On some Ramanujan's equations (Hardy-Ramanujan number, taxicab numbers and Rogers-Ramanujan continued fractions) linked to various parameters of Standard Model Particles and String Theory: New possible mathematical connections. IV

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Abstract

In this research thesis, we have described and deepened further Ramanujan equations (Hardy-Ramanujan number, taxicab numbers and Rogers-Ramanujan continued fractions) linked to various parameters of Standard Model Particles and String Theory. We have therefore obtained further possible mathematical connections.

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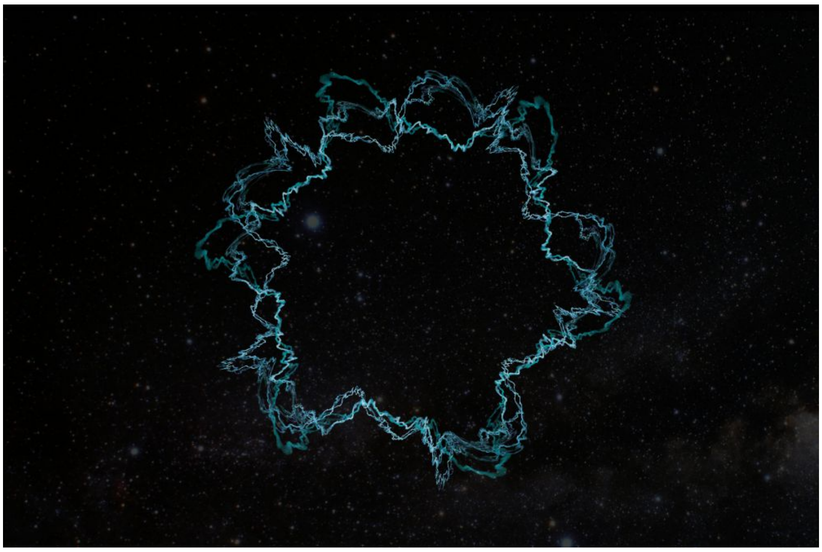
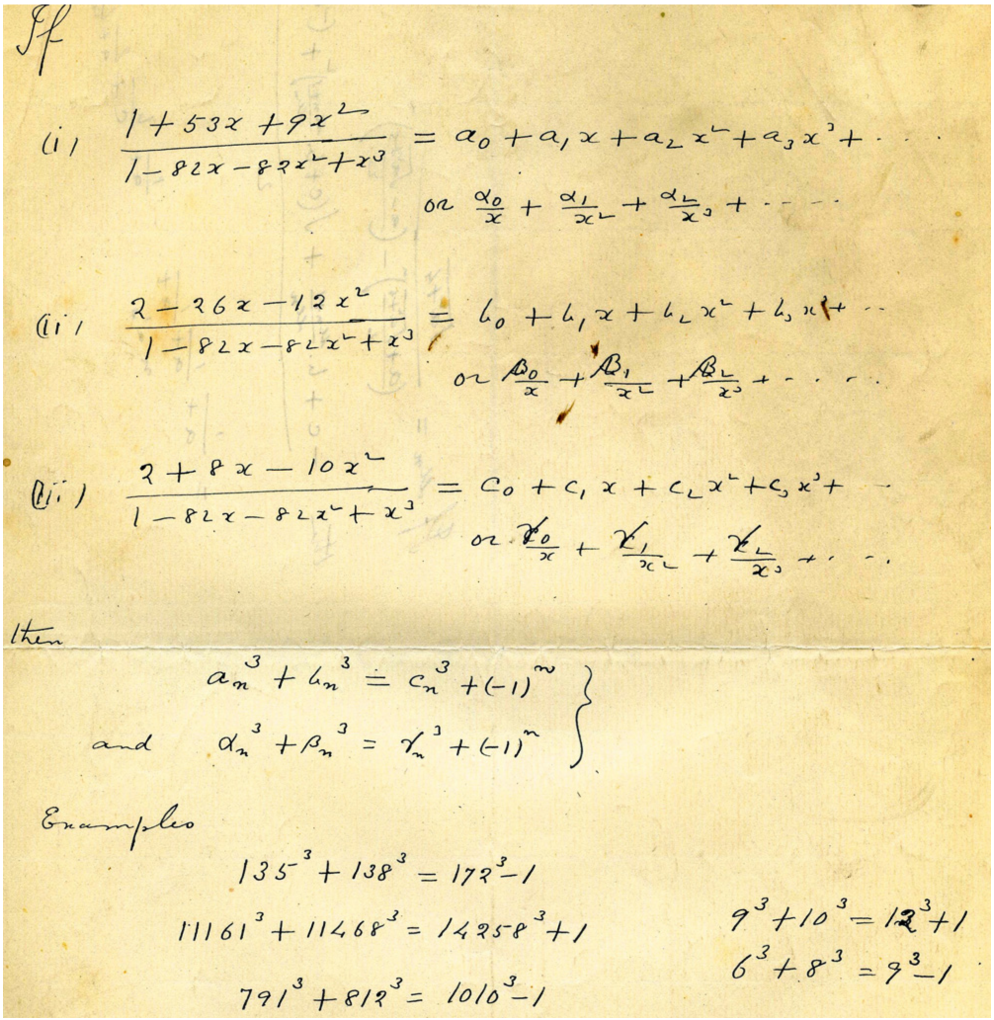
https://www.britannica.com/biography/Srinivasa-Ramanujan



https://futurism.com/brane-science-complex-notions-of-superstring-theory



If

(i) $$\frac{1+53x+9x^2}{1-82x-82x^2+x^3} = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \cdots$$
or $$\frac{\alpha_0}{x} + \frac{\alpha_1}{x^2} + \frac{\alpha_2}{x^3} + \cdots$$

(ii) $$\frac{2-26x-12x^2}{1-82x-82x^2+x^3} = b_0 + b_1 x + b_2 x^2 + b_3 x^3 + \cdots$$
or $$\frac{\beta_0}{x} + \frac{\beta_1}{x^2} + \frac{\beta_2}{x^3} + \cdots$$

(iii) $$\frac{2+8x-10x^2}{1-82x-82x^2+x^3} = c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots$$
or $$\frac{\gamma_0}{x} + \frac{\gamma_1}{x^2} + \frac{\gamma_2}{x^3} + \cdots$$

then

$$\left.\begin{aligned} a_n^3 + b_n^3 &= c_n^3 + (-1)^n \\ \text{and} \quad \alpha_n^3 + \beta_n^3 &= \gamma_n^3 + (-1)^n \end{aligned}\right\}$$

Examples

$135^3 + 138^3 = 172^3 - 1$

$11161^3 + 11468^3 = 14258^3 + 1$

$791^3 + 812^3 = 1010^3 - 1$

$9^3 + 10^3 = 12^3 + 1$

$6^3 + 8^3 = 9^3 - 1$

https://plus.maths.org/content/ramanujan

Ramanujan's manuscript

The representations of 1729 as the sum of two cubes appear in the bottom right corner. The equation expressing the near counter examples to Fermat's last theorem appears further up: $\alpha^3 + \beta^3 = \gamma^3 + (-1)^n$.

From Wikipedia

The ***taxicab number****, typically denoted Ta(n) or Taxicab(n), also called the nth* ***Hardy–Ramanujan number****, is defined as the smallest integer that can be expressed as a sum of two positive integer cubes in n distinct ways. The most famous taxicab number is 1729 = Ta(2) =* $1^3 + 12^3 = 9^3 + 10^3$.

From:

Sub-critical Closed String Field Theory in D Less Than 26
Michio Kaku - arXiv:hep-th/9311173v1 29 Nov 1993

We have that:

The holomorphic part of the energy-momentum tensor is therefore:

$$T^{\phi}_{zz} = -\frac{1}{2}(\partial_z\phi^\mu)^2 - \frac{Q_\mu}{2}\left(\partial_z^2\phi^\mu\right)$$
$$T^{\mathrm{gh}}_{zz} = \frac{1}{2}(\partial_z\sigma)^2 + \frac{3}{2}\left(\partial_z\sigma^2\right) \tag{8}$$

where we have bosonized the ghost fields via $c = e^\sigma$ and $b = e^{-\sigma}$ and where $Q^\mu = (0, Q)$. Demanding that the central charge of the Virasoro algebra vanish implies that:

$$[L_n, L_m] = (n-m)L_{n+m} + \frac{c}{12}n(n^2-1)\delta_{n+m,0} \tag{9}$$

with total central charge:

$$c = D + 1 + 3Q^2 - 26 = 0 \tag{10}$$

so that $Q = 2\sqrt{2}$ for $D = 1$ (or for two dimensions if we promote ϕ to a dimension). Notice that the ghost field has a background charge of -3 and the

From (10), we obtain:

2+3Q^2-26 = 0

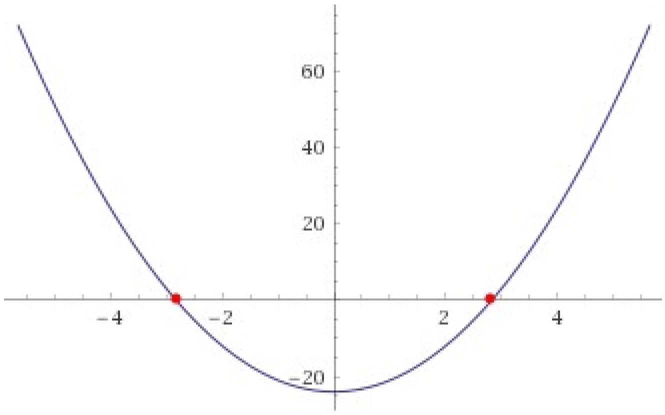
Input:

$2 + 3\,Q^2 - 26 = 0$

Result:

$3\,Q^2 - 24 = 0$

Root plot:



Alternate forms:

$Q^2 = 8$

$3(Q^2 - 8) = 0$

Solutions:

$Q = -2\sqrt{2}$

$Q = 2\sqrt{2}$

2 √2

$2\sqrt{2}$

2.8284271247461900976033774484193961571393437507538961463533...

2.8284271247…

We note that:

2*((2 sqrt(2)))^4

Input:

$2\left(2\sqrt{2}\right)^4$

Result:

128

128

And:

2*((2 sqrt(2)))^4 - Pi +1/golden ratio

Input:

$$2\left(2\sqrt{2}\right)^4 - \pi + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi} + 128 - \pi$$

Decimal approximation:

125.4764413351601016097419434510861352335231397804306570411...

125.47644133… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$128 + \frac{1}{\phi} - \pi$ is a transcendental number

Alternate forms:

$$\frac{1}{2}\left(255 + \sqrt{5} - 2\pi\right)$$

$$-\frac{-128\phi + \pi\phi - 1}{\phi}$$

$$\frac{(128 - \pi)\phi + 1}{\phi}$$

Series representations:

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

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

$$2\left(2\sqrt{2}\right)^4 - \pi + \frac{1}{\phi} = 128 + \frac{1}{\phi} - \sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)$$

Integral representations:

$$2\left(2\sqrt{2}\right)^4 - \pi + \frac{1}{\phi} = 128 + \frac{1}{\phi} - 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$2\left(2\sqrt{2}\right)^4 - \pi + \frac{1}{\phi} = 128 + \frac{1}{\phi} - 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$2\left(2\sqrt{2}\right)^4 - \pi + \frac{1}{\phi} = 128 + \frac{1}{\phi} - 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

2*((2 sqrt(2)))^4 +11+1/golden ratio

Input:

$$2\left(2\sqrt{2}\right)^4 + 11 + \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

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

Decimal approximation:

139.61803398874989484820458683436563811772030917980576286213...

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

Alternate forms:

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

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

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

Series representations:

$$2\left(2\sqrt{2}\right)^4+11+\frac{1}{\phi}=11+\frac{1}{\phi}+32\sqrt{z_0}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4$$

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

$$2\left(2\sqrt{2}\right)^4+11+\frac{1}{\phi}=$$
$$11+\frac{1}{\phi}+32\exp^4\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4$$

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

$$2\left(2\sqrt{2}\right)^4+11+\frac{1}{\phi}=$$
$$11+\frac{1}{\phi}+32\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4$$

2*((2 sqrt(2)))^4 + 7 +golden ratio^2

Input:

$$2\left(2\sqrt{2}\right)^4+7+\phi^2$$

ϕ is the golden ratio

Result:

$$\phi^2+135$$

Decimal approximation:

137.6180339887498948482045868343656381177203091798057628621...

