Further mathematical connections between some Ramanujan formulas, ϕ, ζ(2) and various topics and parameters of LQG, Open Strings and Particle Physics. VI

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Abstract

In this paper we continue to describe and analyze some Ramanujan expressions. Furthermore, we have obtained several mathematical connections with ϕ, ζ(2) and various topics and parameters of LQG, Open Strings and Particle Physics.

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https://www.giornalettismo.com/la-verita-dietro-al-numero-segreto-di-futurama/

We want to highlight that the development of the various equations was carried out according an our possible logical and original interpretation

From:

LQG vertex with finite Immirzi parameter
Jonathan Engle, Etera Livine, Roberto Pereira, Carlo Rovelli - arXiv:0711.0146v2 [gr-qc] 13 Dec 2007

We have that:

$$k^2 = \left(\frac{2j^-}{1-\gamma}\right)^2 = \left(\frac{2j^+}{1+\gamma}\right)^2, \qquad (26)$$

The solutions are substantially different for $\gamma < 1$ and for $\gamma > 1$ (the value $\gamma = 1$ is the natural turning point in the euclidean setting since it corresponds to a pure self-dual connection):

$$k = \begin{cases} j^+ + j^- & 0 < \gamma < 1, \\ j^+ - j^- & \gamma > 1. \end{cases} \qquad (27)$$

$$Area = \sqrt{A_3} = 8\pi\hbar G\,\gamma\,\sqrt{k(k+1)}. \qquad (48)$$

which is *exactly* the spectrum of LQG. This spectrum can be compared with the continuous spectrum

$$Area \sim \frac{1}{2}\sqrt{4k(k+1) - n^2 + \rho^2 + 4}. \qquad (49)$$

that was previously obtained in covariant LQG, before imposing the second class constraints (see [9]). Remarkably, imposing the simplicity constraints (17) and (22) reduces the continuous spectrum (49) to the exact discrete LQG spectrum (48).

For k = 1/2-(-5/2) = 1/2+5/2 = 6/2 = 3; $\gamma > 1 = \sqrt{2}$

From (48)

$$Area = \sqrt{A_3} = 8\pi\hbar G\,\gamma\,\sqrt{k(k+1)}.$$

we obtain:

((8Pi*1.054571e-34 * 6.67430e-11*(sqrt2)))*sqrt(3(3+1))

Input interpretation:

$$\left(8\,\pi\times 1.054571\times 10^{-34}\times 6.67430\times 10^{-11}\sqrt{2}\right)\sqrt{3\,(3+1)}$$

Result:

$8.666166496510896859035723030193961178372021560850284\ldots\times 10^{-43}$

8.66616649651…*10^{-43} that is exactly the spectrum of LQG

From which:

(((-ln[((8Pi*1.054571e-34 * 6.67430e-11*(sqrt2)))*sqrt(3(3+1))]-8))) *1/55

Input interpretation:

$$\left(-\log\left(\left(8\,\pi\times 1.054571\times 10^{-34}\times 6.67430\times 10^{-11}\sqrt{2}\right)\sqrt{3\,(3+1)}\right)-8\right)\times\frac{1}{55}$$

log(x) is the natural logarithm

Result:

1.6154860...

1.6154860…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Now:

(n, ρ), where n is a positive integer and ρ real

n = 3; ρ = √3

We have also:

$$Area \sim \frac{1}{2}\sqrt{4k(k+1) - n^2 + \rho^2 + 4}. \quad (49)$$

from which, we obtain:

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

Input:

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

Result:

$$\sqrt{\frac{23}{2}}$$

Decimal approximation:

3.391164991562634069532278163312984552597874161961644116375...

3.3911649915…

Alternate form:

$$\frac{\sqrt{46}}{2}$$

From which:

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

Input:

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

Result:

$$\sqrt{1 + \frac{\sqrt{\frac{23}{2}}}{2}}$$

Decimal approximation:

1.6418229185211531315993417309212793787187705845713693121 89...

1.64182291852…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Alternate forms:

$$\frac{\sqrt{4+\sqrt{46}}}{2}$$

$$\frac{\sqrt{1-\frac{1}{2}\,i\sqrt{\frac{15}{2}}}+\sqrt{\frac{1}{2}\,i\left(\sqrt{\frac{15}{2}}+-2\,i\right)}}{\sqrt{2}}$$

Minimal polynomial:

$8x^4 - 16x^2 - 15$

sqrt[1+1/2((1/2 * sqrt(4*3(3+1)-3^2+3+4)))]-24/10^3

Input:

$$\sqrt{1+\frac{1}{2}\left(\frac{1}{2}\sqrt{4\times 3\,(3+1)-3^2+3+4}\right)}-\frac{24}{10^3}$$

Result:

$$\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}-\frac{3}{125}$$

Decimal approximation:

1.6178229185211531315993417309212793787187705845713693121 89...

1.61782291852…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternate forms:

$$\frac{1}{250}\left(125\sqrt{4+\sqrt{46}}-6\right)$$

$$\frac{\frac{\sqrt{4+\sqrt{46}}}{2}-\frac{3}{125}}{}$$

$$\frac{125\sqrt{1-\frac{1}{2}i\sqrt{\frac{15}{2}}}+\sqrt{2}\left(-3+\frac{125}{2}\sqrt{i\left(\sqrt{\frac{15}{2}}+-2i\right)}\right)}{125\sqrt{2}}$$

Minimal polynomial:

$$1953125000\,x^4+187500000\,x^3-3899500000\,x^2-187392000\,x-3664358727$$

From

$$\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}-\frac{3}{125}$$

we obtain:

-3/x + sqrt(1 + sqrt(23/2)/2) = 1.61782291852

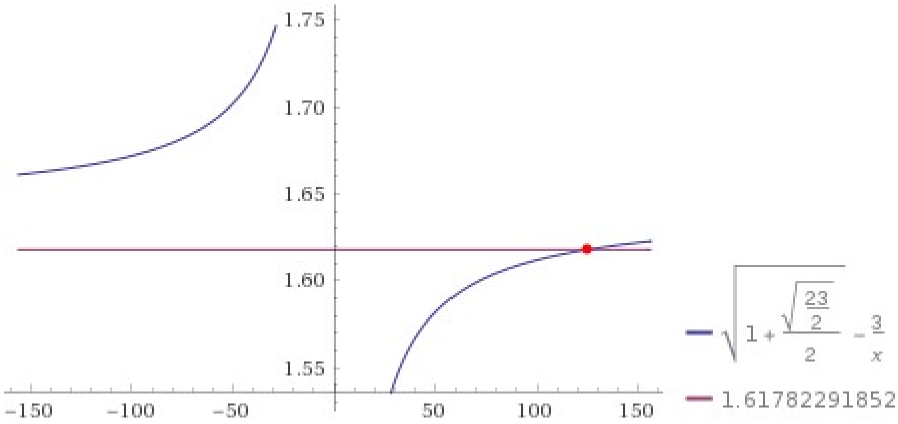
Input interpretation:

$$-\frac{3}{x}+\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}=1.61782291852$$

Result:

$$\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}-\frac{3}{x}=1.61782291852$$

Plot:



Alternate form assuming x is real:

$$\frac{125.0000000}{x} = 1.000000000$$

Alternate forms:

$$(1.00000000 + 0. \times 10^{-10}\, i)\, x = 125.000000 + 0. \times 10^{-8}\, i \quad (\text{for } x \neq 0)$$

$$\frac{\sqrt{4+\sqrt{46}}}{2} - \frac{3}{x} = 1.61782291852$$

$$\frac{\sqrt{4+\sqrt{46}}\; x - 6}{2\, x} = 1.61782291852$$

Alternate form assuming x is positive:

$$1.000000000\, x = 125.0000000 \quad (\text{for } x \neq 0)$$

Solution:

$$x \approx 125.0000000$$

125 result very near to the Higgs boson mass 125.18 GeV

and:

