On some Ramanujan functions applied to various sectors of String Theory and Particle Physics: new possible mathematical connections II.

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Abstract

In this research thesis, we have analyzed and deepened various Ramanujan functions applied to some sectors of String Theory and Particle Physics. We have therefore described further new possible mathematical connections.

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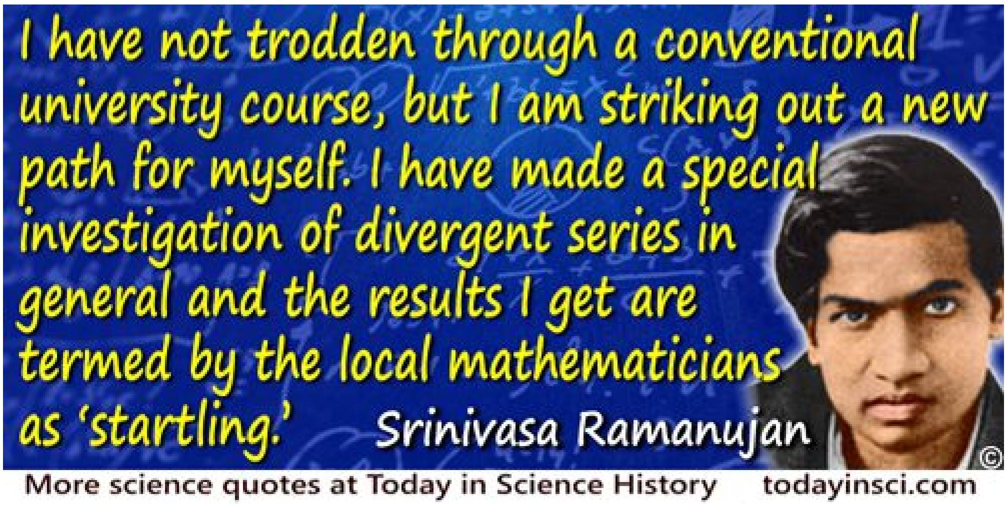
I have not trodden through a conventional university course, but I am striking out a new path for myself. I have made a special investigation of divergent series in general and the results I get are termed by the local mathematicians as 'startling.'
Srinivasa Ramanujan
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From:

Aspects of SUSY Breaking in String Theory

Augusto Sagnotti
Scuola Normale Superiore and INFN –Pisa - OKC Colloquium
Stockholm, September 2018

a. "Climbing" solution (φ climbs, then descends):

$$\dot{\varphi} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\coth\left(\frac{\tau}{2}\,\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\,\tanh\left(\frac{\tau}{2}\,\sqrt{1-\gamma^2}\right)\right]$$

b. "Descending" solution (φ only descends):

$$\dot{\varphi} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\,\tanh\left(\frac{\tau}{2}\,\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\,\coth\left(\frac{\tau}{2}\,\sqrt{1-\gamma^2}\right)\right]$$

$\gamma < 1$

From:

Pre – Inflationary Clues from String Theory ?

N. Kitazawa a and A. Sagnotti – https://arxiv.org/abs/1402.1418v2

For $0 < \gamma < 1$ there are actually *two* classes of such solutions, which describe respectively a scalar that emerges from the initial singularity while *climbing* or *descending* the potential. To begin with, the *climbing* solutions for the τ–derivatives of φ and $\mathcal{A}$ are

$$\begin{aligned}\dot{\varphi} &= \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \sqrt{\frac{1+\gamma}{1-\gamma}}\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right] ,\\ \dot{\mathcal{A}} &= \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \sqrt{\frac{1+\gamma}{1-\gamma}}\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right] ,\end{aligned} \qquad (2.12)$$

and the reader should appreciate that these expressions *do not involve any initial–value constants* other than the Big–Bang time, here set for convenience at $\tau = 0$. On the other hand, the corresponding fields read

$$\begin{aligned}\varphi &= \varphi_0 + \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) ,\\ \mathcal{A} &= \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) ,\end{aligned} \qquad (2.13)$$

and do involve an important *integration constant*, φ_0. This determines the value of φ at a reference "parametric time" $\tau > 0$ or, what is more interesting for us, bounds from above the largest value that it can attain during the cosmological evolution. Strictly speaking, $\mathcal{A}$ would also involve an additive constant, but one can set it to zero up to a rescaling of the spatial coordinates. On the other hand, φ_0 has interesting effects on the dynamics that become particularly pronounced in the two–exponential potentials

$$V(\varphi) = V_0\left(e^{2\varphi} + e^{2\gamma\varphi}\right) . \qquad (2.14)$$

From the following Ramanujan mock theta function:

MOCK THETA ORDER 6

(https://en.wikipedia.org/wiki/Mock_modular_form#Order_6)

$$\sigma(q) = \sum_{n\geq 0}\frac{q^{(n+1)(n+2)/2}(-q;q)_n}{(q;q^2)_{n+1}}$$

That is:

(A053271 sequence OEIS)

Sum_{n >= 0} q^((n+1)(n+2)/2) (1+q)(1+q^2)...(1+q^n)/((1-q)(1-q^3)...(1-q^(2n+1)))

We have that:

sum q^((n+1)(n+2)/2) (1+q)(1+q^2)(1+q^n)))/((1-q)(1-q^3)(1-q^(2n+1))), n = 0 to k

$$\sum_{n=0}^{k} \frac{q^{1/2(n+1)(n+2)}(1+q)(1+q^2)(1+q^n)}{(1-q)(1-q^3)(1-q^{2n+1})}$$