137.6180339887…

This result is very near to the inverse of fine-structure constant 137,035

Alternate forms:

$$\frac{1}{2}\left(273+\sqrt{5}\right)$$

$$\frac{273}{2} + \frac{\sqrt{5}}{2}$$

$$135 + \frac{1}{4}\left(1 + \sqrt{5}\right)^2$$

Series representations:

$$2\left(2\sqrt{2}\right)^4 + 7 + \phi^2 = 7 + \phi^2 + 32\sqrt{z_0}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4$$

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

$$2\left(2\sqrt{2}\right)^4 + 7 + \phi^2 =$$
$$7 + \phi^2 + 32 \exp^4\left(i\pi \left\lfloor \frac{\arg(2 - x)}{2\pi} \right\rfloor\right) \sqrt{x}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k (2 - x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^4$$

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

$$2\left(2\sqrt{2}\right)^4 + 7 + \phi^2 =$$
$$7 + \phi^2 + 32 \left(\frac{1}{z_0}\right)^{2\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{2+2\lfloor \arg(2-z_0)/(2\pi)\rfloor} \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4$$

27*((2 sqrt(2)))^4+1

Input:

$$27\left(2\sqrt{2}\right)^4 + 1$$

Result:

1729

1729

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 (taxicab number)

Now, we have that:

$$\left\{pe^{\sigma(z_0)}\left[\frac{D+2}{24}+\frac{1}{8}(Q^2-3^2)\right]+\frac{de^{\sigma(z_0)}}{dz}\left[\frac{5(D+2)}{96}+\frac{5}{32}(Q^2-3^2)\right]\right\}|V_3\rangle_0 \quad (55)$$

With

Q = 2√2

$p = b/a$

a = 5, b = 8, σ = 2, z_0 = π, D = 2, Q^2 = (2√2)^2 and $|V_3\rangle_0 = 1$

$$\left\{pe^{\sigma(z_0)}\left[\frac{D+2}{24}+\frac{1}{8}(Q^2-3^2)\right]+\frac{de^{\sigma(z_0)}}{dz}\left[\frac{5(D+2)}{96}+\frac{5}{32}(Q^2-3^2)\right]\right\}|V_3\rangle_0 \quad (55)$$

[8/5*e^(2Pi) (((4/24+1/8((2sqrt2)^2-9))))+((d/dz(e^(2Pi)))) (((20/96+5/32((2sqrt2)^2-9))))]

Input interpretation:

$$\frac{8}{5}e^{2\pi}\left(\frac{4}{24}+\frac{1}{8}\left(\left(2\sqrt{2}\right)^2-9\right)\right)+\frac{\partial e^{2\pi}}{\partial z}\left(\frac{20}{96}+\frac{5}{32}\left(\left(2\sqrt{2}\right)^2-9\right)\right)$$

Result:

$$\frac{e^{2\pi}}{15}$$

Decimal approximation:

35.699443701650982433536621972603145431853719840219661033381...

35.6994437016…

Property:

$\frac{e^{2\pi}}{15}$ is a transcendental number

And:

4*[8/5*e^(2Pi) (((4/24+1/8((2sqrt2)^2-9))))+((d/dz(e^(2Pi))))
(((20/96+5/32((2sqrt2)^2-9))))]

Input interpretation:

$$4\left(\frac{8}{5}e^{2\pi}\left(\frac{4}{24}+\frac{1}{8}\left(\left(2\sqrt{2}\right)^2-9\right)\right)+\frac{\partial e^{2\pi}}{\partial z}\left(\frac{20}{96}+\frac{5}{32}\left(\left(2\sqrt{2}\right)^2-9\right)\right)\right)$$

Result:

$$\frac{4e^{2\pi}}{15}$$

Decimal approximation:

142.7977748066039297341464878904125817274148793608786441352...

142.797774806…

Property:

$\frac{4e^{2\pi}}{15}$ is a transcendental number

4*[8/5*e^(2Pi) (((4/24+1/8((2sqrt2)^2-9))))+((d/dz(e^(2Pi))))
(((20/96+5/32((2sqrt2)^2-9))))]-18+1/golden ratio

Input interpretation:

$$4\left(\frac{8}{5}e^{2\pi}\left(\frac{4}{24}+\frac{1}{8}\left(\left(2\sqrt{2}\right)^2-9\right)\right)+\frac{\partial e^{2\pi}}{\partial z}\left(\frac{20}{96}+\frac{5}{32}\left(\left(2\sqrt{2}\right)^2-9\right)\right)\right)-18+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}-18+\frac{4e^{2\pi}}{15}$$

Decimal approximation:

125.4158087953538245823510747247782198451351885406844069973...

125.415808795… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$-18+\frac{4e^{2\pi}}{15}+\frac{1}{\phi}$ is a transcendental number

Alternate forms:

$\frac{1}{2}\left(\sqrt{5}-37\right)+\frac{4e^{2\pi}}{15}$

$-18+\frac{2}{1+\sqrt{5}}+\frac{4e^{2\pi}}{15}$

$\frac{15(1-18\phi)+4e^{2\pi}\phi}{15\phi}$

4*[8/5*e^(2Pi) (((4/24+1/8((2sqrt2)^2-9))))+((d/dz(e^(2Pi)))) (((20/96+5/32((2sqrt2)^2-9))))]-4+1/golden ratio

Input interpretation:

$$4\left(\frac{8}{5}e^{2\pi}\left(\frac{4}{24}+\frac{1}{8}\left(\left(2\sqrt{2}\right)^2-9\right)\right)+\frac{\partial e^{2\pi}}{\partial z}\left(\frac{20}{96}+\frac{5}{32}\left(\left(2\sqrt{2}\right)^2-9\right)\right)\right)-4+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$\frac{1}{\phi}-4+\frac{4e^{2\pi}}{15}$

Decimal approximation:

139.4158087953538245823510747247782198451351885406844069973...

139.41580879… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$-4+\frac{4e^{2\pi}}{15}+\frac{1}{\phi}$ is a transcendental number

Alternate forms:

$\frac{1}{2}\left(\sqrt{5}-9\right)+\frac{4e^{2\pi}}{15}$

$$-4+\frac{2}{1+\sqrt{5}}+\frac{4e^{2\pi}}{15}$$

$$\frac{15(1-4\phi)+4e^{2\pi}\phi}{15\phi}$$

And again:

48*[8/5*e^(2Pi) (((4/24+1/8((2sqrt2)^2-9))))+((d/dz(e^(2Pi)))) (((20/96+5/32((2sqrt2)^2-9))))]+11+Pi+golden ratio

Input interpretation:

$$48\left(\frac{8}{5}e^{2\pi}\left(\frac{4}{24}+\frac{1}{8}\left(\left(2\sqrt{2}\right)^2-9\right)\right)+\frac{\partial e^{2\pi}}{\partial z}\left(\frac{20}{96}+\frac{5}{32}\left(\left(2\sqrt{2}\right)^2-9\right)\right)\right)+11+\pi+\phi$$

ϕ is the golden ratio

Result:

$$\phi+11+\frac{16e^{2\pi}}{5}+\pi$$

Decimal approximation:

1729.332924321586844896425084902596121730896030909724598306...

1729.33292432…

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 (taxicab number)

Alternate forms:

$$\frac{1}{5}\left(5(\phi+11+\pi)+16e^{2\pi}\right)$$

$$\frac{23}{2}+\frac{\sqrt{5}}{2}+\frac{16e^{2\pi}}{5}+\pi$$

$$11+\frac{1}{2}\left(1+\sqrt{5}\right)+\frac{16e^{2\pi}}{5}+\pi$$

We have also:

We also find:

$$\begin{aligned}\frac{dz'}{dz}\frac{1}{(z'-z)^2} &= \epsilon^{-2}f_1^{-2}\Big[(\epsilon f_2)' - 2f_3f_1' \\ &+ 3f_2^2f_1^{-2} + (\epsilon f_1)'(-2f_2f_1^{-1}) + ...\Big] \\ &- \epsilon^{-2}\left(\frac{5}{48}+\frac{p\epsilon}{12}\right) + ... \end{aligned} \quad (38)$$

For p = 8/5 and $\epsilon = 0.0864055$, from

$$\epsilon^{-2}\left(\frac{5}{48}+\frac{p\epsilon}{12}\right) + ...$$

we obtain:

1/0.0864055^2 ((5/48+(8/5*0.0864055)/12))

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)$$

Result:

15.495417615949907075969638070116465418467508140917131 65178...

15.4954176159...

$$\left(\frac{dz'}{dz}\right)^2 \frac{1}{(z'-z)^2} = \epsilon^{-2} f_1^{-2}\Big[-4(\epsilon f_1)' f_2 f_1^{-1} + (\epsilon f_1)' + 2(\epsilon f_2)' - 2 f_3 f_1^{-1} + 3 f_2^2 f_1^{-2} + \ldots\Big] = \epsilon^{-2}\left(\frac{29}{48} + \frac{13}{12} p\epsilon\right) + \ldots \quad (39)$$

$$\left(\frac{dz'}{dz}\right)^2 \frac{1}{z'-z} = \epsilon^{-1} f_1^{-1}\left(-f_2 f_1^{-1} + 2(\epsilon f_1)'\right) = -\frac{3}{4}\epsilon^{-1} + \ldots \quad (40)$$

From

$$\epsilon^{-2}\left(\frac{29}{48} + \frac{13}{12} p\epsilon\right) + \ldots$$

we obtain:

1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055)))

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{29}{48} + \frac{13}{12}\left(\frac{8}{5} \times 0.0864055\right)\right)$$

Result:

100.98382602411612959760233389253230252413662085267822383 81...

100.983826024…

From

$$-\frac{3}{4}\epsilon^{-1} + \ldots$$

we obtain:

-3/4*1/0.0864055

Input interpretation:

$$-\frac{3}{4}\times\frac{1}{0.0864055}$$

Result:

−8.68000300906770981013940084832562741955083877762410957635...

-8.6800030090677…

From the sum of the three expressions, we obtain:

(((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))+(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))+(((-3/4*1/0.0864055)))

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times0.0864055\right)\right)+\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times0.0864055\right)\right)+-\frac{3}{4}\times\frac{1}{0.0864055}$$

Result:

107.79924063099832686343257111432314052305329021597124591 35...

107.79924063099…

From which:

(((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))+(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))+(((-3/4*1/0.0864055)))+29+1/golden ratio

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times0.0864055\right)\right)+\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times0.0864055\right)\right)+-\frac{3}{4}\times\frac{1}{0.0864055}+29+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

137.417...

137.417…

This result is very near to the inverse of fine-structure constant 137,035

Alternative representations:

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\frac{1}{\phi}=29-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+\frac{1}{2\sin(54^\circ)}$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\frac{1}{\phi}=29-\frac{3}{0.0864055\times 4}+-\frac{1}{2\cos(216^\circ)}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\frac{1}{\phi}=29-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+-\frac{1}{2\sin(666^\circ)}$$

(((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))+(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))+(((-3/4*1/0.0864055)))+29+golden ratio^2

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+-\frac{3}{4}\times\frac{1}{0.0864055}+29+\phi^2$$

ϕ is the golden ratio

Result:

139.417...

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

Alternative representations:

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\phi^2 = 29-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+(2\sin(54\,°))^2$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\phi^2 = 29-\frac{3}{0.0864055\times 4}+(-2\cos(216\,°))^2+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+29+\phi^2 = 29-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+(-2\sin(666\,°))^2$$

(((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))+(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))+(((-3/4*1/0.0864055)))+11+4+golden ratio^2

Input interpretation:

$$\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+-\frac{3}{4}\times\frac{1}{0.0864055}+11+4+\phi^2$$

ϕ is the golden ratio

Result:

125.417...

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

Alternative representations:

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+11+4+\phi^2 = 15-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+(2\sin(54\,°))^2$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+11+4+\phi^2=$$

$$15-\frac{3}{0.0864055\times 4}+(-2\cos(216\,°))^2+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}$$

$$\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}+11+4+\phi^2=$$

$$15-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}+(-2\sin(666\,°))^2$$

16*((((((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))+(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055)))))+(((-3/4*1/0.0864055))))))+Pi+golden ratio-1/2

Input interpretation:

$$16\left(\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)+-\frac{3}{4}\times\frac{1}{0.0864055}\right)+\pi+\phi-\frac{1}{2}$$

ϕ is the golden ratio

Result:

1729.05...

1729.05…

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 (taxicab number)

Alternative representations:

$$16\left(\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}\right)+\pi+\phi-\frac{1}{2}=$$

$$-\frac{1}{2}+\pi+2\cos\left(\frac{\pi}{5}\right)+16\left(-\frac{3}{0.0864055\times 4}+\frac{\frac{0.691244}{5\times 12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times 12}+\frac{29}{48}}{0.0864055^2}\right)$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$-\frac{1}{2}+\pi-2\cos(216\,°)+16\left(-\frac{3}{0.0864055\times4}+\frac{\frac{0.691244}{5\times12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times12}+\frac{29}{48}}{0.0864055^2}\right)$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$-\frac{1}{2}+180\,°+2\cos\left(\frac{\pi}{5}\right)+16\left(-\frac{3}{0.0864055\times4}+\frac{\frac{0.691244}{5\times12}+\frac{5}{48}}{0.0864055^2}+\frac{\frac{8.98617}{5\times12}+\frac{29}{48}}{0.0864055^2}\right)$$

Series representations:

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1724.29+\phi+4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1722.29+\phi+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1724.29+\phi+\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$16\left(\frac{\frac{5}{48}+\frac{8\times0.0864055}{5\times12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times0.0864055)}{12\times5}}{0.0864055^2}+-\frac{3}{0.0864055\times4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1724.29+\phi+2\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1724.29+\phi+4\int_0^1\sqrt{1-t^2}\,dt$$

$$16\left(\frac{\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}}{0.0864055^2}+\frac{\frac{29}{48}+\frac{13(8\times 0.0864055)}{12\times 5}}{0.0864055^2}+-\frac{3}{0.0864055\times 4}\right)+\pi+\phi-\frac{1}{2}=$$
$$1724.29+\phi+2\int_0^\infty\frac{\sin(t)}{t}\,dt$$

-((((((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))*(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))*(((-3/4*1/0.0864055))))))

Input interpretation:

$$-\left(\left(\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)\right)\left(\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)\right)\left(-\frac{3}{4}\times\frac{1}{0.0864055}\right)\right)$$

Result:

13582.352020705653056846249897305467635786628242461087525 44...