-3/(x-(11+3)) + sqrt(1 + sqrt(23/2)/2) = 1.61782291852

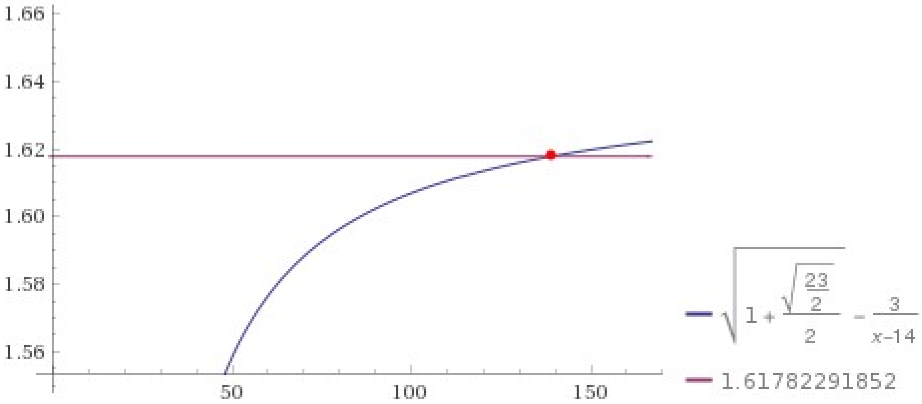
Input interpretation:

$$-\frac{3}{x-(11+3)} + \sqrt{1 + \frac{\sqrt{\frac{23}{2}}}{2}} = 1.61782291852$$

Result:

$$\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}-\frac{3}{x-14}=1.61782291852$$

Plot:



Alternate forms:

$(1.00000000+0.\times 10^{-10}\,i)\,x=139.000000+0.\times 10^{-8}\,i$ (for $x\neq 14$)

$$\frac{\sqrt{4+\sqrt{46}}}{2}-\frac{3}{x-14}=1.61782291852$$

$$\frac{\sqrt{4+\sqrt{46}}\;x-14\sqrt{4+\sqrt{46}}-6}{2(x-14)}=1.61782291852$$

Alternate form assuming x is positive:

$$-\frac{125.00000}{14.00000000-1.00000000\,x}=1.0000000$$

Solution:

$x\approx 139.0000000$

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

((-3/(((2/27))(x-1)-3))) + sqrt(1 + sqrt(23/2)/2) = 1.61782291852

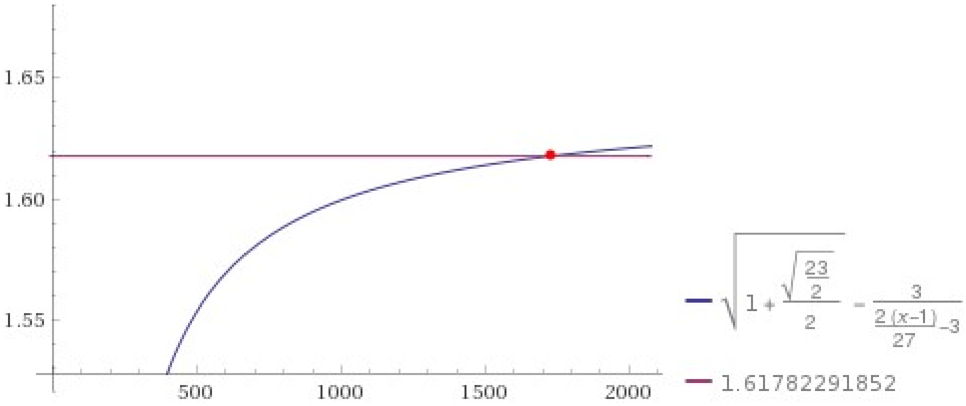
Input interpretation:

$$-\frac{3}{\frac{2}{27}(x-1)-3}+\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}=1.61782291852$$

Result:

$$\sqrt{1+\frac{\sqrt{\frac{23}{2}}}{2}}-\frac{3}{\frac{2(x-1)}{27}-3}=1.61782291852$$

Plot:



Alternate forms:

$$(1.00000000+0.\times 10^{-10}\,i)\,x=1729.00000+0.\times 10^{-7}\,i \quad \left(\text{for } x\neq\frac{83}{2}\right)$$

$$\frac{81}{83-2x}+\frac{\sqrt{4+\sqrt{46}}}{2}=1.61782291852$$

$$\frac{\sqrt{4+\sqrt{46}}}{2}-\frac{3}{\frac{2(x-1)}{27}-3}=1.61782291852$$

Alternate form assuming x is positive:

$$-\frac{1687.5000}{41.5000000-1.00000000\,x}=1.0000000$$

Solution:

$x\approx 1729.000000$

1729

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

From:

Open Strings
C. Angelantonj and A. Sagnotti - arXiv:hep-th/0204089v2 4 Jul 2002

Now, we have:

$$N = -\,8192\,\epsilon\,, \qquad R_N = 0\,,$$
$$D = -\,8192\,\epsilon\,, \qquad R_D = 0\,,$$

thus also requiring that $\epsilon = -1$.

(ϵ = 1, -1)

$\phi_{++} = 1.25 \quad \phi_{+-} = -0.75$

$\phi_{-+} = 1.5477867 \quad \phi_{--} = -0.32304191$ v = 1 / sqrt(0.9991104684)

$$n_1 + n_2 + n_3 + n_4 = 32\,,$$
$$n_1 = 16 = n_4\,, \qquad n_2 = 0 = n_3\,,$$

and

$$R_N = i(n - \bar{n})\,,$$
$$R_D = i(d_i - \bar{d}_i)\,,$$ (see 315)

N = D = 8192; Sqrt(v_4) = (1/sqrt(0.9630552342))^0.5 ; $Q_0 = Q_v = 8$;

$R_N = R_D = 16$

$$\mathcal{F} = \{-\tfrac{1}{2} < \tau_1 \leq \tfrac{1}{2}, |\tau| \geq 1\} \qquad (7)$$

$$\{-\tfrac{1}{2} < \tau_1 \leq \tfrac{1}{2}, \epsilon < \tau_2 < \infty\}$$

$\tau_1 = \frac{1}{2}.$

0.767550…. = P_m

0.0294961 = W_n

η = 2 , 3, 7 and ϑ = 1, 2, 2 ,

$$T = e^{-in\pi/12}\ \mathrm{diag}\left(1, -1, e^{in\pi/4}, e^{in\pi/4}\right)$$

T = (0.965925826289-0.2588190451i) ≈ 1

v = 1.000445063

From:

$$\tilde{K} = \frac{2^5}{8}\left[\left(v_1 v_2 v_3 W_1^e W_2^e W_3^e + \frac{v_k}{2 v_l v_m} W_k^e P_l^e P_m^e\right) T_{oo} + 2\epsilon_k \left(v_k W_k^e + \epsilon \frac{P_k^e}{v_k}\right) T_{ok} \left(\frac{2\eta}{\vartheta_2}\right)^2\right], \tag{382}$$

we obtain:

(2^5)/8* ((((((1.000445063^3 * 0.0294961^3 + (1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+2(1.000445063*0.0294961+0.767550/1.000445063)*4^2)))

Input interpretation:

$$\frac{2^5}{8}\left(\left(1.000445063^3 \times 0.0294961^3 + \frac{1.000445063}{2 \times 1.000445063^2} \times 0.0294961 \times 0.767550^2\right) + 2\left(1.000445063 \times 0.0294961 + \frac{0.767550}{1.000445063}\right) \times 4^2\right)$$

Result:

102.01471632713813820826818697153113931233619878528784444418…

102.0147163…

and adding 26 (The number of spacetime dimensions in bosonic string theory):

26+(2^5)/8* ((((((1.000445063^3 * 0.0294961^3 + (1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+2(1.000445063*0.0294961+0.767550/1.000445063)*4^2)))

Input interpretation:

$$26+\frac{2^5}{8}\left(\left(1.000445063^3\times 0.0294961^3+\frac{1.000445063}{2\times 1.000445063^2}\times 0.0294961\times 0.767550^2\right)+2\left(1.000445063\times 0.0294961+\frac{0.767550}{1.000445063}\right)\times 4^2\right)$$

Result:

128.01471632713813820826818697153113931233619878528784444418...

128.01471632…

Thence:

1/2* (((26+(2^5)/8* ((((((1.000445063^3 * 0.0294961^3 + (1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+2(1.000445063*0.0294961+0.767550/1.000445063)*4^2))))))

Input interpretation:

$$\frac{1}{2}\left(26+\frac{2^5}{8}\left(\left(1.000445063^3\times 0.0294961^3+\frac{1.000445063}{2\times 1.000445063^2}\times 0.0294961\times 0.767550^2\right)+2\left(1.000445063\times 0.0294961+\frac{0.767550}{1.000445063}\right)\times 4^2\right)\right)$$

Result:

64.00735816356906910413409348576556965616809939264392222092...