:

$$\sum_{n=0}^{k} \frac{q^{1/2(n+1)(n+2)}(1+q)(1+q^2)(1+q^n)}{(1-q)(1-q^3)(1-q^{2n+1})}$$

For q = 0.5 and n = 2, we develop the above formula in the following way:

(((0.5^((2+1)(2+2)/2) (1+0.5)(1+0.5^2)(1+0.5^2)))/(((1-0.5)(1-0.5^3)(1-0.5^(2*2+1)))

$$\frac{0.5^{(2+1)\times(2+2)/2}(1+0.5)(1+0.5^2)(1+0.5^2)}{(1-0.5)(1-0.5^3)(1-0.5^{2\times2+1})}$$

0.08640552995391705069124423963133640552995391705069124423 9...

0.0864055...

1+(((0.5^((2+1)(2+2)/2) (1+0.5)(1+0.5^2)(1+0.5^2)))/(((1-0.5)(1-0.5^3)(1-0.5^(2*2+1)))

Input:

$$1+\frac{0.5^{(2+1)\times(2+2)/2}(1+0.5)(1+0.5^2)(1+0.5^2)}{(1-0.5)(1-0.5^3)(1-0.5^{2\times2+1})}$$

1.086405529953917050691244239631336405529953917050691244239...

1.0864055...

From the formula (b), for γ = 0.0864055, we obtain:

1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2)))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

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

$\coth(x)$ is the hyperbolic cotangent function

Result:

−0.9724368…

-0.9724368…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)-\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\frac{1}{2}\left(i\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.0867299+\sum_{k=1}^{\infty}\left(1.09048-0.917024(-1)^k\right)q^{2k} \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.545242+\sum_{k=1}^{\infty}\left(1.09048\,q^{2k}+\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^{\,2}}\right) \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.458512-\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-0.917024(-1)^k q^{2k}-\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

for $q=1.64564$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(0.545242\,i\pi-0.545242\sqrt{0.992534}\right)-0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2\,i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

-1+exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$-1+\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

tanh(x) is the hyperbolic tangent function

coth(x) is the hyperbolic cotangent function

Result:

1.644380...

$1.644380\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternative representations:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

Series representations:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024(-1)^k\right)q^{2k}\right) \text{ for } q=1.64564$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^{\,2}}\right)\right) \text{ for } q=1.64564$$

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^{\,2}}\right)\right) \text{ for } q=1.64564$$

Integral representation:

$$-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=-1+\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2\,i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

-26*1/10^3-1+exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))

where 26 is the number of spacetime dimensions in bosonic string theory.

Input interpretation:

$$-26\times\frac{1}{10^3}-1+\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

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

Result:

1.618380466924724004618081608251932169847324896621048284367...

1.618380466…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-1+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{26}{10^3}$$

Series representations:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024(-1)^k\right)q^{2k}\right) \text{ for } q=1.64564$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right) \text{ for } q=1.64564$$

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=$$

$$-\frac{513}{500}+\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right) \text{ for } q=1.64564$$

Integral representation:

$$-\frac{26}{10^3}-1+\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)=-\frac{513}{500}+\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

(9^3-1)*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2)))))))-144-55+golden ratio^2

where $9^3 - 1$ is a Ramanujan cube, while 144 and 5 are Fibonacci numbers

Input interpretation:

$$(9^3-1)\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-144-55+\phi^2$$

tanh(x) is the hyperbolic tangent function

coth(x) is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

1728.727...

1728.727…

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:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$

$$-199+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)+\phi^2$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$

$$-199+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)+\phi^2$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$

$$-199+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)+\phi^2$$

Series representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2=$$

$$-199+\phi^2+728\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2 = -199+\phi^2+728\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2 = -199+\phi^2+728\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144-55+\phi^2 = -199+\phi^2+728\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

(9^3-1)*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))))))))-144+golden ratio

Input interpretation:

$$(9^3-1)\exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-144+\phi$$

tanh(x) is the hyperbolic tangent function

coth(x) is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

1782.727...

1782.727…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+\exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)(-1+9^3)$$

Series representations:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+728\exp\left(-0.0867299+\sum_{k=1}^{\infty}\left(-1.09048+0.917024\,(-1)^k\right)q^{2k}\right)$$

for $q=1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-144+\phi=$$

$$-144+\phi+728\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$144+\phi=-144+\phi+728\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$(9^3-1)\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$144+\phi=-144+\phi+728\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

55*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2)))))))))-5-1/golden ratio

where 55 and 5 are Fibonacci numbers

Input interpretation:

$$55 \exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-5-\frac{1}{\phi}$$

tanh(x) is the hyperbolic tangent function

coth(x) is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

139.8229...