13582.352020705...

From the formula of coefficients of the '5th order' mock theta function ψ_1(q): (A053261 OEIS Sequence)

sqrt(golden ratio) * exp(Pi*sqrt(n/15)) / (2*5^(1/4)*sqrt(n))

for n = 263 and adding 34, π and the golden ratio conjugate, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(263/15)) / (2*5^(1/4)*sqrt(263)) +34+Pi+1/golden ratio

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{263}{15}}\right)}{2 \sqrt[4]{5} \sqrt{263}} + 34 + \pi + \frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{263/15}\,\pi} \sqrt{\frac{\phi}{263}}}{2 \sqrt[4]{5}} + \frac{1}{\phi} + 34 + \pi$$

Decimal approximation:

13582.55507182406239058945354123977131538191027202659034118...

13582.55507182406…

Alternate forms:

$$\frac{1}{2}\left(67 + \sqrt{5}\right) + \frac{1}{2} \sqrt{\frac{5 + \sqrt{5}}{2630}}\, e^{\sqrt{263/15}\,\pi} + \pi$$

$$34 + \frac{2}{1 + \sqrt{5}} + \frac{\sqrt{\frac{1}{526}\left(1 + \sqrt{5}\right)}\, e^{\sqrt{263/15}\,\pi}}{2 \sqrt[4]{5}} + \pi$$

$$\frac{e^{\sqrt{263/15}\,\pi}\, \phi^{3/2} + 2 \sqrt[4]{5} \sqrt{263}\, ((34 + \pi)\, \phi + 1)}{2 \sqrt[4]{5} \sqrt{263}\, \phi}$$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\sqrt{263}}+34+\pi+\frac{1}{\phi}=$$

$$\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+340\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+\right.$$
$$10\,\phi\,\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+5^{3/4}\,\phi$$
$$\left.\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\sqrt{263}}+34+\pi+\frac{1}{\phi}=$$

$$\left(10\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$340\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+$$
$$10\,\phi\,\pi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+$$
$$5^{3/4}\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{263}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\right.$$
$$\left.\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{263}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$
$$\left(10\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{263}}+34+\pi+\frac{1}{\phi}=\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\right.$$
$$\left(10\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+\right.$$
$$340\,\phi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}$$
$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+10\,\phi\,\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}$$
$$z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+$$
$$5^{3/4}\,\phi\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\right.$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}$$
$$\left.\left.z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/$$
$$\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}\right)$$

From which:

1/8(((sqrt(golden ratio) * exp(Pi*sqrt(263/15)) / (2*5^(1/4)*sqrt(263)))))+34+e-1/golden ratio

Input:

$$\frac{1}{8}\left(\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{263}}\right)+34+e-\frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{263/15}\,\pi}\sqrt{\frac{\phi}{263}}}{16\sqrt[4]{5}}-\frac{1}{\phi}+34+e$$

Decimal approximation:

1729.199678487424488200003989514752796177536037094820380775...

1729.199678487…

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 (taxicab number)

Alternate forms:

$$\frac{1}{2}\left(69-\sqrt{5}\right)+e+\frac{1}{16}\sqrt{\frac{5+\sqrt{5}}{2630}}\;e^{\sqrt{263/15}\,\pi}$$

$$34-\frac{2}{1+\sqrt{5}}+e+\frac{\sqrt{\frac{1}{526}\left(1+\sqrt{5}\right)}\;e^{\sqrt{263/15}\,\pi}}{16\sqrt[4]{5}}$$

$$\frac{-16\sqrt[4]{5}\sqrt{263}\,(1-34\,\phi)+16\sqrt[4]{5}\sqrt{263}\,e\,\phi+e^{\sqrt{263/15}\,\pi}\,\phi^{3/2}}{16\sqrt[4]{5}\sqrt{263}\,\phi}$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{\left(2\sqrt[4]{5}\,\sqrt{263}\right)8}+34+e-\frac{1}{\phi}=$$

$$\left(-80\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+2720\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+80\,e\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+5^{3/4}\,\phi\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(80\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{\left(2\sqrt[4]{5}\,\sqrt{263}\right)8}+34+e-\frac{1}{\phi}=$$

$$\left(-80\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+2720\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+80\,e\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{263}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{263}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(80\,\phi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(263-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{263}{15}}\right)}{\left(2\sqrt[4]{5}\ \sqrt{263}\right)8}+34+e-\frac{1}{\phi}=\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\right.$$

$$\left(-80\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+\right.$$

$$2720\,\phi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+80\,e\,\phi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}$$

$$z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}+$$

$$5^{3/4}\,\phi\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\right.$$

$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}$$

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

$$\left(80\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k z_0^{-k}}{k!}\right)$$

sqrt(golden ratio) * exp(Pi*sqrt(263/15)) / (2*5^(1/4)*sqrt(263))+521+199-2Pi-1/2

Input:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{263}}+521+199-2\pi-\frac{1}{2}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{263/15}\,\pi}\sqrt{\frac{\phi}{263}}}{2\sqrt[4]{5}}+\frac{1439}{2}-2\pi$$

Decimal approximation:

14258.01225987454311602586102425556716861159845464865926085...

14258.0122598745… (Ramanujan taxicab number)

Alternate forms:

$$\frac{1439}{2} + \frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{2630}}\; e^{\sqrt{263/15}\,\pi} - 2\pi$$

$$\frac{3784570 + 5^{3/4}\sqrt{526\left(1+\sqrt{5}\right)}\; e^{\sqrt{263/15}\,\pi} - 10520\,\pi}{5260}$$

$$\frac{\sqrt{\frac{1}{526}\left(1+\sqrt{5}\right)\, e^{\sqrt{263/15}\,\pi}}}{2\sqrt[4]{5}} + \frac{1}{2}(1439 - 4\pi)$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{263}} + 521 + 199 - 2\pi - \frac{1}{2} = -\left(\left(-7195\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (263 - z_0)^k z_0^{-k}}{k!} + 20\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (263 - z_0)^k z_0^{-k}}{k!} - 5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15} - z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (\phi - z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (263 - z_0)^k z_0^{-k}}{k!}\right)\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{263}}+521+199-2\pi-\frac{1}{2}=$$

$$-\left(\left(-7195\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(263-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+20\pi\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(263-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}-5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{263}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{263}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(\phi-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(263-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(263-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$ for $(x\in\mathbb{R}$ and $x<0)$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{263}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{263}}+521+199-2\pi-\frac{1}{2}=$$

$$-\left(\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}z_0^{-1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\left(-7195\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k\,z_0^{-k}}{k!}+20\pi\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(263-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k\,z_0^{-k}}{k!}-5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{263}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{263}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(263-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$

Note that:

-((((((1/0.0864055^2 ((5/48+(8/5*0.0864055)/12)))))*(((1/0.0864055^2 ((29/48+13/12*(8/5*0.0864055))))))*(((-3/4*1/0.0864055))))))+521+123+29+e]

Input interpretation:

$$-\left(\left(\frac{1}{0.0864055^2}\left(\frac{5}{48}+\frac{1}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)\right)\left(\frac{1}{0.0864055^2}\left(\frac{29}{48}+\frac{13}{12}\left(\frac{8}{5}\times 0.0864055\right)\right)\right)\left(-\frac{3}{4}\times\frac{1}{0.0864055}\right)\right)+521+123+29+e$$

Result:

14258.1...

14258.1… (Ramanujan taxicab number)

Alternative representation:

$$-\frac{\left(\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}\right)\left(\left(\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}\right)(-3)\right)}{0.0864055^2\left(0.0864055^2\,(4\times 0.0864055)\right)}+521+123+29+e = -\frac{\left(\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}\right)\left(\left(\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}\right)(-3)\right)}{0.0864055^2\left(0.0864055^2\,(4\times 0.0864055)\right)}+521+123+29+\exp(z) \quad \text{for } z=1$$

Series representations:

$$-\frac{\left(\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}\right)\left(\left(\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}\right)(-3)\right)}{0.0864055^2\left(0.0864055^2\,(4\times 0.0864055)\right)}+521+123+29+e = 14\,255.4+\sum_{k=0}^{\infty}\frac{1}{k!}$$

$$-\frac{\left(\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}\right)\left(\left(\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}\right)(-3)\right)}{0.0864055^2\left(0.0864055^2\,(4\times 0.0864055)\right)}+521+123+29+e = 14\,255.4+0.5\sum_{k=0}^{\infty}\frac{1+k}{k!}$$

$$-\frac{\left(\frac{5}{48}+\frac{8\times 0.0864055}{5\times 12}\right)\left(\left(\frac{29}{48}+\frac{13\,(8\times 0.0864055)}{12\times 5}\right)(-3)\right)}{0.0864055^2\left(0.0864055^2\,(4\times 0.0864055)\right)}+521+123+29+e = 14\,255.4+\sum_{k=0}^{\infty}\frac{(-1+k)^2}{k!}$$

Now, we have that:

$$\left\{pc(z_0)\left[\frac{D}{24}-\frac{13}{12}+\frac{1}{24}+\frac{1}{8}Q^2\right]+\frac{dc(z_0)}{dz}\left[\frac{5D}{96}-\frac{65}{48}+\frac{5}{96}+\frac{5}{32}Q^2\right]\right\}|V_3\rangle_0 \tag{50}$$

With

Q = 2√2

$p = b/a$

a = 5, b = 8, c = 2, $z_0 = \pi$, D = 2, $Q^2 = (2\sqrt{2})$^2 and $|V_3\rangle_0 = 1$

[8/5*(2Pi) (((2/24-13/12+1/24+1/8((2sqrt2)^2))))+((d/dz(2Pi)))) (((10/96-65/48+5/96+5/32((2sqrt2)^2))))]

Input interpretation:

$$\frac{8}{5}(2\pi)\left(\frac{2}{24}-\frac{13}{12}+\frac{1}{24}+\frac{1}{8}\left(2\sqrt{2}\right)^2\right)+\frac{\partial(2\pi)}{\partial z}\left(\frac{10}{96}-\frac{65}{48}+\frac{5}{96}+\frac{5}{32}\left(2\sqrt{2}\right)^2\right)$$

Result:

$$\frac{2\pi}{15}$$

Decimal approximation:

0.4188790204786390984616857844372670512262892532500141094 63...

0.4188790204…

From which:

-4*1/10^3+sqrt15*[[8/5*(2Pi) (((2/24-13/12+1/24+1/8((2sqrt2)^2))))+((d/dz(2Pi)))) (((10/96-65/48+5/96+5/32((2sqrt2)^2))))]]

Input interpretation:

$$-4\times\frac{1}{10^3}+\sqrt{15}\left(\frac{8}{5}(2\pi)\left(\frac{2}{24}-\frac{13}{12}+\frac{1}{24}+\frac{1}{8}\left(2\sqrt{2}\right)^2\right)+\frac{\partial(2\pi)}{\partial z}\left(\frac{10}{96}-\frac{65}{48}+\frac{5}{96}+\frac{5}{32}\left(2\sqrt{2}\right)^2\right)\right)$$

Result:

$$\frac{2\pi}{\sqrt{15}} - \frac{1}{250}$$

Decimal approximation:

1.618311470389444758781184308119175619982003625269461867120...

1.61831147038… result that is a very good approximation to the value of the golden ratio 1,618033988749...

Property:

$-\frac{1}{250} + \frac{2\pi}{\sqrt{15}}$ is a transcendental number

Alternate forms:

$$\frac{1}{750}\left(100\sqrt{15}\,\pi - 3\right)$$

$$\frac{500\pi - \sqrt{15}}{250\sqrt{15}}$$

And:

55*1/[[8/5*(2Pi) (((2/24-13/12+1/24+1/8((2sqrt2)^2))))+((d/dz(2Pi))) (((10/96-65/48+5/96+5/32((2sqrt2)^2))))]]+4-1/2*0.618034

Input interpretation:

$$55 \times \frac{1}{\frac{8}{5}(2\pi)\left(\frac{2}{24} - \frac{13}{12} + \frac{1}{24} + \frac{1}{8}\left(2\sqrt{2}\right)^2\right) + \frac{\partial(2\pi)}{\partial z}\left(\frac{10}{96} - \frac{65}{48} + \frac{5}{96} + \frac{5}{32}\left(2\sqrt{2}\right)^2\right)} + 4 + \frac{1}{2} \times (-0.618034)$$

Result:

134.993811...