64.007358163…. ≈ 64

From which:

27*1/2* (((26+(2^5)/8* ((((((1.000445063^3 * 0.0294961^3 + (1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+2(1.000445063*0.0294961+0.767550/1.000445063)*4^2))))))+1

Input interpretation:

$$27\times\frac{1}{2}\left(26+\frac{2^5}{8}\left(\left(1.000445063^3\times0.0294961^3+\frac{1.000445063}{2\times1.000445063^2}\times0.0294961\times0.767550^2\right)+2\left(1.000445063\times0.0294961+\frac{0.767550}{1.000445063}\right)\times4^2\right)\right)+1$$

Result:

1729.198670416364865811620524115670380716538683601385899965...

1729.19867041…

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

and:

[27*1/2* (((26+(2^5)/8* ((((((1.000445063^3 * 0.0294961^3 + (1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+2(1.000445063*0.0294961+0.767550/1.000445063)*4^2))))))+1]^1/15

Input interpretation:

$$\left(27\times\frac{1}{2}\left(26+\frac{2^5}{8}\left(\left(1.000445063^3\times0.0294961^3+\frac{1.000445063}{2\times1.000445063^2}\times0.0294961\times0.767550^2\right)+2\left(1.000445063\times0.0294961+\frac{0.767550}{1.000445063}\right)\times4^2\right)\right)+1\right)^{\wedge}(1/15)$$

Result:

1.643828...

$1.643828\ldots \approx \zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

Now, we have that:

The transverse-channel annulus amplitude is

$$\tilde{\mathcal{A}} = \frac{2^{-5}}{8}\Bigg\{\left(N_o^2 v_1 v_2 v_3 W_1 W_2 W_3 + \frac{D_{k;o}^2 v_k}{2 v_l v_m} W_k P_l P_m\right) T_{oo} + 4\left[(N_k^2 + D_{k;k}^2) v_k W_k + D_{l\neq k;k}^2 \frac{P_k}{v_k}\right] T_{ko}\left(\frac{2\eta}{\vartheta_4}\right)^2 + 2 N_o D_{k;o} v_k W_k \tilde{T}_{ok}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + 2 N_k D_{k;k} v_k W_k \tilde{T}_{kk}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4 N_l D_{k\neq l;l} \tilde{T}_{lk}^{(\epsilon_k)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4} + D_{k;o} D_{l;o} \frac{P_m}{v_m} \tilde{T}_{om}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + D_{k;m} D_{l;m} \frac{P_m}{v_m} \tilde{T}_{mm}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4 D_{k;k} D_{l;k} \tilde{T}_{km}^{(\epsilon_k\epsilon_l)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4}\Bigg\}, \qquad (385)$$

where N_o, $D_{g;o}$, $D_{f;o}$ and $D_{h;o}$ count the numbers of D9 branes and of the three sets of D5 or $\overline{\mathrm{D}}5$ branes wrapped around the first, second and third torus, denoted for brevity $5_{1,2,3}$ or $\bar{5}_{1,2,3}$ in the following. In a similar fashion, N_k, $D_{g;k}$, $D_{f;k}$ and $D_{h;k}$ $(k = g, f, h)$ parametrize the breakings induced by the three orbifold operations g, f and h. Notice

From

$$\tilde{\mathcal{A}} = \frac{2^{-5}}{8}\Bigg\{\left(N_o^2 v_1 v_2 v_3 W_1 W_2 W_3 + \frac{D_{k;o}^2 v_k}{2 v_l v_m} W_k P_l P_m\right) T_{oo} + 4\left[(N_k^2 + D_{k;k}^2) v_k W_k + D_{l\neq k;k}^2 \frac{P_k}{v_k}\right] T_{ko}\left(\frac{2\eta}{\vartheta_4}\right)^2 + 2 N_o D_{k;o} v_k W_k \tilde{T}_{ok}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + 2 N_k D_{k;k} v_k W_k \tilde{T}_{kk}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4 N_l D_{k\neq l;l} \tilde{T}_{lk}^{(\epsilon_k)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4} + D_{k;o} D_{l;o} \frac{P_m}{v_m} \tilde{T}_{om}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + D_{k;m} D_{l;m} \frac{P_m}{v_m} \tilde{T}_{mm}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4 D_{k;k} D_{l;k} \tilde{T}_{km}^{(\epsilon_k\epsilon_l)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4}\Bigg\},$$

N = D = 8192; η = 2 , 3, 7 and ϑ = 1, 2, 2 ,

$$T = e^{-in\pi/12}\ \mathrm{diag}\left(1, -1, e^{in\pi/4}, e^{in\pi/4}\right)$$

T = (0.965925826289-0.2588190451i) ≈ 1

$v = 1.000445063$; $0.767550.... = P_m$; $0.0294961 = W_n$

We obtain:

$$\frac{2^{-5}}{8}\Bigg\{\left(N_o^2 v_1 v_2 v_3 W_1 W_2 W_3 + \frac{D_{k;o}^2 v_k}{2 v_l v_m} W_k P_l P_m\right) T_{oo} + 4\left[(N_k^2 + D_{k;k}^2) v_k W_k + D_{l\neq k;k}^2 \frac{P_k}{v_k}\right] T_{ko}\left(\frac{2\eta}{\vartheta_4}\right)^2$$

((((((8192^2*1.000445063^3 * 0.0294961^3 +8192^2*(1.000445063/(2*1.000445063^2))*0.0294961*0.767550^2)))+4((2*8192^2)1.000445063*0.0294961+8192^2*0.767550/1.000445063)*4^2)))

Input interpretation:

$$\left(8192^2 \times 1.000445063^3 \times 0.0294961^3 + 8192^2 \times \frac{1.000445063}{2\times 1.000445063^2} \times 0.0294961 \times 0.767550^2\right) + 4\left((2\times 8192^2)\times 1.000445063 \times 0.0294961 + 8192^2 \times \frac{0.767550}{1.000445063}\right)\times 4^2$$

Result:

$3.549202484907539657602890256667840262093566819929832 94... \times 10^9$

$3.54920248490753... \times 10^9$

$$+ 2N_o D_{k;o} v_k W_k \tilde{T}_{ok}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + 2N_k D_{k;k} v_k W_k \tilde{T}_{kk}^{(\epsilon_k)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4N_l D_{k\neq l;l} \tilde{T}_{lk}^{(\epsilon_k)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4} + D_{k;o} D_{l;o} \frac{P_m}{v_m} \tilde{T}_{om}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_2}\right)^2 + D_{k;m} D_{l;m} \frac{P_m}{v_m} \tilde{T}_{mm}^{(\epsilon_k\epsilon_l)}\left(\frac{2\eta}{\vartheta_3}\right)^2 + 4D_{k;k} D_{l;k} \tilde{T}_{km}^{(\epsilon_k\epsilon_l)} \frac{8\eta^3}{\vartheta_2\vartheta_3\vartheta_4}\Bigg\}$$

$N = D = 8192$; $\eta = 2, 3, 7$ and $\vartheta = 1, 2, 2$,

$T = (0.965925826289-0.2588190451i) \approx 1$

$v = 1.000445063$; $0.767550\ldots = P_m$; $0.0294961 = W_n$

2*8192^2*1.000445063*0.0294961*4^2+2*8192^2*1.000445063*0.0294961*4^2+ 4*8192^2*8*2+8192^2*(0.767550/1.000445063)*4^2+8192^2*(0.767550/1.000445063)*4^2+4*8192^2*8*2

Input interpretation:

$$2\times 8192^2\times 1.000445063\times 0.0294961\times 4^2 + 2\times 8192^2\times 1.000445063\times 0.0294961\times 4^2 + 4\times 8192^2\times 8\times 2 + 8192^2\times\frac{0.767550}{1.000445063}\times 4^2 + 8192^2\times\frac{0.767550}{1.000445063}\times 4^2 + 4\times 8192^2\times 8\times 2$$

Result:

$$1.0364243562123441679073235497918076487124410948290121\ldots\times 10^{10}$$

$1.0364243562123441679\ldots \times 10^{10}$

(2^(-5)/8) * (3.54920248490753 × 10^9 + 1.0364243562123441679 × 10^10)

Input interpretation:

$$\frac{1}{2^5\times 8}\left(3.54920248490753\times 10^9 + 1.0364243562123441679\times 10^{10}\right)$$

Result:

$$5.434939862121473312109375\times 10^7$$

$5.434939862\ldots *10^7$ (final result)

From which:

7((((2^(-5)/8) * (3.54920248490753 × 10^9 + 1.0364243562123441679 × 10^10))))^1/8-(2 π)/sqrt(53)

Where 7 is a Lucas number and 53 is a Eisenstein prime

Input interpretation:

$$7\sqrt[8]{\frac{1}{2^5\times 8}\left(3.54920248490753\times 10^9 + 1.0364243562123441679\times 10^{10}\right)} - \frac{2\pi}{\sqrt{53}}$$

Result:

63.99999060314199...