139.8229…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$

$$-5+55\exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 5 - \frac{1}{\phi} =$$

$$-5 + 55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2} + \frac{1}{2} i \sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}} + \sqrt{\frac{1.08641}{0.913595}}\left(1 + \frac{2}{-1 + e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right) - \frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 5 - \frac{1}{\phi} =$$

$$-5 + 55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2} i \sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}} - \sqrt{\frac{0.913595}{1.08641}}\left(-1 + \frac{2}{1 + e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)\right) - \frac{1}{\phi}$$

Series representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 5 - \frac{1}{\phi} =$$

$$-5 - \frac{1}{\phi} + 55 \exp\left(-0.0867299 + \sum_{k=1}^{\infty}\left(-1.09048 + 0.917024 (-1)^k\right) q^{2k}\right)$$

for $q = 1.64564$

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=$$

$$-5-\frac{1}{\phi}+55\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=-5-\frac{1}{\phi}+55\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

Integral representation:

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-5-\frac{1}{\phi}=-5-\frac{1}{\phi}+55\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

55*exp(((-1/2(((((1-0.0864055)/(1+0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2)))))))-21+1/golden ratio

where 55 and 21 are Fibonacci numbers

Input interpretation:

$$55 \exp\left(-\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right) - 21 + \frac{1}{\phi}$$

tanh(x) is the hyperbolic tangent function

coth(x) is the hyperbolic cotangent function

ϕ is the golden ratio

Result:

125.0590...

125.0590…. 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:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 21 + \frac{1}{\phi} =$$

$$-21 + 55 \exp\left(\frac{1}{2}\left(-\sqrt{\frac{0.913595}{1.08641}}\left(-1 + \frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right) + \sqrt{\frac{1.08641}{0.913595}}\left(1 + \frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right) + \frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 21 + \frac{1}{\phi} =$$

$$-21 + 55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2} + \frac{1}{2} i \sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}} + \sqrt{\frac{1.08641}{0.913595}}\left(1 + \frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right) + \frac{1}{\phi}$$

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 21 + \frac{1}{\phi} =$$

$$-21 + 55 \exp\left(\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2} i \sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}} - \sqrt{\frac{0.913595}{1.08641}}\left(-1 + \frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)\right) + \frac{1}{\phi}$$

Series representations:

$$55 \exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right) - 21 + \frac{1}{\phi} =$$

$$-21 + \frac{1}{\phi} + 55 \exp\left(-0.0867299 + \sum_{k=1}^{\infty}\left(-1.09048 + 0.917024 (-1)^k\right) q^{2k}\right)$$

for $q = 1.64564$

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-21+\frac{1}{\phi}=$$

$$-21+\frac{1}{\phi}+55\exp\left(-0.545242+\sum_{k=1}^{\infty}\left(-1.09048\,q^{2k}-\frac{1.83405\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$21+\frac{1}{\phi}=-21+\frac{1}{\phi}+55\exp\left(0.458512+\frac{1.09048}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(0.917024\,(-1)^k q^{2k}+\frac{2.18097\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$55\exp\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)(-1)\right)-$$

$$21+\frac{1}{\phi}=-21+\frac{1}{\phi}+55\exp\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.545242\,i\pi+0.545242\sqrt{0.992534}\right)+0.458512\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

From the formula (a), for γ = 0.0864055, we obtain:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

Result:

0.7442060...

0.7442060…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048\,(-1)^k\right)q^{2k} \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right) \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)$$

$\text{for } q=1.64564$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\,\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2\,i\,\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

and:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))^1/128

Input interpretation:

$$\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)^{\wedge}(1/128)$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

Result:

0.997694557208300922071449503706720027493605707487861199312...

0.997694557208.... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value **0.989117352243 = ϕ**

log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2)))))))-Pi+1/golden ratio

Input interpretation:

$$\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)-\pi+\frac{1}{\phi}$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

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

ϕ is the golden ratio

Result:

125.476...

125.476…. 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:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{\log(0.997695)}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=$$

$$\frac{1}{\phi}-\pi+\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048(-1)^k\right)q^{2k}\right)$$

for $q=1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)\text{ for } q=1.64564$$

Integral representation:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi+\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2)))))))+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)+11+\frac{1}{\phi}$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

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

ϕ is the golden ratio

Result:

139.618...

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

Alternative representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\frac{\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{\log(0.997695)}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)+\frac{1}{\phi}$$

Series representations:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048(-1)^k\right)q^{2k}\right)$$

for $q=1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}+\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048\,(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

27*1/2log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

From Wikipedia:

*"The fundamental group of the complex form, compact real form, or any algebraic version of E_6 is the cyclic group **Z**/3**Z**, and its outer automorphism group is the cyclic group **Z**/2**Z**. Its fundamental representation is 27-dimensional (complex), and a basis is given by the 27 lines on a cubic surface. The dual representation, which is inequivalent, is also 27-dimensional. In particle physics, E_6 plays a role in some grand unified theories".*

Input interpretation:

$$27 \times \frac{1}{2} \log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}} \coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right) - \sqrt{\frac{1+0.0864055}{1-0.0864055}} \tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

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

Result:

1728.00...

1728.00….

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

Alternative representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{2\log(0.997695)}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)$$

Series representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048(-1)^k\right)q^{2k}\right)\text{ for } q=1.64564$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)\text{ for } q=1.64564$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)\text{ for } q=1.64564$$

Integral representation:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)=\frac{27}{2}\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

27*1/2log base 0.997694557(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))-((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))+55-1/golden ratio

where 55 is a Fibonacci number

Input interpretation:

$$27\times\frac{1}{2}\log_{0.997694557}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)+55-\frac{1}{\phi}$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

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

ϕ is the golden ratio

Result:

1782.38...