134.993811... ≈ 135 (Ramanujan taxicab number)

55*1/[[8/5*(2Pi) (((2/24-13/12+1/24+1/8((2sqrt2)^2))))+((d/dz(2Pi))) (((10/96-65/48+5/96+5/32((2sqrt2)^2))))]]+7-1/2*0.618034

Input interpretation:

$$55\times\frac{1}{\frac{8}{5}(2\pi)\left(\frac{2}{24}-\frac{13}{12}+\frac{1}{24}+\frac{1}{8}(2\sqrt{2})^2\right)+\frac{\partial(2\pi)}{\partial z}\left(\frac{10}{96}-\frac{65}{48}+\frac{5}{96}+\frac{5}{32}(2\sqrt{2})^2\right)}+7+\frac{1}{2}\times(-0.618034)$$

Result:

137.993811...

137.993811... ≈ 138 (Ramanujan taxicab number)

55*1/[[8/5*(2Pi) (((2/24-13/12+1/24+1/8((2sqrt2)^2))))+((d/dz(2Pi))) (((10/96-65/48+5/96+5/32((2sqrt2)^2))))]]+47-7+0.618034

Input interpretation:

$$55\times\frac{1}{\frac{8}{5}(2\pi)\left(\frac{2}{24}-\frac{13}{12}+\frac{1}{24}+\frac{1}{8}(2\sqrt{2})^2\right)+\frac{\partial(2\pi)}{\partial z}\left(\frac{10}{96}-\frac{65}{48}+\frac{5}{96}+\frac{5}{32}(2\sqrt{2})^2\right)}+47-7+0.618034$$

Result:

171.92086...

171.92086… ≈ 172 (Ramanujan taxicab number)

From:

A superfield constraint for N = 2 → N = 0 breaking - *E. Dudas , S. Ferrara and A. Sagnotti* - arXiv:1707.03414v1 [hep-th] 11 Jul 2017

6 Born–Infeld revisited

It is instructive to retrace the steps in [22], enforcing the quadratic constraint of eq. (1.8) while also adding a Fayet–Iliopoulos term. The theory would thus involve, to begin with, four parameters, the complex electric charge e_c, the scale m entering the supersymmetry transformations and the constraint (1.8) and the Fayet–Iliopoulos coefficient ξ. On the quadratic constraint, however, the Lagrangian reduces to

$$\mathcal{L} \;=\; -\,\frac{i}{2}\,e_c\,F \;+\frac{i}{2}\,e_c^\star\,\overline{F} \;+\; \frac{\xi}{2}\,D\;, \tag{6.1}$$

with $e_c = e_1 - ie_2$ as above, and it is instructive to work out its bosonic terms in detail. To this end, one first solves for the auxiliary field F from

$$D^2 + 2\,F(\overline{F} + m) - \frac{1}{2}\,F_{\mu\nu}\,F^{\mu\nu} - \frac{i}{2}\,F_{\mu\nu}\,\widetilde{F}^{\mu\nu} \;=\; 0\ , \tag{6.2}$$

which gives

$$F \;=\; -\,\frac{m}{2}\left[1 \;-\; \sqrt{1 \;-\; \frac{2D^2}{m^2} \;+\; \frac{1}{m^2}\,F_{\mu\nu}\,F^{\mu\nu} \;-\; \frac{1}{4m^4}\left(F\cdot\widetilde{F}\right)^2}\,\right] \;+\; \frac{i}{4m}\,F_{\mu\nu}\,\widetilde{F}^{\mu\nu}\ , \tag{6.3}$$

The resulting Lagrangian in eq. (6.1), which now reads

$$\begin{aligned}\mathcal{L} \;&=\; \frac{e_1}{4\,m}\,F\cdot\widetilde{F} \;+\; \frac{\xi}{2}\,D \\ &+\; \frac{m\,e_2}{2}\left[1 \;-\; \sqrt{1 \;-\; \frac{2\,D^2}{m^2} \;+\; \frac{1}{m^2}\,F_{\mu\nu}\,F^{\mu\nu} \;-\; \frac{1}{4\,m^4}\left(F\cdot\widetilde{F}\right)^2}\,\right]\ ,\end{aligned} \tag{6.4}$$

is then to be extremized with respect to D, which gives

$$D \;=\; -\,\frac{\xi\,m}{2\,e_2\sqrt{1 \;+\; \frac{\xi^2}{2\,e_2^2}}}\,\sqrt{1 \;+\; \frac{1}{m^2}\,F_{\mu\nu}\,F^{\mu\nu} \;-\; \frac{1}{4\,m^4}\left(F\cdot\widetilde{F}\right)^2}\ . \tag{6.5}$$

As a result, the Lagrangian in eq. (6.1) can be finally cast in the form

$$\begin{aligned}\mathcal{L} \;&=\; \frac{e_1}{4\,m}\,F\cdot\widetilde{F} \;-\; \frac{m\,e_2}{2}\left[\sqrt{1 \;+\; \frac{\xi^2}{2\,e_2^2}} \;-\; 1\right] \\ &+\; \frac{m\,e_2}{2}\,\sqrt{1 \;+\; \frac{\xi^2}{2\,e_2^2}}\,\left[1 \;-\; \sqrt{1 \;+\; \frac{1}{m^2}\,F_{\mu\nu}\,F^{\mu\nu} \;-\; \frac{1}{4\,m^4}\left(F\cdot\widetilde{F}\right)^2}\,\right]\ .\end{aligned} \tag{6.6}$$

The Maxwell kinetic term contained in this expression is not in conventional form, but this can be recovered letting

$$F_{\mu\nu} \;\longrightarrow\; F_{\mu\nu}\left[\frac{m}{e_2\,\sqrt{1 \;+\; \frac{\xi^2}{2\,e_2^2}}}\right]^{\frac{1}{2}}\ , \tag{6.7}$$

which turns the Lagrangian into

$$\begin{aligned}\mathcal{L} \;&=\; \frac{\theta}{4}\,F\cdot\widetilde{F} \;-\; \frac{m\,e_2}{2}\left[\sqrt{1 \;+\; \frac{\xi^2}{2\,e_2^2}} \;-\; 1\right] \\ &+\; \frac{\rho^2}{2}\,\left[1 \;-\; \sqrt{1 \;+\; \frac{1}{\rho^2}\,F_{\mu\nu}\,F^{\mu\nu} \;-\; \frac{1}{4\,\rho^4}\left(F\cdot\widetilde{F}\right)^2}\,\right]\ .\end{aligned} \tag{6.8}$$

Here

$$\rho^2 = m\, e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}} \,, \qquad \theta = \frac{e_1}{e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}}} \,, \tag{6.9}$$

and the four original parameters (m, e_1, e_2, ξ) have thus combined into three independent quantities: ρ, θ and the vacuum energy

$$\mathcal{E}_0 = \frac{m\, e_2}{2} \left[\sqrt{1 + \frac{\xi^2}{2\, e_2^2}} - 1 \right] . \tag{6.10}$$

$$\mathcal{L} = \frac{\theta}{4}\, F \cdot \widetilde{F} - \frac{m\, e_2}{2} \left[\sqrt{1 + \frac{\xi^2}{2\, e_2^2}} - 1 \right] + \frac{\rho^2}{2} \left[1 - \sqrt{1 + \frac{1}{\rho^2}\, F_{\mu\nu}\, F^{\mu\nu} - \frac{1}{4\, \rho^4} \left(F \cdot \widetilde{F} \right)^2} \right] . \tag{6.8}$$

$$\rho^2 = m\, e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}} \,, \qquad \theta = \frac{e_1}{e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}}} \,, \tag{6.9}$$

$$\mathcal{E}_0 = \frac{m\, e_2}{2} \left[\sqrt{1 + \frac{\xi^2}{2\, e_2^2}} - 1 \right] . \tag{6.10}$$

We have that, from

$$9^3 + 10^3 = 12^3 + 1$$

the parameters are free, thence we put

m = 1, $e_1 = 9$, $e_2 = 10$, $\xi = 12$

$$\begin{aligned} \rho^2 &= m\, e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}}\,, \\ \theta &= \frac{e_1}{e_2 \sqrt{1 + \frac{\xi^2}{2\, e_2^2}}}\,, \end{aligned} \tag{6.9}$$

10*sqrt(1+(12^2)/(2*10^2))

Input interpretation:

$$10\sqrt{1+\frac{12^2}{2\times 10^2}}$$

Result:

$$2\sqrt{43}$$

Decimal approximation:

13.114877048604001304688219995272003255853932639767579539 73...

$13.114877\ldots = \rho^2$

9/(((10*sqrt(1+(12^2)/(2*10^2)))))

Input interpretation:

$$\frac{9}{10\sqrt{1+\frac{12^2}{2\times 10^2}}}$$

Result:

$$\frac{9}{2\sqrt{43}}$$

Decimal approximation:

0.68624356649672099850112779045027924013189182417388497591 6...

$0.686243566496\ldots = \theta$

Alternate form:

$$\frac{9\sqrt{43}}{86}$$

$$\mathcal{E}_0 = \frac{m\,e_2}{2}\left[\sqrt{1 + \frac{\xi^2}{2\,e_2^2}} - 1\right] . \qquad (6.10)$$

$m = 1$, $e_1 = 9$, $e_2 = 10$, $\xi = 12$

10/2* [sqrt(1+(12^2)/(2*10^2))-1]

Input interpretation:

$$\frac{10}{2}\left(\sqrt{1+\frac{12^2}{2\times 10^2}}-1\right)$$

Result:

$$5\left(\frac{\sqrt{43}}{5}-1\right)$$

Decimal approximation:

1.5574385243020006523441099976360016279269663198837897698 65...

1.5574385243…

Alternate form:

$$\sqrt{43}-5$$

1+1/((((10/2* [sqrt(1+(12^2)/(2*10^2))-1]))))-24*1/10^3

Input interpretation:

$$1+\frac{1}{\frac{10}{2}\left(\sqrt{1+\frac{12^2}{2\times 10^2}}-1\right)}-24\times\frac{1}{10^3}$$

Result:

$$\frac{122}{125}+\frac{1}{5\left(\frac{\sqrt{43}}{5}-1\right)}$$

Decimal approximation:

1.6180799180167778140191172220908889793292759066602105427 70...

1.618079918016… result that is a very good approximation to the value of the golden ratio 1,618033988749...

Alternate forms:

$$\frac{2821}{2250} + \frac{\sqrt{43}}{18}$$

$$\frac{2821 + 125\sqrt{43}}{2250}$$

$$\frac{122}{125} + \frac{1}{\sqrt{43} - 5}$$

Thence:

$$\begin{aligned} \mathcal{L} \;=\; & \frac{\theta}{4}\, F \cdot \widetilde{F} \;-\; \frac{m\, e_2}{2} \left[\sqrt{1 \,+\, \frac{\xi^2}{2\, e_2^2}} \;-\; 1 \right] \\ & +\; \frac{\rho^2}{2} \left[1 \;-\; \sqrt{1 \,+\, \frac{1}{\rho^2}\, F_{\mu\nu}\, F^{\mu\nu} \;-\; \frac{1}{4\,\rho^4} \left(F \cdot \widetilde{F} \right)^2 } \right] . \qquad (6.8) \end{aligned}$$

From

$$6^3 + 8^3 = 9^3 - 1$$

m = 1, $e_1 = 9$, $e_2 = 10$, $\xi = 12$, 13.114877… $= \rho^2$, 0.686243566496… $= \theta$

$\left(F \cdot \widetilde{F} \right) = 6$,

$\left(F_{\mu\nu}\, F^{\mu\nu} \right) = 8$

(0.68624356/4)*6-10/2[sqrt(1+(12^2)/(2*10^2))-1]+(13.114877/2)*[1-sqrt((1+(1/13.114877)*8-1/(4*13.114877^2)*6^2))]

Input interpretation:

$$\frac{0.68624356}{4}\times 6-\frac{10}{2}\left(\sqrt{1+\frac{12^2}{2\times 10^2}}-1\right)+\frac{13.114877}{2}\left(1-\sqrt{1+\frac{1}{13.114877}\times 8-\frac{1}{4\times 13.114877^2}\times 6^2}\right)$$

Result:

-2.1547506...

-2.1547506…

From which:

((((1/2*-((((0.68624356/4)*6-10/2[sqrt(1+(12^2)/(2*10^2))-1]+(13.114877/2)*[1-sqrt((1+(1/13.114877)*8-1/(4*13.114877^2)*6^2))])))))))^((5 π^3)/24)

Input interpretation:

$$\left(\frac{1}{2}\times(-1)\left(\frac{0.68624356}{4}\times 6-\frac{10}{2}\left(\sqrt{1+\frac{12^2}{2\times 10^2}}-1\right)+\frac{13.114877}{2}\left(1-\sqrt{1+\frac{1}{13.114877}\times 8-\frac{1}{4\times 13.114877^2}\times 6^2}\right)\right)\right)^{1/24\,(5\pi^3)}$$

Result:

1.618376...

1.618376... result that is a very good approximation to the value of the golden ratio 1,618033988749...