63.99999… ≈ 64

From which:

27* (((7((((2^(-5)/8) * (3.54920248490753 × 10^9 + 1.0364243562123441679 × 10^10))))^1/8-(2 π)/sqrt(53)))) +1

Input interpretation:

$$27\left(7\sqrt[8]{\frac{1}{2^5\times 8}\left(3.54920248490753\times 10^9+1.0364243562123441679\times 10^{10}\right)}-\frac{2\pi}{\sqrt{53}}\right)+1$$

Result:

1728.999746284834...

1728.999746284834… ≈ 1729

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

With regard 27 (From Wikipedia):

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

[((((27* (((7((((2^(-5)/8) * (3.54920248490753 × 10^9 + 1.0364243562123441679 × 10^10))))^1/8-(2 π)/sqrt(53))))))))+1]^1/15

Input interpretation:

$$\left(27\left(7\sqrt[8]{\frac{1}{2^5\times 8}\left(3.54920248490753\times 10^9+1.0364243562123441679\times 10^{10}\right)}-\frac{2\pi}{\sqrt{53}}\right)+1\right)\text{^}(1/15)$$

Result:

1.64381521266772244...

1.64381521266772244…. ≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

Now, from:

$$\mathcal{M} = \quad \frac{1}{8}\left\{N_o P_1 P_2 P_3 \hat{T}_{oo} \quad N_o P_k c_k \hat{T}_{ok}\left(\frac{2\hat{\eta}}{\hat{\vartheta}_2}\right)^2 \mid \frac{1}{2} D_{k;o} P_k W_l W_m c_k \hat{\hat{T}}_{co}^{(\epsilon_k)} - \left(D_{l;o} c_k W_m \hat{\hat{T}}_{om}^{(\epsilon_l)} + D_{k;o} P_k \hat{\hat{T}}_{ok}^{(\epsilon_k)}\right)\left(\frac{2\hat{\eta}}{\hat{\vartheta}_2}\right)^2\right\}. \quad (392)$$

N = D = 8192;   η = 2 , 3, 7 and ϑ = 1, 2, 2 ,

T = (0.965925826289-0.2588190451i) ≈ 1

v = 1.000445063;   0.767550…. = P_m ; 0.0294961 = W_n

we obtain:

-1/8[8192*0.767550*3-8192*0.767550*4^2+1/2*8192*0.767550*0.0294961^2-(8192*0.0294961+8192*0.767550)*4^2]

Input interpretation:

$$-\frac{1}{8}\left(8192\times 0.767550\times 3+8192\times 4^2\times(-0.767550)+\frac{1}{2}\times 8192\times 0.767550\times 0.0294961^2-(8192\times 0.0294961+8192\times 0.767550)\times 4^2\right)$$

Result:

23276.086997101609249024

23276.08699710…

Multiplying by π and adding 322 and 47 that are two Lucas number, we obtain:

Pi*(((-1/8[8192*0.767550*3-8192*0.767550*4^2+1/2*8192*0.767550*0.0294961^2-(8192*0.0294961+8192*0.767550)*4^2])))+322+47

Input interpretation:

$$\pi\left(-\frac{1}{8}\left(8192\times 0.767550\times 3+8192\times 4^2\times(-0.767550)+\frac{1}{2}\times 8192\times 0.767550\times 0.0294961^2-(8192\times 0.0294961+8192\times 0.767550)\times 4^2\right)\right)+322+47$$

Result:

73493.0…

73493

Alternative representations:

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)\,4^2\right)+322+47=369-\frac{180}{8}{}^\circ\left(18\,863.3+3143.88\times 0.0294961^2-12\,817.2\times 4^2\right)$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)\,4^2\right)+322+47=369+\frac{1}{8}i\log(-1)\left(18\,863.3+3143.88\times 0.0294961^2-12\,817.2\times 4^2\right)$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)\,4^2\right)+322+47=369-\frac{1}{8}\cos^{-1}(-1)\left(18\,863.3+3143.88\times 0.0294961^2-12\,817.2\times 4^2\right)$$

Series representations:

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)4^2\right)+322+47=369+93\,104.3\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)4^2\right)+322+47=-46\,183.2+46\,552.2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)4^2\right)+322+47=369+23\,276.1\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)4^2\right)+322+47=369+46\,552.2\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)4^2\right)+322+47=369+93\,104.3\int_0^{1}\sqrt{1-t^2}\,dt$$

$$\frac{1}{8}\pi(-1)\left(8192\times 0.76755\times 3-8192\times 0.76755\times 4^2+\frac{8192\times 0.76755\times 0.0294961^2}{2}-(8192\times 0.0294961+8192\times 0.76755)\,4^2\right)+$$

$$322+47=369+46\,552.2\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

Note that 73493 is connected with

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

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

That is the Karatsuba's equation concerning the zeros of a special type of function

We obtain also:

1/27*2 (((-1/8[8192*0.767550*3-8192*0.767550*4^2+1/2*8192*0.767550*0.0294961^2-(8192*0.0294961+8192*0.767550)*4^2])))+5

Input interpretation:

$$\frac{1}{27}\times 2\left(-\frac{1}{8}\left(8192\times 0.767550\times 3+8192\times 4^2\times(-0.767550)+\frac{1}{2}\times 8192\times 0.767550\times 0.0294961^2-(8192\times 0.0294961+8192\times 0.767550)\times 4^2\right)\right)+5$$

Result:

1729.154592377896981409185185185185185185185185185185185185185...

1729.15459237…

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

From which:

(((((1/27*2 (((-1/8[8192*0.767550*3-8192*0.767550*4^2+1/2*8192*0.767550*0.0294961^2-(8192*0.0294961+8192*0.767550)*4^2])))+5)))))^1/15

Input interpretation:

$$\left(\frac{1}{27}\times 2\left(-\frac{1}{8}\left(8192\times 0.767550\times 3+ 8192\times 4^2\times(-0.767550)+\frac{1}{2}\times 8192\times 0.767550\times 0.0294961^2-(8192\times 0.0294961+8192\times 0.767550)\times 4^2\right)\right)+5\right)\,\hat{}\,(1/15)$$

Result:

1.643825...

$1.643825.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

While, from:

$$\mathcal{M} = -\tfrac{1}{8}\Big\{N_o P_1 P_2 P_3 \hat{T}_{oo} - N_o P_k \epsilon_k \hat{T}_{ok}\left(\frac{2\hat{\eta}}{\hat{\vartheta}_2}\right)^2 + \tfrac{1}{2} D_{k;o} P_k W_l W_m \epsilon_k \hat{\tilde{T}}^{(\epsilon_k)}_{oo} - \left(D_{l;o}\epsilon_k W_m \hat{\tilde{T}}^{(\epsilon_l)}_{om} + D_{k;o} P_k \hat{\tilde{T}}^{(\epsilon_k)}_{ok}\right)\left(\frac{2\hat{\eta}}{\hat{\vartheta}_2}\right)^2\Big\}. \quad (392)$$

for N = D = 32, we obtain:

-1/8[32*0.767550*3-32*0.767550*4^2+1/2*32*0.767550*0.0294961^2-(32*0.0294961+32*0.767550)*4^2]

Input interpretation:

$$-\frac{1}{8}\left(32\times 0.767550\times 3+32\times 4^2\times(-0.767550)+\frac{1}{2}\times 32\times 0.767550\times 0.0294961^2-(32\times 0.0294961+32\times 0.767550)\times 4^2\right)$$

Result:

90.922214832428161129

90.922214832428161129

-1/8[32*0.767550*3-32*0.767550*4^2+1/2*32*0.767550*0.0294961^2-(32*0.0294961+32*0.767550)*4^2]-27

Input interpretation:

$$-\frac{1}{8}\left(32\times 0.767550\times 3+32\times 4^2\times(-0.767550)+\frac{1}{2}\times 32\times 0.767550\times 0.0294961^2-(32\times 0.0294961+32\times 0.767550)\times 4^2\right)-27$$

Result:

63.922214832428161129

63.922214832428161129 ≈ 64

From which:

27*((((-1/8[32*0.767550*3-32*0.767550*4^2+1/2*32*0.767550*0.0294961^2-(32*0.0294961+32*0.767550)*4^2]-27))))+Pi

Input interpretation:

$$27\left(-\frac{1}{8}\left(32\times 0.767550\times 3+32\times 4^2\times(-0.767550)+\frac{1}{2}\times 32\times 0.767550\times 0.0294961^2-(32\times 0.0294961+32\times 0.767550)\times 4^2\right)-27\right)+\pi$$

Result:

1729.04...