1782.38…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternative representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27\log\left(\frac{1}{2}\left(\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\sqrt{\frac{0.913595}{1.08641}}-\sqrt{\frac{1.08641}{0.913595}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)}{2\log(0.997695)}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=$$

$$55+\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=$$

$$55+\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(-i\left(\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)-\frac{1}{\phi}$$

Series representations:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=$$

$$55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(0.0867299+\sum_{k=1}^{\infty}\left(-0.917024+1.09048(-1)^k\right)q^{2k}\right)$$

for $q=1.64564$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}-\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$

for $q = 1.64564$

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(1.09048(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)$$ for $q = 1.64564$

Integral representation:

$$\frac{27}{2}\log_{0.997695}\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)-\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)\right)+55-\frac{1}{\phi}=55-\frac{1}{\phi}+\frac{27}{2}\log_{0.997695}\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)+0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)$$

We have also, from the following calculation:

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2)))))))/0.7442060

Input interpretation:

$$\frac{1}{0.7442060}\,\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

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

Result:

1.674982778577893204872023223387147912787255509665369170774...

1.6749827785…

Alternative representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=\frac{\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2}=\frac{i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2} = \frac{-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206}$$

Series representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2} = -1.34876+\sum_{k=1}^{\infty}\left(-1.23222-1.4653(-1)^k\right)q^{2k} \text{ for } q=1.64564$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2} = -0.616109+\sum_{k=1}^{\infty}\left(-1.23222\,q^{2k}+\frac{2.9306\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right) \text{ for } q=1.64564$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2} = -0.732649+\frac{1.23222}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-1.4653(-1)^k q^{2k}+\frac{2.46444\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right) \text{ for } q=1.64564$$

Integral representation:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{0.744206\times 2} = \int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.616109\,i\pi+0.616109\sqrt{0.992534}\right)-0.732649\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

1/10^27*(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2)))))))/0.7442060

Input interpretation:

$$\frac{1}{10^{27}} \times \frac{1}{0.7442060}\,\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

coth(x) is the hyperbolic cotangent function

tanh(x) is the hyperbolic tangent function

Result:

$1.674983... \times 10^{-27}$

$1.674983...*10^{-27}$ result practically equal to the neutron mass

Alternative representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{i\cot\left(\frac{\pi}{2}+\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} = \frac{-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)}{2\times 0.744206\times 10^{27}}$$

Series representations:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} =$$

$$-1.34876\times10^{-27}+\sum_{k=1}^{\infty}\left(-1.23222\times10^{-27}-1.4653\times10^{-27}\,(-1)^k\right)q^{2k}$$

for $q = 1.64564$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} =$$

$$-6.16109\times10^{-28}+\sum_{k=1}^{\infty}\left(-1.23222\times10^{-27}\,q^{2k}+\frac{2.9306\times10^{-27}\sqrt{0.992534}}{(1-2k)^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)$$

for $q = 1.64564$

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} =$$

$$-7.32649\times10^{-28}+\frac{1.23222\times10^{-27}}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-1.4653\times10^{-27}\,(-1)^k\,q^{2k}+\frac{2.46444\times10^{-27}\sqrt{0.992534}}{4k^2\,\pi^2+\sqrt{0.992534}^{\,2}}\right)\ \text{for } q = 1.64564$$

Integral representation:

$$\frac{\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)}{(2\times 0.744206)\,10^{27}} =$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-6.16109\times10^{-28}\,i\pi+6.16109\times10^{-28}\sqrt{0.992534}\right)-7.32649\times10^{-28}\,\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

From

$$\dot{\mathcal{A}} = \frac{1}{2}\left[\sqrt{\frac{1-\gamma}{1+\gamma}}\coth\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \sqrt{\frac{1+\gamma}{1-\gamma}}\tanh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right)\right] , \qquad (2.12)$$

$$\varphi = \varphi_0 + \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) - \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) ,$$

$$\mathcal{A} = \frac{1}{1+\gamma}\log\sinh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) + \frac{1}{1-\gamma}\log\cosh\left(\frac{\tau}{2}\sqrt{1-\gamma^2}\right) , \qquad (2.13)$$

We obtain from the first of (2.12);

(((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))

Input interpretation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right) + \sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

$\coth(x)$ is the hyperbolic cotangent function

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

Result:

1.246532...

1.246532…

Alternative representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{0.913595}{1.08641}}\right)+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)$$

Series representations:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-1.00375+\sum_{k=1}^{\infty}\left(-0.917024-1.09048(-1)^k\right)q^{2k} \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.458512+\sum_{k=1}^{\infty}\left(-0.917024\,q^{2k}+\frac{2.18097\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right) \quad \text{for } q=1.64564$$

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$-0.545242+\frac{0.917024}{\sqrt{0.992534}}+\sum_{k=1}^{\infty}\left(-1.09048(-1)^k q^{2k}+\frac{1.83405\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)$$
$$\text{for } q=1.64564$$

Integral representation:

$$\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)=$$

$$\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(-0.458512\,i\pi+0.458512\sqrt{0.992534}\right)-0.545242\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt$$

and from (2.13):

1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) + 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$\frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)+\frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

Result:

−0.4731811...