Thence:

$$D\;=\;-\;\frac{\xi\,m}{2\,e_2\,\sqrt{1\;+\;\frac{\xi^2}{2\,e_2^2}}}\,\sqrt{1\;+\;\frac{1}{m^2}\;F_{\mu\nu}\,F^{\mu\nu}\;-\;\frac{1}{4\,m^4}\,\Big(F\cdot\tilde{F}\Big)^2}\;.$$

For

$m = 1$, $e_1 = 9$, $e_2 = 10$, $\xi = 12$, $13.114877\ldots = \rho^2$, $0.686243566496\ldots = \theta$

$\left(F \cdot \tilde{F} \right) = 9,$

$\left(F_{\mu\nu} F^{\mu\nu} \right) = 1$

12/(2*10 * sqrt(1+(12^2)/(2*10^2)))*sqrt((1+1-1/4*9^2))

Input interpretation:

$$\frac{12}{2\times 10\sqrt{1+\frac{12^2}{2\times 10^2}}}\sqrt{1+1-\frac{1}{4}\times 9^2}$$

Result:

$$\frac{3}{2}\,i\sqrt{\frac{73}{43}}$$

Decimal approximation:

1.954422534116014820842628068262620987840438406211700050005... i

Polar coordinates:

$r \approx 1.95442$ (radius), $\theta = 90°$ (angle)

D = 1.95442

From

$$2\,|F|^2 + D^2 = m^2\left[1 - \frac{1}{\sqrt{1+\frac{\xi^2}{2\,e_2^2}}}\right]$$

2*x^2+1.9544225i^2 = (1- 1/((sqrt(1+(12^2)/(2*10^2)))))

Input interpretation:

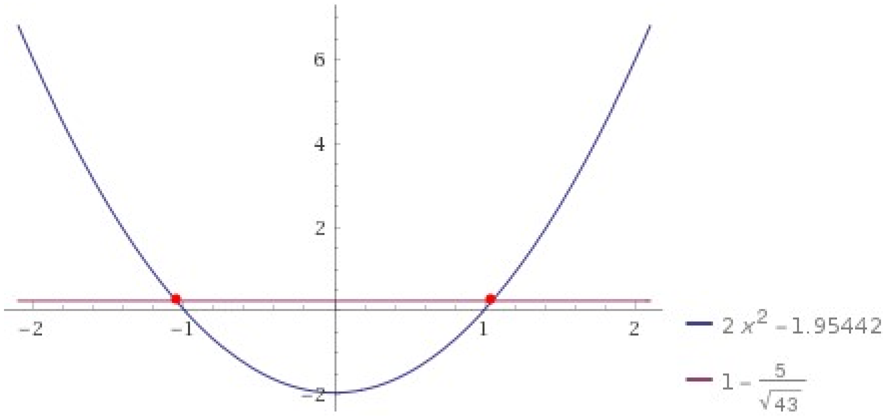
$$2\,x^2 + 1.9544225\,i^2 = 1 - \frac{1}{\sqrt{1+\frac{12^2}{2\times 10^2}}}$$

i is the imaginary unit

Result:

$$2x^2 - 1.95442 = 1 - \frac{5}{\sqrt{43}}$$

Plot:



Alternate forms:

$$2x^2 - 2.19193 = 0$$

$$2x^2 - 1.95442 = \frac{1}{43}\left(43 - 5\sqrt{43}\right)$$

$$2.\,(x - 0.98854)(x + 0.98854) = \frac{1}{43}\left(43 - 5\sqrt{43}\right)$$

Solutions:

$$x \approx -1.04688$$

$$x \approx 1.04688$$

1.04688

2*(1.04688)^2+1.9544225i^2 = (1- 1/((sqrt(1+(12^2)/(2*10^2)))))

2*(1.04688)^2+1.9544225i^2

Input interpretation:

$$2 \times 1.04688^2 + 1.9544225\, i^2$$

i is the imaginary unit

Result:

0.2374929688

0.2374929688…

(1-1/((sqrt(1+(12^2)/(2*10^2)))))

Input interpretation:

$$1-\frac{1}{\sqrt{1+\frac{12^2}{2\times 10^2}}}$$

Result:

$$1-\frac{5}{\sqrt{43}}$$

Decimal approximation:

0.237507148336976668332080232833023066520120195362350026759…

0.2375071483…

Alternate forms:

$$1-\frac{5\sqrt{43}}{43}$$

$$\frac{1}{43}\left(43-5\sqrt{43}\right)$$

$$\frac{\sqrt{43}-5}{\sqrt{43}}$$

We have that:

$$\Lambda^8 = \det\left(\mathcal{M}^\dagger \mathcal{M}\right) = \frac{1}{4}\left[e^2 + \left(m+\frac{1}{\sqrt{2}}\,\xi\right)^2\right]\left[e^2 + \left(m-\frac{1}{\sqrt{2}}\,\xi\right)^2\right] . \quad (5.13)$$

For e = 9, m = 10, ξ = 12

1/4(81+((10+12/(sqrt2))^2)) (81+((10-12/(sqrt2))^2))

Input:

$$\frac{1}{4}\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)$$

Result:

$$\frac{35\,209}{4}$$

Decimal form:

8802.25

8802.25

1/5(((1/4(81+((10+12/(sqrt2))^2)) (81+((10-12/(sqrt2))^2)))))-29-Pi+1/golden ratio

Input:

$$\frac{1}{5}\left(\frac{1}{4}\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)\right)-29-\pi+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}-29+\frac{1}{20}\left(81+\left(10-6\sqrt{2}\right)^2\right)\left(81+\left(10+6\sqrt{2}\right)^2\right)-\pi$$

Decimal approximation:

1728.926441335160101609741943451086135233523139780430657041...

1728.92644133…

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 (taxicab number)

Property:

$-29+\frac{1}{20}\left(81+\left(10-6\sqrt{2}\right)^2\right)\left(81+\left(10+6\sqrt{2}\right)^2\right)+\frac{1}{\phi}-\pi$ is a transcendental number

Alternate forms:

$$\frac{1}{20}\left(34619+10\sqrt{5}-20\pi\right)$$

$$\frac{1}{\phi}+\frac{34629}{20}-\pi$$

$$\frac{34619}{20}+\frac{\sqrt{5}}{2}-\pi$$

Expanded form:

$$\frac{34629}{20}+\frac{2}{1+\sqrt{5}}-\pi$$

Series representations:

$$\frac{\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)}{4\times 5}-29-\pi+\frac{1}{\phi}=$$
$$-\left(\left(-20736\,\phi+5472\,\phi\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2-\right.\right.$$
$$20\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4-$$
$$32181\,\phi\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4+$$
$$\left.20\,\phi\,\pi\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4\right)\Bigg/$$
$$\left.\left(20\,\phi\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4\right)\right)$$

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

$$\frac{\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)}{4\times 5}-29-\pi+\frac{1}{\phi}=$$

$$-\left(\left(-20\,736\,\phi+5472\,\phi\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2-\right.\right.$$
$$20\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4-$$
$$32\,181\,\phi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4+$$
$$\left.20\,\phi\,\pi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4\right)\Bigg/$$
$$\left.\left(20\,\phi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4\right)\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)}{4\times 5}-29-\pi+\frac{1}{\phi}=$$

$$-\left(\left(\left(\frac{1}{z_0}\right)^{-2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{-2-2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\right.\right.$$
$$\left(-20\,736\,\phi+5472\,\phi\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\right.$$
$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2-20\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$
$$z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4-$$
$$32\,181\,\phi\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$
$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4+20\,\phi\,\pi\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$
$$\left.\left.z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4\right)\right)\Bigg/$$
$$\left.\left(20\,\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4\right)\right)$$

(((((1/5(((1/4(81+((10+12/(sqrt2))^2)) (81+((10-12/(sqrt2))^2)))))-29-Pi+1/golden ratio)))))^1/15

Input:

$$\sqrt[15]{\frac{1}{5}\left(\frac{1}{4}\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)\right)-29-\pi+\frac{1}{\phi}}$$

ϕ is the golden ratio

Exact result:

$$\sqrt[15]{\frac{1}{\phi}-29+\frac{1}{20}\left(81+\left(10-6\sqrt{2}\right)^2\right)\left(81+\left(10+6\sqrt{2}\right)^2\right)-\pi}$$

Decimal approximation:

1.643810566352190399466617282272459954618902438169146807866...

1.64381056635… ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Property:

$$\sqrt[15]{-29+\frac{1}{20}\left(81+\left(10-6\sqrt{2}\right)^2\right)\left(81+\left(10+6\sqrt{2}\right)^2\right)+\frac{1}{\phi}-\pi}$$

is a transcendental number

Alternate forms:

$$\sqrt[15]{\frac{1}{20}\left(34619+10\sqrt{5}\right)-\pi}$$

$$\sqrt[15]{\frac{34629}{20}+\frac{2}{1+\sqrt{5}}-\pi}$$

$$\frac{\sqrt[15]{\frac{34619}{5}+2\sqrt{5}-4\pi}}{2^{2/15}}$$

All 15th roots of 1/ϕ - 29 + 1/20 (81 + (10 - 6 sqrt(2))^2) (81 + (10 + 6 sqrt(2))^2) - π:

$$e^0 \sqrt[15]{\frac{1}{\phi} - 29 + \frac{1}{20}\left(81 + \left(10 - 6\sqrt{2}\right)^2\right)\left(81 + \left(10 + 6\sqrt{2}\right)^2\right) - \pi} \approx 1.64381$$

(real, principal root)

$$e^{(2 i \pi)/15} \sqrt[15]{\frac{1}{\phi} - 29 + \frac{1}{20}\left(81 + \left(10 - 6\sqrt{2}\right)^2\right)\left(81 + \left(10 + 6\sqrt{2}\right)^2\right) - \pi}$$
$$\approx 1.5017 + 0.6686\, i$$

$$e^{(4 i \pi)/15} \sqrt[15]{\frac{1}{\phi} - 29 + \frac{1}{20}\left(81 + \left(10 - 6\sqrt{2}\right)^2\right)\left(81 + \left(10 + 6\sqrt{2}\right)^2\right) - \pi}$$
$$\approx 1.0999 + 1.2216\, i$$

$$e^{(2 i \pi)/5} \sqrt[15]{\frac{1}{\phi} - 29 + \frac{1}{20}\left(81 + \left(10 - 6\sqrt{2}\right)^2\right)\left(81 + \left(10 + 6\sqrt{2}\right)^2\right) - \pi} \approx 0.5080 + 1.5634\, i$$

$$e^{(8 i \pi)/15} \sqrt[15]{\frac{1}{\phi} - 29 + \frac{1}{20}\left(81 + \left(10 - 6\sqrt{2}\right)^2\right)\left(81 + \left(10 + 6\sqrt{2}\right)^2\right) - \pi}$$
$$\approx -0.17182 + 1.63481\, i$$

Series representations:

$$\sqrt[15]{\frac{\left(81 + \left(10 + \frac{12}{\sqrt{2}}\right)^2\right)\left(81 + \left(10 - \frac{12}{\sqrt{2}}\right)^2\right)}{4 \times 5} - 29 - \pi + \frac{1}{\phi}} =$$
$$\frac{1}{2^{2/15}\sqrt[15]{5}} \left(\left(\left(20\,736\,\phi - 5472\,\phi\,\sqrt{z_0}^2 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^2 + 20\,\sqrt{z_0}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4 + 32\,181\,\phi\,\sqrt{z_0}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4 - 20\,\phi\,\pi\,\sqrt{z_0}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4\right) \Big/ \left(\phi\,\sqrt{z_0}^4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2 - z_0)^k z_0^{-k}}{k!}\right)^4\right)\right) \hat{}\ (1/15)\right)$$

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

$$\sqrt[15]{\frac{\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)}{4\times 5}-29-\pi+\frac{1}{\phi}} = \frac{1}{2^{2/15}\sqrt[15]{5}}$$

$$\left(\left(\left(\left(20\,736\,\phi-5472\,\phi\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2+\right.\right.\right.\right.$$

$$20\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4+$$

$$32\,181\,\phi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4-$$

$$\left.\left.20\,\phi\,\pi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4\right)\right)\Big/$$

$$\left.\left(\phi\exp^4\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^4\right)\right)\hat{}$$

$$\left.(1/15)\right)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\sqrt[15]{\frac{\left(81+\left(10+\frac{12}{\sqrt{2}}\right)^2\right)\left(81+\left(10-\frac{12}{\sqrt{2}}\right)^2\right)}{4\times 5}-29-\pi+\frac{1}{\phi}} =$$

$$\frac{1}{2^{2/15}\sqrt[15]{5}}\left(\left(\left(\left(\frac{1}{z_0}\right)^{-2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{-2-2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\right.\right.\right.\right.$$

$$\left(20\,736\,\phi-5472\,\phi\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\right.$$

$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2+20\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$

$$z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4+$$

$$32\,181\,\phi\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$

$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4-20\,\phi\,\pi\left(\frac{1}{z_0}\right)^{2\lfloor\arg(2-z_0)/(2\pi)\rfloor}$$

$$\left.\left.z_0^{2+2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4\right)\right)\Big/$$

$$\left.\left(\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^4\right)\right)\hat{}\,(1/15)\right)$$

Integral representation:

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

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

We take again the previous expression:

$$\mathcal{L} = \frac{\theta}{4}\,F\cdot\widetilde{F} - \frac{m\,e_2}{2}\left[\sqrt{1+\frac{\xi^2}{2\,e_2^2}} - 1\right] + \frac{\rho^2}{2}\left[1 - \sqrt{1+\frac{1}{\rho^2}\,F_{\mu\nu}\,F^{\mu\nu} - \frac{1}{4\,\rho^4}\left(F\cdot\widetilde{F}\right)^2}\,\right]. \qquad (6.8)$$

From

$$6^3 + 8^3 = 9^3 - 1$$

$$135^3 + 138^3 = 172^3 - 1$$

$$791^3 + 812^3 = 1010^3 - 1$$

$m = 1$, $e_1 = 135$, $e_2 = 138$, $\xi = 172$, $183.945644 = \rho^2$, $0.7339124589 = \theta$

$\left(F\cdot\widetilde{F}\right) = 791$,

$\left(F_{\mu\nu}\,F^{\mu\nu}\right) = 812$

$m = 1$, $e_1 = 135$, $e_2 = 138$, $\xi = 172$

$$\rho^2 = m\,e_2 \sqrt{1 + \frac{\xi^2}{2\,e_2^2}}\,,$$
$$\theta = \frac{e_1}{e_2 \sqrt{1 + \frac{\xi^2}{2\,e_2^2}}}\,, \qquad (6.9)$$

138*sqrt(1+(172^2)/(2*138^2))

Input:

$$138 \sqrt{1 + \frac{172^2}{2 \times 138^2}}$$

Result:

$$2\sqrt{8459}$$

Decimal approximation:

183.94564414522024772413496144257940283591288310873646692 35...