1729.04…

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

Alternative representations:

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi=180\,^\circ+27\left(-27-\frac{1}{8}\left(73.6848+12.2808\times 0.0294961^2-50.0671\times 4^2\right)\right)$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi=-i\log(-1)+27\left(-27-\frac{1}{8}\left(73.6848+12.2808\times 0.0294961^2-50.0671\times 4^2\right)\right)$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi=\cos^{-1}(-1)+27\left(-27-\frac{1}{8}\left(73.6848+12.2808\times 0.0294961^2-50.0671\times 4^2\right)\right)$$

Series representations:

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi=1725.9+4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi = 1723.9+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi = 1725.9+\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi = 1725.9+2\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi = 1725.9+4\int_0^{1}\sqrt{1-t^2}\,dt$$

$$27\left(\frac{1}{8}\left(32\times 0.76755\times 3-32\times 0.76755\times 4^2+\frac{32\times 0.76755\times 0.0294961^2}{2}-(32\times 0.0294961+32\times 0.76755)\,4^2\right)(-1)-27\right)+\pi = 1725.9+2\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

((((27*((((-1/8[32*0.767550*3-32*0.767550*4^2+1/2*32*0.767550*0.0294961^2-(32*0.0294961+32*0.767550)*4^2]-27))))+Pi))))^1/15

Input interpretation:

$$\left(27\left(-\frac{1}{8}\left(32\times0.767550\times3+32\times4^2\times(-0.767550)+\frac{1}{2}\times32\times0.767550\times0.0294961^2-(32\times0.0294961+32\times0.767550)\times4^2\right)-27\right)+\pi\right)^{\wedge}(1/15)$$

Result:

1.643818...

$1.643818.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Now, we have that:

$$\begin{aligned}\mathcal{M} = -\tfrac{1}{4}\Bigg[&(\hat{Q}_o+\hat{Q}_v)(0;0)\left[(n+\bar{n})P_1P_2+(d+\bar{d})W_1W_2\right]\\ &-(m+\bar{m})(\hat{Q}_o+\hat{Q}_v)(2\zeta_1\tau;2\zeta_2\tau)\frac{2k_1\hat{\eta}}{\hat{\vartheta}_1(2\zeta_1\tau)}\frac{2k_2\hat{\eta}}{\hat{\vartheta}_1(2\zeta_2\tau)}\\ &-\left(n+\bar{n}+d+\bar{d}\right)(\hat{Q}_o-\hat{Q}_v)(0;0)\left(\frac{2\hat{\eta}}{\hat{\vartheta}_2(0)}\right)^2\\ &-(m+\bar{m})(\hat{Q}_o-\hat{Q}_v)(2\zeta_1\tau;2\zeta_2\tau)\frac{2\hat{\eta}}{\hat{\vartheta}_2(2\zeta_1\tau)}\frac{2\hat{\eta}}{\hat{\vartheta}_2(2\zeta_2\tau)}\Bigg]. \end{aligned} \quad (428)$$

For

Sqrt(v_4) = (1/sqrt(0.9630552342))^0.5 ; $Q_0 = Q_v = 8$

N = D = 8192; η = 2 , 3, 7 and ϑ = 1, 2, 2 ,

T = (0.965925826289-0.2588190451i) ≈ 1

v = 1.000445063; 0.767550…. = P_m ; 0.0294961 = W_n

$$m + \bar{m} + n + \bar{n} = 32\,,$$
$$k_1 k_2 (m + \bar{m}) + d + \bar{d} = 32$$

4+4+12+12 = 32;   1*2(4+4)+8+8 = 32

we obtain:

-1/4[16*(24*0.767550^2+16*0.0294961^2)-8*8*2*(2*zeta(2))*4/(2*zeta(2))*8/(2*zeta(2))]

Input interpretation:

$$-\frac{1}{4}\left(16\left(24\times 0.767550^2+16\times 0.0294961^2\right)-8\times 8\times 2\,(2\,\zeta(2))\times\frac{4}{2\,\zeta(2)}\times\frac{8}{2\,\zeta(2)}\right)$$

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

Result:

254.646…

254.646…

Alternative representations:

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-\frac{1}{4}\left(16\left(16\times 0.0294961^2+24\times 0.76755^2\right)-8192\left(\frac{1}{2\,\zeta(2,\,1)}\right)^2\zeta(2,\,1)\right)$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-\frac{1}{4}\left(16\left(16\times 0.0294961^2+24\times 0.76755^2\right)-8192\,S_{1,1}(1)\left(\frac{1}{2\,S_{1,1}(1)}\right)^2\right)$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-\frac{1}{4}\left(16\left(16\times 0.0294961^2+24\times 0.76755^2\right)+\frac{8192\,\mathrm{Li}_2(-1)\left(-\frac{\frac{1}{2\,\mathrm{Li}_2(-1)}}{\frac{1}{2}}\right)^2}{\frac{1}{2}}\right)$$

Series representations:

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{512}{\sum_{k=1}^{\infty}\frac{1}{k^2}}$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124-\frac{256}{\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}}$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{384}{\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}}$$

Integral representations:

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{768\,\Gamma(2)}{\int_0^{\infty}t\,\operatorname{csch}(t)\,dt}$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{512\,\Gamma(2)}{\int_0^{\infty}\frac{t}{-1+e^t}\,dt}$$

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{256\,\Gamma(3)}{\int_0^{\infty}t^2\,\operatorname{csch}^2(t)\,dt}$$

From:

$$\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-\frac{2\,\zeta(2)\,8\,(8\times 2\times 4\times 8)}{(2\,\zeta(2))\,(2\,\zeta(2))}\right)(-1)=$$
$$-56.6124+\frac{256\,\Gamma(3)}{\int_0^{\infty}t^2\,\operatorname{csch}^2(t)\,dt}$$

we obtain:

Input interpretation:

$$-\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-8\times 8\times 2\,(2\,\zeta(2))\times\frac{4}{2\,\zeta(2)}\times\frac{8}{2\,\zeta(2)}\right)=$$
$$-56.6124+\frac{x\,\Gamma(3)}{\int_0^\infty t^2\operatorname{csch}^2(t)\,dt}$$

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

$\Gamma(x)$ is the gamma function

$\operatorname{csch}(x)$ is the hyperbolic cosecant function

Result:

$$254.646=\frac{12\,x}{\pi^2}-56.6124$$

Solution:

$x\approx 256.$

256

from which:

Input interpretation:

$$-\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-8\times 8\times 2\,(2\,\zeta(2))\times\frac{4}{2\,\zeta(2)}\times\frac{8}{2\,\zeta(2)}\right)=$$
$$-56.6124+\frac{4\,x\,\Gamma(3)}{\int_0^\infty t^2\operatorname{csch}^2(t)\,dt}$$

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

$\Gamma(x)$ is the gamma function

$\operatorname{csch}(x)$ is the hyperbolic cosecant function

Result:

$$254.646=\frac{48\,x}{\pi^2}-56.6124$$

Solution:

$x\approx 64.$

64

and

Input interpretation:

$$-\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-8\times 8\times 2\,(2\,\zeta(2))\times\frac{4}{2\,\zeta(2)}\times\frac{8}{2\,\zeta(2)}\right)=$$
$$-56.6124+\frac{4\,x\times\frac{1}{27}\,\Gamma(3)}{\int_0^\infty t^2\,\text{csch}^2(t)\,dt}$$

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

$\Gamma(x)$ is the gamma function

$\text{csch}(x)$ is the hyperbolic cosecant function

Result:

$$254.646=\frac{16\,x}{9\,\pi^2}-56.6124$$

Solution:

$x\approx 1728.$

1728

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

Input interpretation:

$$-\frac{1}{4}\left(16\left(24\times 0.76755^2+16\times 0.0294961^2\right)-8\times 8\times 2\,(2\,\zeta(2))\times\frac{4}{2\,\zeta(2)}\times\frac{8}{2\,\zeta(2)}\right)=$$
$$-56.6124+\frac{\left(4\,x^{15}\times\frac{1}{27}\right)\Gamma(3)}{\int_0^\infty t^2\,\text{csch}^2(t)\,dt}$$

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

$\Gamma(x)$ is the gamma function

$\text{csch}(x)$ is the hyperbolic cosecant function

Result:

$$254.646=\frac{16\,x^{15}}{9\,\pi^2}-56.6124$$

Alternate forms:

$$254.646 = 0.180127\,x^{15} - 56.6124$$

$$254.646 = -5.73604\,(9.8696 - 0.0314026\,x^{15})$$

$$311.259 - \frac{16\,x^{15}}{9\,\pi^2} = 0$$

Real solution:

$x \approx 1.64375$

$1.64375 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Complex solutions:

$x = -1.60783 - 0.341755\,i$

$x = -1.60783 + 0.341755\,i$

$x = -1.32982 - 0.966173\,i$

$x = -1.32982 + 0.966173\,i$

$x = -0.821876 - 1.42353\,i$

Now, we have that:

$$\mathcal{M}_0 \sim -\tfrac{1}{2}(m+\bar{m})\,\hat{Q}_v(0) - 2\,(k_1k_2+1)\,\frac{n+\bar{n}}{2}\,\hat{Q}_v(\zeta\tau)\,, \quad (441)$$

For $n = 12, 14$; $m = 2, 4$; $Q_0 = Q_v = 8$; $k_1k_2 = 2$, we obtain:

-1/2(2+4)*8 – 2(2+1)*(12+14)/2 * 8 * zeta(2)

Input:

$$-\frac{1}{2}(2+4)\times 8-2(2+1)\times\frac{12+14}{2}\times 8\,\zeta(2)$$

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

Exact result:

$$-24-104\pi^2$$

Decimal approximation:

-1050.43885771329329635878706398711971807262473835304222514...

-1050.4388577…

Property:

$-24-104\pi^2$ is a transcendental number

Alternate form:

$$-8\left(3+13\pi^2\right)$$

Alternative representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2))=-24-624\zeta(2,1)$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2))=-24-624S_{1,1}(1)$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2))=-24+\frac{624\,\mathrm{Li}_2(-1)}{\frac{1}{2}}$$

Series representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2))=-24-624\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2))=-24+1248\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2)) = -24-832\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2)) = -24-1664\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2)) = -24-416\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}((12+14)2)(2+1)(8\zeta(2)) = -24-416\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

Adding 26 and changing the sign, (26 is the number of spacetime dimensions in bosonic string theory) we obtain:

(-(-1/2(2+4)*8 – 2(2+1)*(12+14)/2 * 8 * zeta(2) + 26)

Input:

$$-\left(-\frac{1}{2}(2+4)\times 8-2(2+1)\times\frac{12+14}{2}\times 8\zeta(2)+26\right)$$

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

Exact result:

$104\pi^2-2$

Decimal approximation:

1024.438857713293296358787063987119718072624738353042225146...

1024.4388577… ≈ 1024

Property:

$-2+104\pi^2$ is a transcendental number

Alternate form:

$2(52\pi^2-1)$

Alternative representations:

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+624\,\zeta(2,\,1)$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+624\,S_{1,1}(1)$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2-\frac{624\,\mathrm{Li}_2(-1)}{\frac{1}{2}}$$

Series representations:

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+624\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2-1248\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+832\sum_{k=0}^{\infty}\frac{1}{(1+2\,k)^2}$$

Integral representations:

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+1664\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+416\left(\int_0^\infty\frac{1}{1+t^2}\,dt\right)^2$$

$$-\left(\frac{1}{2}\left((2+4)\,8\right)(-1)-\frac{1}{2}\left((12+14)\,2\right)(2+1)\left(8\,\zeta(2)\right)+26\right)=-2+416\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

1/16((-(-1/2(2+4)*8 – 2(2+1)*(12+14)/2 * 8 * zeta(2) + 26)))

Input:

$$\frac{1}{16}\left(-\left(-\frac{1}{2}\,(2+4)\times 8-2\,(2+1)\times\frac{12+14}{2}\times 8\,\zeta(2)+26\right)\right)$$

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

Exact result:

$$\frac{1}{16}\left(104\pi^2 - 2\right)$$

Decimal approximation:

64.02742860708083102242419149919498237953904614706513907168...

64.0274286… ≈ 64

Property:

$\frac{1}{16}\left(-2 + 104\pi^2\right)$ is a transcendental number

Alternate forms:

$$\frac{13\pi^2}{2} - \frac{1}{8}$$

$$\frac{1}{8}\left(52\pi^2 - 1\right)$$

Alternative representations:

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = \frac{1}{16}\left(-2 + 624\,\zeta(2, 1)\right)$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = \frac{1}{16}\left(-2 + 624\,S_{1,1}(1)\right)$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = \frac{1}{16}\left(-2 - \frac{624\,\mathrm{Li}_2(-1)}{\frac{1}{2}}\right)$$

Series representations:

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = -\frac{1}{8} + 39\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = -\frac{1}{8} - 78\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8 - \frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2)) + 26\right) = -\frac{1}{8} + 52\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8-\frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2))+26\right)=-\frac{1}{8}+104\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8-\frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2))+26\right)=-\frac{1}{8}+26\left(\int_0^\infty\frac{1}{1+t^2}\,dt\right)^2$$

$$-\frac{1}{16}\left(-\frac{1}{2}(2+4)\,8-\frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2))+26\right)=-\frac{1}{8}+26\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

27*1/16((-(-1/2(2+4)*8 – 2(2+1)*(12+14)/2 * 8 * zeta(2) + 26)))

Input:

$$27\times\frac{1}{16}\left(-\left(-\frac{1}{2}(2+4)\times8-2\,(2+1)\times\frac{12+14}{2}\times8\,\zeta(2)+26\right)\right)$$

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

Exact result:

$$\frac{27}{16}\left(104\,\pi^2-2\right)$$

Decimal approximation:

1728.7405723911824376054531704782645242475542459707587549 35...

1728.7405723…

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

Property:

$\frac{27}{16}\left(-2+104\,\pi^2\right)$ is a transcendental number

Alternate forms:

$$\frac{351\pi^2}{2} - \frac{27}{8}$$

$$\frac{27}{8}(52\pi^2 - 1)$$

Alternative representations:

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = \frac{27}{16}(-2 + 624\zeta(2, 1))$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = \frac{27}{16}(-2 + 624 S_{1,1}(1))$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = \frac{27}{16}\left(-2 - \frac{624\,\mathrm{Li}_2(-1)}{\frac{1}{2}}\right)$$

Series representations:

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} + 1053\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} - 2106\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} + 1404\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} + 2808\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} + 702\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8 - \frac{1}{2}(12+14)2((2+1)8\zeta(2)) + 26\right)\right) = -\frac{27}{8} + 702\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

[27*1/16((-(-1/2(2+4)*8 – 2(2+1)*(12+14)/2 * 8 * zeta(2) + 26)))]^1/15

Input:

$$\sqrt[15]{27 \times \frac{1}{16}\left(-\left(-\frac{1}{2}(2+4) \times 8 - 2(2+1) \times \frac{12+14}{2} \times 8\,\zeta(2) + 26\right)\right)}$$

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

Exact result:

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\,\pi^2 - 2}}{2^{4/15}}$$

Decimal approximation:

1.643798784525958647081173524166279275402938807877161680971...