-0.4731811…

Alternative representations:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}+\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=\frac{\log\left(\frac{1}{2}\left(e^{-1/2\sqrt{1-0.0864055^2}}+e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{0.913595}+\frac{\log\left(\frac{1}{2}\left(-e^{-1/2\sqrt{1-0.0864055^2}}+e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{1.08641}$$

Series representation:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} + \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} = \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1.09458 \left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k - 0.920467 \left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}$$

Integral representations:

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} + \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} = \int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)} \frac{-2.01504\, t + 1.09458 \cosh\left(\frac{\sqrt{0.992534}}{2}\right) + (-1.09458 + 2.01504\, t) \sinh\left(\frac{\sqrt{0.992534}}{2}\right)}{t \left(-t + \cosh\left(\frac{\sqrt{0.992534}}{2}\right) + (-1+t) \sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)} \, dt$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} + \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} = 0.920467 \left(\log\left(\frac{\sqrt{0.992534}}{2} \int_0^1 \cosh\left(\frac{t\sqrt{0.992534}}{2}\right) dt\right) + 1.18916 \log\left(1 + \frac{\sqrt{0.992534}}{2} \int_0^1 \sinh\left(\frac{t\sqrt{0.992534}}{2}\right) dt\right)\right)$$

$$\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} + \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} = 1.09458 \left(\log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}} \sinh(t)\, dt\right) + 0.840933 \log\left(\frac{\sqrt{0.992534}}{2} \int_0^1 \cosh\left(\frac{t\sqrt{0.992534}}{2}\right) dt\right)\right)$$

We have also that:

(((1/((((((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))-0.4731810709136926398312))))))^2

Input interpretation:

$$\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-0.4731810709136926398312\right)\right)^2$$

coth(x) is the hyperbolic cotangent function
tanh(x) is the hyperbolic tangent function

Result:

1.672039...

1.672039...

1/10^27 (((1/((((((1/2(((((1-0.0864055)/(1+0.0864055))^1/2*coth(1/2*sqrt(1-0.0864055^2))+((1+0.0864055)/(1-0.0864055))^1/2*tanh(1/2*sqrt(1-0.0864055^2))))))))-0.4731810709136926398312))))))^2

Input interpretation:

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-0.4731810709136926398312\right)\right)^2$$

coth(x) is the hyperbolic cotangent function
tanh(x) is the hyperbolic tangent function

Result:

1.672039428160193587677569690294535343406044589021623... × 10^-27

1.672039428…*10^-27 result practically equal to the proton mass

Alternative representations:

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.4731810709136926398312000\right)\right)^2 =$$

$$\frac{1}{10^{27}}\left(1\Big/\left(-0.4731810709136926398312000+\frac{1}{2}\left(\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

$$\frac{1}{10^{27}}\left(1\Big/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.4731810709136926398312000\right)\right)^2 =$$

$$\frac{1}{10^{27}}\left(1\Big/\left(-0.4731810709136926398312000+\frac{1}{2}\left(-i\left(\cot\left(-\frac{1}{2}\,i\sqrt{1-0.0864055^2}\right)\right)\sqrt{\frac{0.913595}{1.08641}}+\sqrt{\frac{1.08641}{0.913595}}\left(-1+\frac{2}{1+e^{-\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

$$\frac{1}{10^{27}}\left(1\Bigg/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.4731810709136926398312000\right)\right)^2=\frac{1}{10^{27}}$$

$$\left(1\Bigg/\left(-0.4731810709136926398312000+\frac{1}{2}\left(i\cot\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\sqrt{\frac{1.08641}{0.913595}}+\sqrt{\frac{0.913595}{1.08641}}\left(1+\frac{2}{-1+e^{\sqrt{1-0.0864055^2}}}\right)\right)\right)\right)^2$$

Series representations:

$$\frac{1}{10^{27}}\left(1\Bigg/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.4731810709136926398312000\right)\right)^2=$$

$$\frac{1.18916\times10^{-27}}{\left(1.61057+\sum_{k=1}^{\infty}\left(1+1.18916\,(-1)^k\right)q^{2k}\right)^2}$$

for

$q =$

1.64564

$$\frac{1}{10^{27}}\left(1\bigg/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2 = \frac{1.18916\times 10^{-27}}{\left(1.016+\sum_{k=1}^{\infty}\left(q^{2k}-\frac{2.37831\sqrt{0.992534}}{(1-2k)^2\pi^2+\sqrt{0.992534}^2}\right)\right)^2}$$

for
$q =$
1.64564

$$\frac{1}{10^{27}}\left(1\bigg/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2 = \left(4.75662\times 10^{-27}\sqrt{0.992534}^2\right)\bigg/\left(2-2.22115\sqrt{0.992534}+\sum_{k=1}^{\infty}\sqrt{0.992534}\left(-2.37831(-1)^k q^{2k}+\frac{4\sqrt{0.992534}}{4k^2\pi^2+\sqrt{0.992534}^2}\right)\right)^2 \text{ for } q = 1.64564$$

Integral representation:

$$\frac{1}{10^{27}}\left(1\bigg/\left(\frac{1}{2}\left(\sqrt{\frac{1-0.0864055}{1+0.0864055}}\coth\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)+\sqrt{\frac{1+0.0864055}{1-0.0864055}}\tanh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)-0.47318107091369263983120000\right)\right)^2 = 4.75662\times 10^{-27}\bigg/\left(1.03199+\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\frac{1}{i\pi-\sqrt{0.992534}}\left(\operatorname{csch}^2(t)\left(i\pi-\sqrt{0.992534}\right)+1.18916\operatorname{sech}^2\left(\frac{(i\pi-2t)\sqrt{0.992534}}{2i\pi-2\sqrt{0.992534}}\right)\sqrt{0.992534}\right)dt\right)^2$$