183.945644...

135/(((138*sqrt(1+(172^2)/(2*138^2)))))

Input:

$$\frac{135}{138 \sqrt{1 + \frac{172^2}{2 \times 138^2}}}$$

Result:

$$\frac{135}{2\sqrt{8459}}$$

Decimal approximation:

0.73391245890781219537646943476617269721149778991841302265 8...

0.7339124589…..

Alternate form:

$$\frac{135\sqrt{8459}}{16918}$$

Now:

$$\mathcal{L} = \frac{\theta}{4} F \cdot \widetilde{F} - \frac{m\, e_2}{2}\left[\sqrt{1 + \frac{\xi^2}{2\, e_2^2}} - 1\right] + \frac{\rho^2}{2}\left[1 - \sqrt{1 + \frac{1}{\rho^2} F_{\mu\nu} F^{\mu\nu} - \frac{1}{4\,\rho^4}\left(F \cdot \widetilde{F}\right)^2}\,\right] . \tag{6.8}$$

m = 1, e_1 = 135, e_2 = 138, ξ = 172, 183.945644 = ρ^2, 0.7339124589 = θ

$\left(F \cdot \widetilde{F}\right)$ = 791,

$\left(F_{\mu\nu} F^{\mu\nu}\right)$ = 812

(0.7339124589/4)*791-138/2[sqrt(1+(172^2)/(2*138^2))-1]+(183.945644/2)*[1-sqrt((1+(1/183.945644)*812-1/(4*183.945644^2)*791^2))]

Input interpretation:

$$\frac{0.7339124589}{4} \times 791 - \frac{138}{2}\left(\sqrt{1 + \frac{172^2}{2 \times 138^2}} - 1\right) + \frac{183.945644}{2}\left(1 - \sqrt{1 + \frac{1}{183.945644} \times 812 - \frac{1}{4 \times 183.945644^2} \times 791^2}\right)$$

Result:

132.30880...

132.30880…

(0.7339124589/4)*791-138/2[sqrt(1+(172^2)/(2*138^2))-1]+(183.945644/2)*[1-sqrt((1+(1/183.945644)*812-1/(4*183.945644^2)*791^2))]+5

Input interpretation:

$$\frac{0.7339124589}{4}\times 791-\frac{138}{2}\left(\sqrt{1+\frac{172^2}{2\times 138^2}}-1\right)+\frac{183.945644}{2}\left(1-\sqrt{1+\frac{1}{183.945644}\times 812-\frac{1}{4\times 183.945644^2}\times 791^2}\right)+5$$

Result:

137.30880...

137.3088…

This result is very near to the inverse of fine-structure constant 137,035

(0.7339124589/4)*791-138/2[sqrt(1+(172^2)/(2*138^2))-1]+(183.945644/2)*[1-sqrt((1+(1/183.945644)*812-1/(4*183.945644^2)*791^2))]+7

Input interpretation:

$$\frac{0.7339124589}{4}\times 791-\frac{138}{2}\left(\sqrt{1+\frac{172^2}{2\times 138^2}}-1\right)+\frac{183.945644}{2}\left(1-\sqrt{1+\frac{1}{183.945644}\times 812-\frac{1}{4\times 183.945644^2}\times 791^2}\right)+7$$

Result:

139.30880...

139.3088… result practically equal to the rest mass of Pion meson 139.57 MeV

(0.7339124589/4)*791-138/2[sqrt(1+(172^2)/(2*138^2))-1]+(183.945644/2)*[1-sqrt((1+(1/183.945644)*812-1/(4*183.945644^2)*791^2))]-7

Input interpretation:

$$\frac{0.7339124589}{4}\times 791-\frac{138}{2}\left(\sqrt{1+\frac{172^2}{2\times 138^2}}-1\right)+\frac{183.945644}{2}\left(1-\sqrt{1+\frac{1}{183.945644}\times 812-\frac{1}{4\times 183.945644^2}\times 791^2}\right)-7$$

Result:

125.30880...

125.3088… 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

Now, we analyze the following equation:

$$Z = \frac{\left(\overline{F} + m\right)\psi\psi - i\sqrt{2}\,D\,\psi\,\lambda + F\,\lambda\lambda}{\left[D^2 + 2F\left(\overline{F} + m\right)\right]} . \qquad (2.3)$$

For $\bar{F} = 135$, F = 138, D = 172, m = 791, $\psi = 6$ and $\lambda = 8$

(((135+791)*36-i*sqrt2*172*48+138*64)) / ((172^2+2*138(135+791)))

Input:

$$\frac{(135+791)\times 36 - i\sqrt{2}\times 172\times 48+138\times 64}{172^2+2\times 138\,(135+791)}$$

i is the imaginary unit

Result:

$$\frac{42\,168 - 8256\, i\sqrt{2}}{285\,160}$$

Decimal approximation:

0.147874877261888062841913311824940384345630523215037 1721... −
0.040944547520522768701454418947521627635963006743975 60419... i

Polar coordinates:

$r \approx 0.153439$ (radius), $\theta \approx -15.4767°$ (angle)

0.153439

Alternate forms:

$$\frac{3\left(1757 - 344\, i \sqrt{2}\right)}{35\,645}$$

$$\frac{5271}{35\,645} - \frac{1032\, i \sqrt{2}}{35\,645}$$

$$\frac{5271 - 1032\, i \sqrt{2}}{35\,645}$$

Minimal polynomial:

$$1\,270\,566\,025\, x^2 - 375\,769\,590\, x + 29\,913\,489$$

21*1/((((((135+791)*36-i*sqrt2*172*48+138*64)) / ((172^2+2*138(135+791))))))+1/golden ratio

Input:

$$21 \times \frac{1}{\frac{(135+791)\times 36 - i\sqrt{2}\times 172\times 48 + 138\times 64}{172^2 + 2\times 138\,(135+791)}} + \frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Result:

$$\frac{1}{\phi} + \frac{5\,988\,360}{42\,168 - 8256\, i \sqrt{2}}$$

Decimal approximation:

132.5177496989433798007622774467846708825041162442374645 60... +
36.5212419975502898766181507218225864113032403221358363944... i

Polar coordinates:

$r \approx 137.458$ (radius), $\theta \approx 15.4079°$ (angle)

137.458

This result is very near to the inverse of fine-structure constant 137,035

Alternate forms:

$$\frac{873\,471\,989 + 171\,666\,320\, i \sqrt{2} + 3\,323\,721 \sqrt{5}}{6\,647\,442}$$

$$\frac{1}{\phi} + \frac{438\,397\,855}{3\,323\,721} + \frac{85\,833\,160\, i \sqrt{2}}{3\,323\,721}$$

$$\frac{873\,471\,989 + \sqrt{5 \left(-11\,776\,683\,047\,651\,119 + 228\,228\,381\,110\,688\, i \sqrt{10}\right)}}{6\,647\,442}$$

Minimal polynomial:

$$11\,047\,121\,285\,841\, x^4 - 5\,806\,354\,385\,502\,138\, x^3 + 1\,173\,871\,680\,970\,551\,979\, x^2 - 107\,989\,112\,788\,086\,355\,722\, x + 3\,821\,293\,216\,766\,910\,151\,201$$

Series representations:

$$\frac{21}{\frac{(135+791)\,36 - i\left(\sqrt{2}\;172 \times 48\right) + 138 \times 64}{172^2 + 2 \times 138\,(135+791)}} + \frac{1}{\phi} = \frac{1}{\phi} - \frac{249\,515}{-1757 + 344\, i \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{21}{\frac{(135+791)\,36 - i\left(\sqrt{2}\;172 \times 48\right) + 138 \times 64}{172^2 + 2 \times 138\,(135+791)}} + \frac{1}{\phi} = \frac{1}{\phi} - \frac{249\,515}{-1757 + 344\, i \exp\left(\pi \mathcal{A} \left\lfloor \frac{\arg(2-x)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{21}{\frac{(135+791)\,36 - i\left(\sqrt{2}\;172 \times 48\right) + 138 \times 64}{172^2 + 2 \times 138\,(135+791)}} + \frac{1}{\phi} = \frac{1}{\phi} + \frac{5\,988\,360}{42\,168 - 8256\, i \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi) \rfloor} z_0^{1/2 (1 + \lfloor \arg(2-z_0)/(2\pi) \rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}$$

21*1/((((((135+791)*36-i*sqrt2*172*48+138*64)) / ((172^2+2*138(135+791))))))+golden ratio^2

Input:

$$21 \times \frac{1}{\frac{(135+791)\times 36 - i\sqrt{2}\times 172\times 48 + 138\times 64}{172^2 + 2\times 138\,(135+791)}} + \phi^2$$

i is the imaginary unit

ϕ is the golden ratio

Result:

$$\phi^2 + \frac{5\,988\,360}{42\,168 - 8256\, i\sqrt{2}}$$

Decimal approximation:

134.51774969894337980076227744678467088250411624423746 4560... + 36.521241997550289876618150721822586411303240322135836 3944... i

Polar coordinates:

$r \approx 139.387$ (radius), $\theta \approx 15.1895°$ (angle)

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

Alternate forms:

$$\frac{1\,773\,533\,746 + 343\,332\,640\, i\sqrt{2} + 6\,647\,442\sqrt{5}}{13\,294\,884}$$

$$\phi^2 + \frac{438\,397\,855}{3\,323\,721} + \frac{85\,833\,160\, i\sqrt{2}}{3\,323\,721}$$

$$\phi^2 + \frac{249\,515\, i}{344\sqrt{2} + 1757\, i}$$

Minimal polynomial:

$$11\,047\,121\,285\,841\, x^4 - 5\,894\,731\,355\,788\,866\, x^3 + 1\,208\,974\,938\,194\,424\,991\, x^2 - 112\,754\,629\,272\,475\,736\,206\, x + 4\,042\,013\,556\,655\,989\,661\,121$$

Expanded form:

$$\frac{3}{2} + \frac{\sqrt{5}}{2} + \frac{5\,988\,360}{42\,168 - 8256\, i\sqrt{2}}$$

Series representations:

$$\frac{21}{\frac{(135+791)\,36-i\left(\sqrt{2}\;172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}}+\phi^2 = \phi^2 - \frac{249\,515}{-1757+344\,i\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k\,z_0^{-k}}{k!}}$$

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

$$\frac{21}{\frac{(135+791)\,36-i\left(\sqrt{2}\;172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}}+\phi^2 = \phi^2 - \frac{249\,515}{-1757+344\,i\,\exp\left(\pi\,\mathcal{A}\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k (2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{21}{\frac{(135+791)\,36-i\left(\sqrt{2}\;172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}}+\phi^2 = \phi^2 + \frac{5\,988\,360}{42\,168-8256\,i\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k\,z_0^{-k}}{k!}}$$

21*1/((((((135+791)*36-i*sqrt2*172*48+138*64)) / ((172^2+2*138(135+791))))))-11 - 1/golden ratio

Input:

$$21\times\frac{1}{\frac{(135+791)\times 36-i\,\sqrt{2}\times 172\times 48+138\times 64}{172^2+2\times 138\,(135+791)}}-11-\frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Result:

$$-\frac{1}{\phi}-11+\frac{5\,988\,360}{42\,168-8256\,i\,\sqrt{2}}$$

Decimal approximation:

120.281681721443590104353103778053394647063497884625938836... +
36.5212419975502898766181507218225864113032403221358363944... i

Polar coordinates:

$r \approx 125.704$ (radius), $\theta \approx 16.8899°$ (angle)

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

Alternate forms:

$$\frac{806\,997\,569 + 171\,666\,320\,i\sqrt{2} - 3\,323\,721\sqrt{5}}{6\,647\,442}$$

$$-\frac{1}{\phi} + \frac{401\,836\,924}{3\,323\,721} + \frac{85\,833\,160\,i\sqrt{2}}{3\,323\,721}$$

$$-\frac{1}{\phi} - 11 + \frac{249\,515\,i}{344\sqrt{2} + 1757\,i}$$

Minimal polynomial:

$$11\,047\,121\,285\,841\,x^4 - 5\,364\,469\,534\,068\,498\,x^3 + 1\,006\,309\,322\,176\,992\,439\,x^2 - 86\,209\,396\,999\,182\,593\,542\,x + 2\,853\,093\,373\,810\,458\,063\,881$$

Series representations:

$$\frac{21}{\frac{(135+791)36-i\left(\sqrt{2}\ 172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}} - 11 - \frac{1}{\phi} = -11 - \frac{1}{\phi} - \frac{249\,515}{-1757 + 344\,i\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{21}{\frac{(135+791)36-i\left(\sqrt{2}\ 172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}} - 11 - \frac{1}{\phi} = -11 - \frac{1}{\phi} - \frac{249\,515}{-1757 + 344\,i\exp\left(\pi\,\mathcal{A}\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{21}{\frac{(135+791)36-i\left(\sqrt{2}\ 172\times 48\right)+138\times 64}{172^2+2\times 138\,(135+791)}} - 11 - \frac{1}{\phi} = -11 - \frac{1}{\phi} + \frac{5\,988\,360}{42\,168 - 8256\,i\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}$$

From:

$$\left[D^2 + 2\,F(\overline{F}+m) - \frac{1}{2}\,F_{\mu\nu}\,F^{\mu\nu} - \frac{i}{2}\,F_{\mu\nu}\,\widetilde{F}^{\mu\nu} - 2\,i\,\psi\,\sigma^{\mu}\,\partial_{\mu}\bar{\psi} - 2\,i\,\lambda\,\sigma^{\mu}\,\partial_{\mu}\bar{\lambda} + Z\Box\bar{Z}\right] Z$$
$$= (\overline{F}+m)\,\psi\,\psi - i\sqrt{2}\,\psi\,(D + i\,\sigma^{\mu\nu}F_{\mu\nu})\,\lambda + F\,\lambda\,\lambda\,. \qquad (2.5)$$

For

$$\left(\sigma^{\mu\nu}F_{\mu\nu}\right) = 9$$

$\bar{F} = 135$, F = 138, D = 172, m = 791, $\psi = 6$ and $\lambda = 8$, we obtain:

(135+791)*36-i*sqrt2*6(172+i*9)8+138*64

Input:

$(135+791)\times 36 - i\sqrt{2}\times 6\,(172+i\times 9)\times 8 + 138\times 64$

i is the imaginary unit

Exact result:

$42\,168 + (432 - 8256\,i)\sqrt{2}$

Decimal approximation:

42778.940258945177061082329528858589569942098250162841567 6... −
11675.747170952272722906742107075267336671211003112083292 1... i

Polar coordinates:

$r \approx 44\,343.7$ (radius), $\theta \approx -15.266°$ (angle)

44343.7

Alternate forms:

$24\left(1757 + (18 - 344\,i)\sqrt{2}\right)$

$-24\,i\left(1757\,i + (344 + 18\,i)\sqrt{2}\right)$

Minimal polynomial:

$x^4 - 168\,672\,x^3 + 10\,940\,740\,992\,x^2 - 322\,853\,396\,576\,256\,x +$
$3\,663\,944\,241\,108\,553\,728$

sqrt((((135+791)*36-i*sqrt2*6(172+i*9)8+138*64))) - 76 + golden ratio

Input:

$$\sqrt{(135+791)\times 36 - i\sqrt{2}\times 6\,(172+i\times 9)\times 8 + 138\times 64} - 76 + \phi$$

i is the imaginary unit

ϕ is the golden ratio

Exact result:

$$\phi - 76 + \sqrt{42\,168 + (432 - 8256\,i)\sqrt{2}}$$

Decimal approximation:

134.33148257791689762399910638638769306136232565656815384 9... −
27.970759071531835715325321357244242578193117381334665871 1... i

Alternate forms:

$$\phi - 76 + 2\sqrt{-6\,i\left(1757\,i + (344 + 18\,i)\sqrt{2}\right)}$$

$$-76 + \sqrt{42\,168 + (432 - 8256\,i)\sqrt{2}} + \frac{1}{2}\left(1 + \sqrt{5}\right)$$

$$\frac{1}{2}\left(-151 + \sqrt{5} + 4\sqrt{6\left(1757 + (18 - 344\,i)\sqrt{2}\right)}\right)$$

Minimal polynomial:

$$x^{16} + 1208\,x^{15} + 346\,676\,x^{14} - 115\,576\,608\,x^{13} - 65\,522\,373\,478\,x^{12} + 3\,470\,130\,909\,400\,x^{11} + 5\,110\,426\,217\,831\,920\,x^{10} - 5\,391\,769\,084\,098\,744\,x^{9} - 240\,941\,606\,544\,823\,322\,909\,x^{8} + 1\,063\,530\,850\,072\,133\,771\,928\,x^{7} + 7\,359\,544\,784\,245\,025\,267\,163\,760\,x^{6} - 248\,998\,063\,268\,748\,510\,137\,121\,016\,x^{5} - 133\,003\,829\,033\,117\,584\,189\,840\,197\,478\,x^{4} + 10\,207\,582\,510\,085\,013\,596\,119\,294\,083\,936\,x^{3} + 932\,043\,793\,368\,646\,797\,512\,487\,391\,971\,572\,x^{2} - 138\,735\,865\,948\,840\,903\,501\,100\,014\,118\,326\,040\,x + 4\,616\,372\,529\,171\,231\,109\,523\,019\,237\,787\,501\,441$$

Expanded form:

$$-\frac{151}{2} + \frac{\sqrt{5}}{2} + \sqrt{42\,168 + (432 - 8256\,i)\sqrt{2}}$$

Series representations:

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\phi = -76+\phi+\sqrt{42\,167-48\,i\,(172+9\,i)\,\sqrt{2}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(42\,167-48\,i\,(172+9\,i)\,\sqrt{2}\right)^{-k}$$

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\phi = -76+\phi+\sqrt{42\,167-48\,i\,(172+9\,i)\,\sqrt{2}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,167-48\,i\,(172+9\,i)\,\sqrt{2}\right)^{-k}}{k!}$$

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\phi = -76+\phi+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,168-48\,i\,(172+9\,i)\,\sqrt{2}-z_0\right)^k z_0^{-k}}{k!}$$

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

Input interpretation:

$134.331482577916897+i\times(-27.970759071531835)$

i is the imaginary unit

Result:

$134.331482577916897\ldots-$
$27.970759071531835\ldots\,i$

Polar coordinates:

$r=137.212647283764886$ (radius), $\theta=-11.762170759128570°$ (angle)

137.212647283764886

This result is very near to the inverse of fine-structure constant 137,035

Possible closed forms:

$$\frac{388\,290\,\pi^2-3\,156\,623}{1601\,\pi}+i\left(-\frac{9417}{44}-\frac{1137}{4\,\pi}+\frac{3873\,\pi}{44}\right)\approx$$
$$134.33148257791689918869297\,67-27.970759071531834462660014\,40\,i$$

$$\frac{388\,290\,\pi^2 - 3\,156\,623}{1601\,\pi} - \frac{158\,849\,594\,i\,\pi}{17\,841\,515} \approx$$
$$134.33148257791689918869297\,67 - 27.970759071531834514823213\,48\,i$$

$$\frac{388\,290\,\pi^2 - 3\,156\,623}{1601\,\pi} - i\,\pi\,\boxed{\text{root of } 551\,x^3 - 3734\,x^2 - 10\,658\,x + 2007 \text{ near } x = 8.90337} \approx$$
$$134.33148257791689918869297\,67 - 27.970759071531838765285103\,41\,i$$

sqrt((((135+791)*36-i*sqrt2*6(172+i*9)8+138*64))) - 76 + Pi + 1/golden ratio

Input:

$$\sqrt{(135+791)\times 36 - i\sqrt{2}\times 6\,(172 + i\times 9)\times 8 + 138\times 64} - 76 + \pi + \frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi} - 76 + \sqrt{42\,168 + (432 - 8256\,i)\sqrt{2}} + \pi$$

Decimal approximation:

136.47307523150669086246174976966719594555949505594325967 0... –
27.9707590715318357153253213572442425781931173813346658711... i

Input interpretation:

136.473075231506690862461749769667195945559495055943259670 +
i × (–27.9707590715318357153253213572442425781931173813346658711)

i is the imaginary unit

Result:

136.47307523150669086246174976966719594555949505594325967... –
27.9707590715318357153253213572442425781931173813346658711... i

Polar coordinates:

r = 139.30995522999124668157134336596559640627106952299695312 7 (radius), θ = –11.5826196186533517274809410373457047541531860383565244065° (angle)

139.30995522… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$$-76+\sqrt{42\,168+(432-8256\,i)\sqrt{2}}+\frac{1}{\phi}+\pi \text{ is a transcendental number}$$

Alternate forms:

$$\frac{1}{\phi}-76+2\sqrt{-6\,i\left(1757\,i+(344+18\,i)\sqrt{2}\right)}+\pi$$

$$-76+\sqrt{42\,168+(432-8256\,i)\sqrt{2}}+\frac{2}{1+\sqrt{5}}+\pi$$

$$\frac{1+\left(-76+2\sqrt{-6\,i\left(1757\,i+(344+18\,i)\sqrt{2}\right)}+\pi\right)\phi}{\phi}$$

Series representations:

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\pi+\frac{1}{\phi}=$$
$$-76+\frac{1}{\phi}+\pi+\sqrt{42\,167-48\,i\,(172+9\,i)\sqrt{2}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(42\,167-48\,i\,(172+9\,i)\sqrt{2}\right)^{-k}$$

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\pi+\frac{1}{\phi}=-76+\frac{1}{\phi}+\pi+$$
$$\sqrt{42\,167-48\,i\,(172+9\,i)\sqrt{2}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,167-48\,i\,(172+9\,i)\sqrt{2}\right)^{-k}}{k!}$$

$$\sqrt{(135+791)\,36-i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right)+138\times 64}-76+\pi+\frac{1}{\phi}=$$
$$-76+\frac{1}{\phi}+\pi+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,168-48\,i\,(172+9\,i)\sqrt{2}-z_0\right)^k z_0^{-k}}{k!}$$
$$\text{for not } \left((z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0)\right)$$

sqrt((((135+791)*36-i*sqrt2*6(172+i*9)8+138*64))) - 76 - 11 + 1/golden ratio

Input:

$$\sqrt{(135+791)\times 36-i\sqrt{2}\times 6\,(172+i\times 9)\times 8+138\times 64}-76-11+\frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Exact result:

$$\frac{1}{\phi} - 87 + \sqrt{42\,168 + (432 - 8256\, i)\sqrt{2}}$$

Decimal approximation:

122.3314825779168976239991063863876930613623256565681538 49... −
27.970759071531835715325321357244242578193117381334665871 1... i

Input interpretation:

122.331482577916897623999106386387693061362325656568153849 +
i×(−27.9707590715318357153253213572442425781931173813346658711)

i is the imaginary unit

Result:

122.331482577916897623999106386387693061362325656568153849... −
27.9707590715318357153253213572442425781931173813346658711... i

Polar coordinates:

r = 125.48846557651769268333223832822421719136926534245982598 0 (radius)
, θ = −12.8791309301633948619443573576222302779012121876264002912° (angle)

125.4884655… result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{\phi} - 87 + 2\sqrt{-6\, i\left(1757\, i + (344 + 18\, i)\sqrt{2}\right)}$$

$$-87 + \sqrt{42\,168 + (432 - 8256\, i)\sqrt{2}} + \frac{2}{1+\sqrt{5}}$$

$$\frac{1 + \left(-87 + 2\sqrt{-6\, i\left(1757\, i + (344 + 18\, i)\sqrt{2}\right)}\right)\phi}{\phi}$$

Minimal polynomial:

$$x^{16} + 1400 x^{15} + 581\,396 x^{14} - 38\,102\,400 x^{13} - 78\,021\,964\,582 x^{12} - 7\,009\,911\,998\,600 x^{11} + 4\,896\,762\,418\,955\,920 x^{10} + 608\,911\,425\,815\,805\,000 x^{9} - 208\,125\,114\,950\,840\,552\,381 x^{8} - 21\,024\,829\,632\,030\,485\,104\,200 x^{7} + 6\,499\,087\,370\,545\,245\,487\,041\,424 x^{6} + 261\,099\,074\,041\,134\,820\,576\,622\,600 x^{5} - 132\,329\,443\,147\,684\,294\,901\,286\,606\,982 x^{4} + 3\,716\,622\,609\,687\,606\,981\,270\,942\,868\,800 x^{3} + 1\,182\,573\,387\,274\,351\,073\,036\,068\,558\,362\,164 x^{2} - 112\,891\,336\,700\,223\,187\,140\,006\,648\,129\,183\,800 x + 3\,100\,597\,130\,804\,053\,943\,766\,635\,399\,215\,593\,889$$