1.643798784…. ≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

Property:

$$\frac{\sqrt[5]{3}\ \sqrt[15]{-2 + 104\,\pi^2}}{2^{4/15}}$$ is a transcendental number

Alternate form:

$$\sqrt[5]{\frac{3}{2}}\ \sqrt[15]{52\,\pi^2 - 1}$$

All 15th roots of 27/16 (104 π^2 - 2):

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\,\pi^2 - 2}\ e^0}{2^{4/15}} \approx 1.6438 \text{ (real, principal root)}$$

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\,\pi^2 - 2}\ e^{(2 i \pi)/15}}{2^{4/15}} \approx 1.5017 + 0.6686\, i$$

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\,\pi^2 - 2}\ e^{(4 i \pi)/15}}{2^{4/15}} \approx 1.0999 + 1.2216\, i$$

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\,\pi^2 - 2}\ e^{(2 i \pi)/5}}{2^{4/15}} \approx 0.5080 + 1.5633\, i$$

$$\frac{\sqrt[5]{3}\ \sqrt[15]{104\pi^2-2}\ e^{(8 i \pi)/15}}{2^{4/15}} \approx -0.17182+1.6348 i$$

Alternative representations:

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[15]{\frac{27}{16}(-2+624\zeta(2,1))}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[15]{\frac{27}{16}(-2+624 S_{1,1}(1))}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[15]{\frac{27}{16}\left(-2-\frac{624\operatorname{Li}_2(-1)}{\frac{1}{2}}\right)}$$

Series representations:

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\ \sqrt[15]{-1+312\sum_{k=1}^{\infty}\frac{1}{k^2}}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\ \sqrt[15]{-1-624\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\ \sqrt[15]{-1+416\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}}$$

Integral representations:

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)8-\frac{1}{2}(12+14)2((2+1)8\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\ \sqrt[15]{-1+208\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)\,8-\frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\sqrt[15]{-1+832\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2}$$

$$\sqrt[15]{\frac{27}{16}\left(-\left(-\frac{1}{2}(2+4)\,8-\frac{1}{2}(12+14)\,2\,((2+1)\,8\,\zeta(2))+26\right)\right)} = \sqrt[5]{\frac{3}{2}}\sqrt[15]{-1+208\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2}$$

From

$$\mathcal{M}_0^{(r)} \sim -\tfrac{1}{2}(m+\bar{m})\hat{Q}_v(0) - \tfrac{1}{2}(2\cdot 2^{r/2}\cdot k_1k_2+2)(n+\bar{n})\hat{Q}_v(\zeta\tau)\,, \qquad (449)$$

$r = 0, 2, 4$ and $\xi = \pm 1.$

for $n = 12, 14$; $m = 2, 4$; $r = 2$; $Q_0 = Q_v = 8$; $k_1k_2 = 2$, we obtain:

-1/2(2+4)*8-1/2(2*2*2+2)(12+14)*8*(zeta (2))

Input:

$$-\frac{1}{2}(2+4)\times 8-\frac{1}{2}(2\times 2\times 2+2)((12+14)\times 8\,\zeta(2))$$

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

Exact result:

$$-24-\frac{520\,\pi^2}{3}$$

Decimal approximation:

-1734.73142952215549393131177331186619678770789725507037524...

-1734.73142952…

Property:

$-24-\frac{520\pi^2}{3}$ is a transcendental number

Alternate form:

$-\frac{8}{3}\left(9+65\pi^2\right)$

Alternative representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-1040\,\zeta(2,1)$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24+\frac{1040\,\mathrm{Li}_2(-1)}{\frac{1}{2}}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-1040\,S_{1,1}(1)$$

Series representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-1040\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24+2080\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-\frac{4160}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-\frac{8320}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-\frac{2080}{3}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2)) = -24-\frac{2080}{3}\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

From which:

-1/2(2+4)*8-1/2(2*2*2+2)(12+14)*8*(zeta (2)) +5

Input:

$$-\frac{1}{2}(2+4)\times 8-\frac{1}{2}(2\times 2\times 2+2)((12+14)\times 8\,\zeta(2))+5$$

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

Exact result:

$$-19-\frac{520\,\pi^2}{3}$$

Decimal approximation:

-1729.7314295221554939313117733118661967877078972550703752 4...

-1729.7314295…

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

Property:

$-19-\frac{520\,\pi^2}{3}$ is a transcendental number

Alternate form:

$$\frac{1}{3}\left(-57-520\,\pi^2\right)$$

Alternative representations:

$$\frac{1}{2}((2+4)\,8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\,\zeta(2))+5=-19-1040\,\zeta(2,1)$$

$$\frac{1}{2}((2+4)\,8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\,\zeta(2))+5=-19+\frac{1040\,\mathrm{Li}_2(-1)}{\frac{1}{2}}$$

$$\frac{1}{2}((2+4)\,8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\,\zeta(2))+5=-19-1040\,S_{1,1}(1)$$

Series representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19-1040\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19+2080\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19-\frac{4160}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19-\frac{8320}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19-\frac{2080}{3}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times2\times2+2)(12+14)(8\zeta(2))+5=-19-\frac{2080}{3}\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

and:

(-(-1/2(2+4)*8-1/2(2*2*2+2)(12+14)*8*(zeta (2)) +5))^1/15

Input:

$$\sqrt[15]{-\left(-\frac{1}{2}(2+4)\times8-\frac{1}{2}(2\times2\times2+2)((12+14)\times8\zeta(2))+5\right)}$$

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

Exact result:

$$\sqrt[15]{19+\frac{520\pi^2}{3}}$$

Decimal approximation:

1.643861579151301863171229471586696154153590305813916633339...

1.6438615791…. ≈ $\zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

Property:

$\sqrt[15]{19+\frac{520\pi^2}{3}}$ is a transcendental number

Alternate form:

$\sqrt[15]{\frac{1}{3}(57+520\pi^2)}$

All 15th roots of 19 + (520 π^2)/3:

$\sqrt[15]{19+\frac{520\pi^2}{3}}\ e^0 \approx 1.64386$ (real, principal root)

$\sqrt[15]{19+\frac{520\pi^2}{3}}\ e^{(2i\pi)/15} \approx 1.50174+0.6686\,i$

$\sqrt[15]{19+\frac{520\pi^2}{3}}\ e^{(4i\pi)/15} \approx 1.1000+1.2216\,i$

$\sqrt[15]{19+\frac{520\pi^2}{3}}\ e^{(2i\pi)/5} \approx 0.5080+1.5634\,i$

$\sqrt[15]{19+\frac{520\pi^2}{3}}\ e^{(8i\pi)/15} \approx -0.17183+1.63486\,i$

Alternative representations:

$$\sqrt[15]{-\left(\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2))+5\right)} = \sqrt[15]{19+1040\,\zeta(2,1)}$$

$$\sqrt[15]{-\left(\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2))+5\right)} = \sqrt[15]{19+1040\,S_{1,1}(1)}$$

$$\sqrt[15]{-\left(\frac{1}{2}((2+4)8)(-1)-\frac{1}{2}(2\times 2\times 2+2)(12+14)(8\zeta(2))+5\right)} = \sqrt[15]{19-\frac{1040\,\mathrm{Li}_2(-1)}{\frac{1}{2}}}$$

Series representations:

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=\sqrt[15]{19+1040\sum_{k=1}^{\infty}\frac{1}{k^2}}$$

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=\sqrt[15]{19-2080\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}}$$

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=$$
$$\sqrt[15]{19+\frac{4160}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2\,k)^2}}$$

Integral representations:

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=$$
$$\sqrt[15]{19+\frac{2080}{3}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}$$

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=$$
$$\sqrt[15]{19+\frac{8320}{3}\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2}$$

$$\sqrt[15]{-\left(\frac{1}{2}\,((2+4)\,8)\,(-1)-\frac{1}{2}\,(2\times 2\times 2+2)\,(12+14)\,(8\,\zeta(2))+5\right)}=$$
$$\sqrt[15]{19+\frac{2080}{3}\left(\int_0^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)^2}$$

Now, we have that:

$$\mathcal{M}_0^{(r)}\sim\tfrac{1}{2}\,(n_1+n_2)\hat{Q}_o(0)-\tfrac{1}{2}\,\left[2\cdot 2^{r/2}\cdot k_1k_2+2\right](m+\bar{m})\hat{Q}_v(\zeta\tau)\,. \qquad (454)$$

For n = 12, 14 ; m = 2, 4 ; r = 2; $Q_0 = Q_v = 8$; $k_1k_2 = 2$, we obtain:

1/2(12+14)*8-1/2(2*2*2+2)(2+4)*8*(zeta (2))

Input:

$$\frac{1}{2}(12+14)\times 8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\times 8\,\zeta(2))$$

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

Exact result:

$$104-40\,\pi^2$$

Decimal approximation:

-290.7841760435743447533796399950460454125479762896316250 56...