We have also, from the second of (2.12):

x+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$x + \frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right) - \frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

Result:

$x - 0.734242$

Geometric figure:

line

Alternate forms:

$x - 0.734242$

$3.13809\times10^{-9}\,(3.18665\times10^{8}\,x - 2.33977\times10^{8})$

Root:

$x \approx 0.734242$

0.734242

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\mathbb{R}$ (all real numbers)

Bijectivity

bijective from its domain to $\mathbb{R}$

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

Derivative:

$$\frac{d}{dx}(x - 0.734242) = 1$$

Indefinite integral:

$$\int\left(x+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}\right)dx=$$

$$0.5\,x^2-0.734242\,x+\text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty((-0.734242+x)-(-0.734242+x))\,dx=0$$

0.734242+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2))

Input interpretation:

$$0.734242+\frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)-\frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)$$

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

Result:

$3.91796...\times10^{-7}$

$3.91796\ldots*10^{-7}=\varphi$

Alternative representations:

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=0.734242-\frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=0.734242-\frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}$$

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$0.734242-\frac{\log\left(\frac{1}{2}\left(e^{-1/2\sqrt{1-0.0864055^2}}+e^{\sqrt{1-0.0864055^2}/2}\right)\right)}{0.913595}+$$
$$\frac{\log\left(i\cos\left(\frac{\pi}{2}+\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{1.08641}$$

Series representation:

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=0.734242+$$
$$\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.09458\left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k-0.920467\left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}$$

Integral representations:

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$0.734242+\int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)}\left(\left(0.174111\,t-1.09458\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+\right.\right.$$
$$\left.(1.09458-0.174111\,t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\Big/$$
$$\left.\left(t\left(-t+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(-1+t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\right)\right)dt$$

$$0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}=$$
$$0.920467\left(0.797685+\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)-\right.$$
$$\left.1.18916\log\left(1+\frac{\sqrt{0.992534}}{2}\int_0^1\sinh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

$$0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055} =$$

$$-1.09458\left(-0.670799 + \log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}} \sinh(t)\,dt\right) - 0.840933 \log\left(\frac{\sqrt{0.992534}}{2} \int_0^1 \cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)$$

[1/(((0.734242+1/(1+0.0864055) ln sinh(1/2*sqrt(1-0.0864055^2)) - 1/(1-0.0864055) ln cosh(1/2*sqrt(1-0.0864055^2)))))]^1/30-(11+5+1)*1/10^3

where 11 is a Lucas number and 5 is a Fibonacci number

Input interpretation:

$$\left(1\middle/\left(0.734242 + \frac{1}{1+0.0864055}\log\left(\sinh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right) - \frac{1}{1-0.0864055}\log\left(\cosh\left(\frac{1}{2}\sqrt{1-0.0864055^2}\right)\right)\right)\right)\hat{}\,(1/30) - (11+5+1)\times\frac{1}{10^3}$$

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

Result:

1.618176597492330675952672454695510581717883715917510599300...

1.61817659749…. result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternative representations:

$$\sqrt[30]{\frac{1}{0.734242 + \frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055} - \frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}} - \frac{11+5+1}{10^3} =$$

$$-\frac{17}{10^3} + \sqrt[30]{\frac{1}{0.734242 - \frac{\log_e\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595} + \frac{\log_e\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}}}$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{10^3}+\sqrt[30]{\frac{1}{0.734242-\frac{\log(a)\log_a\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{0.913595}+\frac{\log(a)\log_a\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1.08641}}}$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{10^3}+\sqrt[30]{\frac{1}{0.734242-\frac{\log\left(\cos\left(-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{0.913595}+\frac{\log\left(-i\cos\left(\frac{\pi}{2}-\frac{1}{2}i\sqrt{1-0.0864055^2}\right)\right)}{1.08641}}}$$

Series representation:

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{1000}+\sqrt[30]{\frac{1}{0.734242+\sum_{k=1}^{\infty}\frac{(-1)^k\left(1.09458\left(-1+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k-0.920467\left(-1+\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)^k\right)}{k}}}$$

Integral representations:

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$\frac{1}{1000}\left(-17+1000\left(1\bigg/\left(0.734242-1.09458\log\left(\int_{\frac{i\pi}{2}}^{\frac{\sqrt{0.992534}}{2}}\sinh(t)\,dt\right)+0.920467\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)\right)\wedge(1/30)\right)$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$\frac{1}{1000}\left(-17+1000\left(1\Big/\left(0.734242+0.920467\log\left(\frac{\sqrt{0.992534}}{2}\int_0^1\cosh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)-1.09458\log\left(1+\frac{\sqrt{0.992534}}{2}\int_0^1\sinh\left(\frac{t\sqrt{0.992534}}{2}\right)dt\right)\right)\right)\text{^}(1/30)\right)$$

$$\sqrt[30]{\frac{1}{0.734242+\frac{\log\left(\sinh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1+0.0864055}-\frac{\log\left(\cosh\left(\frac{\sqrt{1-0.0864055^2}}{2}\right)\right)}{1-0.0864055}}}-\frac{11+5+1}{10^3}=$$

$$-\frac{17}{1000}+\left(1\Big/\left(0.734242+\int_1^{\cosh\left(\frac{\sqrt{0.992534}}{2}\right)}\left(\left(0.174111\,t-1.09458\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(1.09458-0.174111\,t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\Big/\left(t\left(-t+\cosh\left(\frac{\sqrt{0.992534}}{2}\right)+(-1+t)\sinh\left(\frac{\sqrt{0.992534}}{2}\right)\right)\right)\right)dt\right)\right)\text{^}(1/30)$$