Series representations:

$$\sqrt{(135+791)\,36 - i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right) + 138\times 64} - 76 - 11 + \frac{1}{\phi} = -87 + \frac{1}{\phi} + \sqrt{42\,167 - 48\,i\,(172+9\,i)\sqrt{2}}\;\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(42\,167 - 48\,i\,(172+9\,i)\sqrt{2}\right)^{-k}$$

$$\sqrt{(135+791)\,36 - i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right) + 138\times 64} - 76 - 11 + \frac{1}{\phi} = -87 + \frac{1}{\phi} + \sqrt{42\,167 - 48\,i\,(172+9\,i)\sqrt{2}}\;\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,167 - 48\,i\,(172+9\,i)\sqrt{2}\right)^{-k}}{k!}$$

$$\sqrt{(135+791)\,36 - i\left(\sqrt{2}\;6\,(172+i\,9)\,8\right) + 138\times 64} - 76 - 11 + \frac{1}{\phi} = -87 + \frac{1}{\phi} + \sqrt{z_0}\;\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(42\,168 - 48\,i\,(172+9\,i)\sqrt{2} - z_0\right)^{k} z_0^{-k}}{k!}$$

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

From:

Two–Field Born–Infeld with Diverse Dualities
S. Ferrara, A. Sagnotti and A. Yeranyan - arXiv:1602.04566v3 [hep-th] 8 Jul 2016

In addressing generalized dualities, it is convenient to rely on "master actions" that combine the dynamical curvature $F_{\alpha\beta}$ and the auxiliary field $V_{\alpha\beta}$ with their complex conjugates. For the one–field systems of interest in this section, these are built integrating over space time the Lagrangians

$$\mathcal{L} = \frac{1}{2}\left(\phi+\overline{\phi}\right) - 2h\left(F\cdot V+\overline{F}\cdot\overline{V}\right) + h^2\left(\nu + \overline{\nu}\right)+E(\nu,\overline{\nu}) . \tag{2.12}$$

These rest on generic Lorentz–invariant interaction terms $E(\nu,\overline{\nu})$, and extend slightly the result of the second paper in [39], since they also involve the duality–invariant scalar "lapse function" $h(a)$, which will prove very useful in the following. The BI action is a special case, and is recovered if

$$E = 2a\frac{1+a}{(1-a)^2} , \tag{2.13}$$

$$h = \frac{\sqrt{2}}{1-a} . \tag{2.14}$$

From:

$$\mathcal{L} = \frac{1}{2}\left(\phi+\overline{\phi}\right) - 2h\left(F\cdot V+\overline{F}\cdot\overline{V}\right) + h^2\left(\nu + \overline{\nu}\right)+E(\nu,\overline{\nu}) .$$

$$9^3+10^3=12^3+1$$
$$6^3+8^3=9^3-1$$

$$135^3+138^3=172^3-1$$

$\bar{\phi}=6$; $\phi=8$; $F=9$; $\bar{F}=10$; $V=12$; $\bar{V}=135$; $\nu=138$; $\bar{\nu}=172$

$$E = 2a\frac{1+a}{(1-a)^2} ,$$
$$h = \frac{\sqrt{2}}{1-a} .$$

For a = 3, we obtain:

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

Input:

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

Result:

6

6

sqrt2/(1-3)

Input:

$$\frac{\sqrt{2}}{1-3}$$

Result:

$$-\frac{1}{\sqrt{2}}$$

Decimal approximation:

−0.7071067811865475244008443621048490392848359376884740365 8...

-0.7071067811...

$$\mathcal{L} \;=\; \frac{1}{2}\,\left(\phi+\overline{\phi}\right)\;-\;2\,h\,\left(F\cdot V+\overline{F}\cdot\overline{V}\right)\;+\;h^2\,\left(\nu\;+\;\overline{\nu}\right)+E\big(\nu,\overline{\nu}\big)\;.$$

For $\bar{\phi} = 6$; $\phi = 8$; $F = 9$; $\bar{F} = 10$; $V = 12$; $\bar{V} = 135$; $\nu = 138$; $\bar{\nu} = 172$

1/2 (8+6)-2*(-0.7071067811)*(9*12+10*135)+(-0.7071067811)^2*(138+172)+6*(138,172)

Input interpretation:

$$\frac{1}{2}\,(8+6) - 2 \times (-0.7071067811)\,(9 \times 12 + 10 \times 135) + (-0.7071067811)^2\,(138+172) + 6\,\{138,\,172\}$$

Result:

{3051.92, 3255.92}

Difference:

3255.92 − 3051.92 = 204

Ratio:

$$\frac{3051.92}{3255.92} = 0.937345$$

0.937345

Note that:

(0.937345)^1/128

Input interpretation:

$$\sqrt[128]{0.937345}$$

Result:

0.99949463...

0.99949463… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

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

Total:

3051.92 + 3255.92 = 6307.85

Vector length:

4462.65

Normalized vector:

$(0.683881, 0.729594)$

Angles between vector and coordinate axes:

horizontal: 46.8523° | vertical: 43.1477°

Polar coordinates:

$r = 4462.65$ (radius), $\theta = 46.8523°$ (angle)

4462.65

3*(((1/2 (8+6)-2*(-0.7071067811)*(9*12+10*135)+(-0.7071067811)^2*(138+172)+6*(138,172))))+610+5+1/golden ratio

Input interpretation:

$$3\left(\frac{1}{2}(8+6)-2\times(-0.7071067811)(9\times 12+10\times 135)+(-0.7071067811)^2(138+172)+6\{138, 172\}\right)+610+5+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$\{9771.39, 10\,383.4\}$

Difference:

$10\,383.4 - 9771.39 = 612$

Ratio:

$$\frac{9771.39}{10\,383.4} = 0.94106$$

0.94106

Note that:

(0.94106)^1/64

Input:

$$\sqrt[64]{0.94106}$$

Result:

0.99905126...

0.99905126... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

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

Total:

$9771.39 + 10\,383.4 = 20\,154.8$

Vector length:

14 258.1

Normalized vector:

(0.68532, 0.728242)

Angles between vector and coordinate axes:

horizontal: 46.7393° | vertical: 43.2607°

Polar coordinates:

$r = 14\,258.1$ (radius), $\theta = 46.7393°$ (angle)

14258.1 ≈ 14258 (Ramanujan taxicab number)

1/4(((1/2 (8+6)-2*(-0.7071067811)*(9*12+10*135)+(-0.7071067811)^2*(138+172)+6*(138,172))))-18*4-golden ratio^2

Input interpretation:

$$\frac{1}{4}\left(\frac{1}{2}(8+6)-2\times(-0.7071067811)(9\times12+10\times135)+(-0.7071067811)^2(138+172)+6\{138,172\}\right)-18\times4-\phi^2$$

ϕ is the golden ratio

Result:

$\{688.363, 739.363\}$

Difference:

$739.363-688.363=51$

Ratio:

$$\frac{688.363}{739.363}=0.931022$$

0.931022

Note that:

(0.931022)^1/128

Input interpretation:

$\sqrt[128]{0.931022}$

Result:

0.99944178...

0.99944178… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

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

Total:

$688.363 + 739.363 = 1427.73$

Vector length:

1010.2

Normalized vector:

(0.681414, 0.731899)

Angles between vector and coordinate axes:

horizontal: 47.0458° | vertical: 42.9542°

Polar coordinates:

$r = 1010.2$ (radius), $\theta = 47.0458°$ (angle)

1010.2 ≈ 1010 (Ramanujan taxicab number)

Conclusions

Note that:

$$g_{22} = \sqrt{(1+\sqrt{2})}.$$

Hence

$$\begin{aligned} 64 g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276 e^{-\pi\sqrt{22}} - \cdots, \\ 64 g_{22}^{-24} &= \qquad\qquad 4096 e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

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

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Thence:

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

And

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

That are connected with 64, 128, 256, 512, 1024 and 4096 = 64^2

(**Modular equations and approximations to π -** *S. Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372)

DILATON VALUE CALCULATIONS 0.989117352243

from:

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

We have that:

5. Since G_n and g_n can be expressed as roots of algebraical equations with rational coefficients, the same is true of G_n^{24} or g_n^{24}. So let us suppose that

$$1 = ag_n^{-24} - bg_n^{-48} + \cdots,$$

or

$$g_n^{24} = a - bg_n^{-24} + \cdots.$$

But we know that

$$\begin{aligned} 64e^{-\pi\sqrt{n}}g_n^{24} &= 1 - 24e^{-\pi\sqrt{n}} + 276e^{-2\pi\sqrt{n}} - \cdots, \\ 64g_n^{24} &= e^{\pi\sqrt{n}} - 24 + 276e^{-\pi\sqrt{n}} - \cdots, \\ 64a - 64bg_n^{-24} + \cdots &= e^{\pi\sqrt{n}} - 24 + 276e^{-\pi\sqrt{n}} - \cdots, \\ 64a - 4096be^{-\pi\sqrt{n}} + \cdots &= e^{\pi\sqrt{n}} - 24 + 276e^{-\pi\sqrt{n}} - \cdots, \end{aligned}$$

that is

$$e^{\pi\sqrt{n}} = (64a + 24) - (4096b + 276)e^{-\pi\sqrt{n}} + \cdots \tag{13}$$

Similarly, if

$$1 = aG_n^{-24} - bG_n^{-48} + \cdots,$$

then

$$e^{\pi\sqrt{n}} = (64a - 24) - (4096b + 276)e^{-\pi\sqrt{n}} + \cdots \tag{14}$$

From (13) and (14) we can find whether $e^{\pi\sqrt{n}}$ is very nearly an integer for given values of n, and ascertain also the number of 9's or 0's in the decimal part. But if G_n and g_n be simple quadratic surds we may work independently as follows. We have, for example,

$$g_{22} = \sqrt{(1 + \sqrt{2})}.$$

Hence

$$
\begin{aligned}
64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\
64g_{22}^{-24} &= \qquad\qquad\quad 4096e^{-\pi\sqrt{22}} + \cdots,
\end{aligned}
$$

so that

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

Hence

$$
e^{\pi\sqrt{22}} = 2508951.9982\ldots
$$

Again

$$
G_{37} = (6+\sqrt{37})^{\frac{1}{4}},
$$

$$
\begin{aligned}
64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\
64G_{37}^{-24} &= \qquad\qquad\quad 4096e^{-\pi\sqrt{37}} - \cdots,
\end{aligned}
$$

so that

$$
64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.
$$

Hence

$$
e^{\pi\sqrt{37}} = 199148647.999978\ldots.
$$

Similarly, from

$$
g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},
$$

we obtain

$$
64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.
$$

Hence

$$
e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.
$$

From:

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Now, we have that:

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = - \frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)} \phi}$$

$$16\, k'\, e^{\;\;2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7 - p)}$$

$$(A')^2 - k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

We have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

Therefore with respect to the exponential of the vacuum equation, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

phi = -Pi*sqrt(18) + 6C, for C = 1, we obtain:

exp((-Pi*sqrt(18))

Input:

$\exp\left(-\pi\sqrt{18}\right)$

Exact result:

$e^{-3\sqrt{2}\,\pi}$

Decimal approximation:

$1.6272016226072509292942156739117979541838581136954016... \times 10^{-6}$

$1.6272016... * 10^{-6}$

Now:

$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$

$e^{-\pi\sqrt{18}}$ = 1.6272016… * 10^{-6}

$\frac{1}{4096} e^{-6C+\phi}$ = 1.6272016… * 10^{-6}

0.000244140625 $e^{-6C+\phi} = e^{-\pi\sqrt{18}}$ = 1.6272016… * 10^{-6}

$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$

Result:

0.0066650177536

0.006665017...

0.000244140625 $e^{-6C+\phi} = e^{-\pi\sqrt{18}}$

Dividing both sides by 0.000244140625, we obtain:

$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$

$e^{-6C+\phi}$ = 0.0066650177536

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$

Result:

0.00666501785...

0.00666501785…

$e^{-6C+\phi}$ = 0.0066650177536

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

= 0.00666501785…

ln(0.00666501784619)

Input interpretation:

log(0.00666501784619)

Result:

-5.010882647757...

-5.010882647757…

Now:

$-6C+\phi = -5.010882647757$ ...

For C = 1, we obtain:

$\phi = -5.010882647757 + 6 =$ **0.989117352243** = $\boldsymbol{\phi}$

All the results of the most important connections are signed in blue throughout the drafting of the paper. We highlight as in the development of the various equations we use always the constants π, ϕ, 1/ϕ, the Fibonacci and Lucas numbers, linked to the golden ratio, that play a fundamental role in the development, and therefore, in the final results of the analyzed expressions.

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S. Ferrara, A. Sagnotti and A. Yeranyan - arXiv:1602.04566v3 [hep-th] 8 Jul 2016