}{2\sqrt{3}}\right)}\right)$$

$$\frac{1953}{1000}+3\log\left(e^{5/\sqrt{3}}-1\right)-3\log\left(1+e^{5/\sqrt{3}}\right)$$

Alternative representations:

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\,\sqrt{\frac{10}{18}}\,\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=2+3\log_e\left(\tanh\left(\sqrt{5}\,\sqrt{1-\frac{1}{4}}\,\sqrt{\frac{10}{18}}\right)\right)-\frac{47}{10^3}$$

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\,\sqrt{\frac{10}{18}}\,\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=2+3\log(a)\log_a\left(\tanh\left(\sqrt{5}\,\sqrt{1-\frac{1}{4}}\,\sqrt{\frac{10}{18}}\right)\right)-\frac{47}{10^3}$$

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=$$
$$2+3\log\left(i\cot\left(\frac{\pi}{2}+i\sqrt{5}\sqrt{1-\frac{1}{4}}\sqrt{\frac{10}{18}}\right)\right)-\frac{47}{10^3}$$

Series representation:

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=\frac{1953}{1000}-3\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\tanh\left(\frac{5}{2\sqrt{3}}\right)\right)^k}{k}$$

Integral representations:

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=\frac{1953}{1000}+3\int_1^{\tanh\left(\frac{5}{2\sqrt{3}}\right)}\frac{1}{t}\,dt$$

$$\left(2+3\log\left(\tanh\left(\sqrt{5}\sqrt{\frac{10}{18}}\sqrt{1-\frac{1}{4}}\right)\right)\right)-\frac{47}{10^3}=\frac{1953}{1000}+3\log\left(\int_0^{\frac{5}{2\sqrt{3}}}\operatorname{sech}^2(t)\,dt\right)$$

Observations

It should be highlighted how all the expressions has been developed using always parameters belonging to the Ramanujan's mathematics, the Lucas and / or Fibonacci sequences connected strictly to the golden ratio, in addition to π and the golden ratio itself.

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