Now, we have that: (**Aspects of SUSY Breaking in String Theory** *Augusto Sagnotti*)

$$V(\varphi)=V_0\left\{e^{2\varphi}+\frac{1}{2}e^{2\gamma\varphi}+a_1e^{-a_2(\varphi+a_3)^2}+\left[1-e^{-\frac{2}{3}(\varphi+\Delta)}\right]^2\right\}-v_0$$

For $\Delta = 0.351$ $\varphi = 3.91796\ldots*10^{-7}$

and we obtain:

(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-x

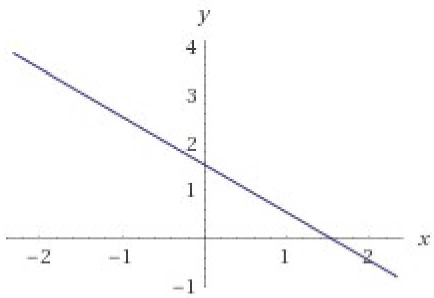
Input interpretation:

$$\left(\exp(2\times 3.91796\times 10^{-7})+\frac{1}{2}\exp(2\times 0.0864055\times 3.91796\times 10^{-7})+\exp(-2\,(3.91796\times 10^{-7}+3)^2)+\left(1-\exp\left(-\frac{2}{3}\,(3.91796\times 10^{-7}+0.351)\right)\right)^2\right)-x$$

Result:

$1.54353 - x$

Plot:



(x from −2.3 to 2.3)

Geometric figure:

line

Alternate forms:

$1.54353 - x$

$9.25774\times 10^{-9}\,(1.66729\times 10^{8} - 1.08018\times 10^{8}\,x)$

Root:

$x \approx 1.54353$

1.54353

Properties as a real function:

Domain

ℝ (all real numbers)

Range

ℝ (all real numbers)

Bijectivity

bijective from its domain to ℝ

ℝ is the set of real numbers

Derivative:

$$\frac{d}{dx}(1.54353 - x) = -1$$

Indefinite integral:

$$\int\left(\left(\exp(2\ 3.91796\times 10^{-7}) + \frac{1}{2}\exp(2\times 0.0864055\ 3.91796\times 10^{-7}) + \exp(-2\,(3.91796\times 10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times 10^{-7}+0.351)\right)\right)^2\right) - x\right)dx = 1.54353\,x - 0.5\,x^2 + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((1.54353 - x) - (1.54353 - x))\,dx = 0$$

x*(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-1.54353

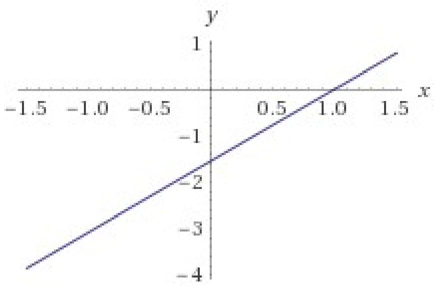
Input interpretation:

$$x\left(\exp(2\times 3.91796\times 10^{-7}) + \frac{1}{2}\exp(2\times 0.0864055\times 3.91796\times 10^{-7}) + \exp(-2\,(3.91796\times 10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times 10^{-7}+0.351)\right)\right)^2\right) - 1.54353$$

Result:

$$1.54353\,x - 1.54353$$

Plot:



(x from −1.5 to 1.5)

Geometric figure:

line

Alternate forms:

$$1.54353\,(x - 0.999999)$$

$9.25774\times10^{-14}\,(1.66729\times10^{13}\,x - 1.66729\times10^{13})$

Root:

$x \approx 0.999999$

0.999999

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\mathbb{R}$ (all real numbers)

Bijectivity

bijective from its domain to $\mathbb{R}$

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

Derivative:

$$\frac{d}{dx}(1.54353\,x - 1.54353) = 1.54353$$

Indefinite integral:

$$\int \left(x \left(\exp(2\; 3.91796\times10^{-7}) + \frac{1}{2}\exp(2\times0.0864055\; 3.91796\times10^{-7}) + \exp(-2\,(3.91796\times10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times10^{-7}+0.351)\right)\right)^2\right) - 1.54353\right) dx = 0.771765\,x^2 - 1.54353\,x + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty ((-1.54353 + 1.54353\,x) - (-1.54353 + 1.54353\,x))\,dx = 0$$

0.999999*(((exp(2*3.91796e-7) + 1/2(exp(2*0.0864055*3.91796e-7))+exp(-2(3.91796e-7+3)^2)+(1-exp(-2/3*(3.91796e-7+0.351)))^2)))-1.54353

Input interpretation:

$$0.999999\left(\exp(2\times3.91796\times10^{-7}) + \frac{1}{2}\exp(2\times0.0864055\times3.91796\times10^{-7}) + \exp(-2\,(3.91796\times10^{-7}+3)^2) + \left(1-\exp\left(-\frac{2}{3}\,(3.91796\times10^{-7}+0.351)\right)\right)^2\right) - 1.54353$$

Result:

$-7.32737... \times 10^{-7}$

-7.32737…*10^{-7} = $V(\varphi)$

We observe that:

1+1/(((-7.32737 × 10^-7 / 3.91796e-7)^2))^1/3

Input interpretation:

$$1 + \frac{1}{\sqrt[3]{\left(-\frac{7.32737 \times 10^{-7}}{3.91796 \times 10^{-7}}\right)^2}}$$

Result:

1.65878...

1.65878…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164,2696 i.e. 1,65578...

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4 + 21

where 21 is a Fibonacci number

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737 \times 10^{-7} \times 3.91796 \times 10^{-7}}} + 21$$

Result:

1387.15...

1387.15… result practically equal to the rest mass of Sigma baryon 1387.2

2(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/7+golden ratio

Input interpretation:

$$2\sqrt[7]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}}+\phi$$

ϕ is the golden ratio

Result:

125.4244...

125.4244…. 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

2(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/7+13+golden ratio^2

where 13 is a Fibonacci number

Input interpretation:

$$2\sqrt[7]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}}+13+\phi^2$$

ϕ is the golden ratio

Result:

139.4244...

139.4244…. result practically equal to the rest mass of Pion meson 139.57 MeV

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4+322+47-7

where 322, 47 and 7 are Lucas numbers

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}}+322+47-7$$

Result:

1728.15...

1728.15….

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

(((-1/(((-7.32737 × 10^-7 * 3.91796e-7))))))^1/4+322+76+18

where 322, 76 and 18 are Lucas numbers

Input interpretation:

$$\sqrt[4]{\frac{-1}{-7.32737\times 10^{-7}\times 3.91796\times 10^{-7}}}+322+76+18$$

Result:

1782.15...

1782.15… result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Appendix

From:

Lectures on N = 2 String Theory
Doron Gepner
Joseph Henry Laboratories - Princeton University
Princeton, New Jersey 08544- April, 1989

Let us consider now the right moving vector representation. From table 2 the internal dimension for the vector fields is $\bar{\Delta}_i = \frac{1}{2}$ and the charge is $\bar{Q}_i = \pm 1$. Again, these fields obey $\bar{\Delta} = |\bar{Q}|/2$, and are thus chiral or anti–chiral fields of the right moving $N = 2$ algebra with charges ± 1. Denote such a field with $\bar{Q}_i = 1$ by $C = \hat{C}\exp(i\bar{\phi}/\sqrt{3})$, where $\hat{C}$ is a neutral field. The vertex operator for the massless fields in the vector representation of $SO(10)$ is $V_\mu \hat{C}\exp(i\bar{\phi}/\sqrt{3})$, where V_μ, $\mu = 1, 2, \ldots 10$ represents the vector of $SO(10)$ at level one. (V_μ can be taken to be 10 free Majorana fermions.) Acting on this field with the right moving supersymmetry generator $Q^\dagger$ we obtain a massless spinor field, $S_\alpha \hat{C}\exp(-i\bar{\phi}/2\sqrt{3})$, where S_α is the spin field of $SO(10)$. Acting once more with $Q^\dagger$ gives the massless singlet field $\hat{C}\exp(-2i\bar{\phi}/\sqrt{3})$. Counting states we find $10+16+1 = 27$. Indeed these fields together give the 27 representation of E_6. It can be easily checked that the weights of these fields are the correct ones for the 27 of E_6 (as we did for the adjoint), and that this is precisely the vertex operator representation for the 27 of E_6 at level one.

Similarly, the right moving vector fields with $\bar{Q}_i = -1$ give the $\bar{27}$ representation of E_6 when acting with Q twice, $\bar{27} = 10 + \bar{16} + 1$. It can be further seen that these are all the possible fields in the right moving sector of the theory.

How are the right movers in the 27 and $\bar{27}$ representations of E_6 connected together with the right movers? The only possible fields in the right moving sector that these fields can multiply are the spinor and anti–spinor multiplets of $SO(2)$. We thus have four possibilities: space–time left fermions which are 27 ($Q_i = \bar{Q}_i = 1$), right fermions which are 27 ($-Q_i = \bar{Q}_i = 1$), left fermions which are $\bar{27}$ ($Q_i = -\bar{Q}_i = 1$) and right fermions which are $\bar{27}$ ($Q_i = \bar{Q}_i = -1$). The last two are CPT conjugates of the first two ($Q_i \to -Q_i$ along with $\bar{Q}_i \to -\bar{Q}_i$). We conclude that the matter content of the theory consists of a number of left handed fermions in the 27 of E_6 and a number of left–handed fermions in the $\bar{27}$ of E_6. The 27 fields correspond to left and right chiral fields, (c, c), whereas the $\bar{27}$ correspond to the fields which are left chiral and right anti–chiral, (c, a). In general the number of 27 fields, N_{27} would be different from the number of $\bar{27}$, $N_{\bar{27}}$, giving rise to a net number of chiral generations in the theory, $N = N_{27} - N_{\bar{27}}$.

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