-290.784176…

Property:

$104-40\,\pi^2$ is a transcendental number

Alternate form:

$$-8\,(5\,\pi^2-13)$$

Alternative representations:

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104-240\,\zeta(2,1)$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104-240\,S_{1,1}(1)$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104+\frac{240\,\mathrm{Li}_2(-1)}{\frac{1}{2}}$$

Series representations:

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104-240\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104+480\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2))=104-320\sum_{k=0}^{\infty}\frac{1}{(1+2\,k)^2}$$

Integral representations:

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2)) = 104-640\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2)) = 104-160\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)(2+4)(8\,\zeta(2)) = 104-160\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

From which:

-1/4(((1/2(12+14)*8-1/2(2*2*2+2)(2+4)*8*(zeta (2))+34)))

Input:

$$-\frac{1}{4}\left(\frac{1}{2}(12+14)\times 8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\times 8\,\zeta(2))+34\right)$$

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

Exact result:

$$\frac{1}{4}(40\pi^2-138)$$

Decimal approximation:

64.19604401089358618834490999876151135313699407240790626413...

64.196044… ≈ 64

Property:

$\frac{1}{4}(-138+40\pi^2)$ is a transcendental number

Alternate forms:

$$10\pi^2-\frac{69}{2}$$

$$\frac{1}{2}(20\pi^2-69)$$

Alternative representations:

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{1}{4}(138-240\,\zeta(2,1))$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{1}{4}\left(138-240\,S_{1,1}(1)\right)$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{1}{4}\left(138+\frac{240\,\mathrm{Li}_2(-1)}{\frac{1}{2}}\right)$$

Series representations:

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{69}{2}+60\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{69}{2}-120\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{69}{2}+80\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=$$
$$-\frac{69}{2}+160\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=-\frac{69}{2}+40\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{4}\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times2\times2+2)((2+4)\,8\,\zeta(2))+34\right)(-1)=$$
$$-\frac{69}{2}+40\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

27*-1/4(((1/2(12+14)*8-1/2(2*2*2+2)(2+4)*8*(zeta (2))+34)))-4

Input:

$$\frac{27}{4}\times(-1)\left(\frac{1}{2}(12+14)\times 8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\times 8\,\zeta(2))+34\right)-4$$

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

Exact result:

$$-4-\frac{27}{4}\left(138-40\,\pi^2\right)$$

Decimal approximation:

1729.293188294126827085312569966560806534698839955013469131...

1729.29318829…

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

Property:

$-4-\frac{27}{4}\left(138-40\,\pi^2\right)$ is a transcendental number

Alternate forms:

$$270\,\pi^2-\frac{1871}{2}$$

$$\frac{1}{2}\left(540\,\pi^2-1871\right)$$

Alternative representations:

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4=$$
$$-4-\frac{27}{4}\left(138-240\,\zeta(2,1)\right)$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -4-\frac{27}{4}\left(138-240\,S_{1,1}(1)\right)$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -4-\frac{27}{4}\left(138+\frac{240\,\mathrm{Li}_2(-1)}{\frac{1}{2}}\right)$$

Series representations:

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}+1620\sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}-3240\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}+2160\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}+4320\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}+1080\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)8-\frac{1}{2}(2\times 2\times 2+2)((2+4)8\,\zeta(2))+34\right)\right)(-1)-4 = -\frac{1871}{2}+1080\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

(((27*-1/4(((1/2(12+14)*8-1/2(2*2*2+2)(2+4)*8*(zeta (2))+34)))-4)))^1/15

Input:

$$\sqrt[15]{\frac{27}{4}\times(-1)\left(\frac{1}{2}(12+14)\times 8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\times 8\,\zeta(2))+34\right)-4}$$

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

Exact result:

$$\sqrt[15]{-4-\frac{27}{4}(138-40\pi^2)}$$

Decimal approximation:

1.643833810173402610581831163516191926995739666197593178056...

1.64383381017.... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Property:

$\sqrt[15]{-4-\frac{27}{4}(138-40\pi^2)}$ is a transcendental number

Alternate forms:

$$\sqrt[15]{270\pi^2-\frac{1871}{2}}$$

$$\sqrt[15]{\frac{1}{2}(540\pi^2-1871)}$$

All 15th roots of -4 - 27/4 (138 - 40 π^2):

$\sqrt[15]{-4-\frac{27}{4}(138-40\pi^2)}\, e^0 \approx 1.64383$ (real, principal root)

$\sqrt[15]{-4-\frac{27}{4}(138-40\pi^2)}\, e^{(2 i\pi)/15} \approx 1.5017+0.6686\, i$

$\sqrt[15]{-4-\frac{27}{4}(138-40\pi^2)}\, e^{(4 i\pi)/15} \approx 1.0999+1.2216\, i$

$$\sqrt[15]{-4-\frac{27}{4}\left(138-40\pi^2\right)}\ e^{(2 i \pi)/5} \approx 0.5080+1.5634\, i$$

$$\sqrt[15]{-4-\frac{27}{4}\left(138-40\pi^2\right)}\ e^{(8 i \pi)/15} \approx -0.17183+1.63483\, i$$

Alternative representations:

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-4-\frac{27}{4}(138-240\,\zeta(2,1))}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-4-\frac{27}{4}\left(138-240\, S_{1,1}(1)\right)}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-4-\frac{27}{4}\left(138+\frac{240\,\mathrm{Li}_2(-1)}{\frac{1}{2}}\right)}$$

Series representations:

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}+1620\sum_{k=1}^{\infty}\frac{1}{k^2}}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}-3240\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}+2160\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}}$$

Integral representations:

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)\,((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}+1080\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)\,((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}+4320\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2}$$

$$\sqrt[15]{\frac{1}{4}\left(27\left(\frac{1}{2}(12+14)\,8-\frac{1}{2}(2\times 2\times 2+2)\,((2+4)\,8\,\zeta(2))+34\right)\right)(-1)-4} = \sqrt[15]{-\frac{1871}{2}+1080\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2}$$

Now, we have that:

Next we let $n_B = 1$ and $n_F = 0$, and demand that, within this single-charge assignment, the contributions in $\mathcal{A}$ and $\mathcal{M}$ be equal modulo two. This gives the conditions

$$b_1^2 = a_1^2\,, \qquad \tfrac{1}{2}(a_1^2 + b_1^2) = a_1 \bmod 2\,, \qquad \tfrac{1}{2}(a_1^2 + b_1^2) = b_1 \bmod 2\,, \tag{512}$$

that clearly admit the four solutions $a_1 = b_1 = \pm 1$ $a_1 = -b_1 = \pm 1$, two of which can be obtained from the others by the usual overall reversal of $\mathcal{M}$, while the choice $n_B = 0$, $n_F = 1$ leads again to these solutions. The general solution can then be obtained *superposing* an independent pair of these, say $a_1 = b_1 = b_2 = 1$, $a_2 = -1$, so that, as before

$$\begin{aligned} \mathcal{A} &= \tfrac{1}{2}(n_B^2 + n_F^2)(O_8 + V_8) - n_B n_F (S_8 + C_8)\,, \\ \mathcal{M} &= -\tfrac{1}{2}(n_B - n_F)\hat{O}_8 + \tfrac{1}{2}(n_B + n_F)\hat{V}_8\,. \end{aligned} \tag{513}$$

Notice that the restriction to the orientifold can be simply relaxed, so that the oriented D9 brane spectrum of the "parent" 0A model,

$$\begin{aligned} \tilde{\mathcal{A}} &= \frac{2^{-5}}{2}\left[|n_B + n_F|^2 V_8 + |n_B - n_F|^2 O_8\right]\,, \\ \mathcal{A} &= (n_B \bar{n}_B + n_F \bar{n}_F)(O_8 + V_8) - (n_B \bar{n}_F + n_F \bar{n}_B)(S_8 + C_8) \end{aligned} \tag{514}$$

can be recovered complexifying all multiplicities, as in the previous section. In analogy with our discussion of subsection 5.12, these amplitudes also describe uncharged branes of the 0B string.

From

$$\begin{aligned} \mathcal{A} &= \tfrac{1}{2}(n_B^2 + n_F^2)(O_8 + V_8) - n_B n_F (S_8 + C_8)\,, \\ \mathcal{M} &= -\tfrac{1}{2}(n_B - n_F)\hat{O}_8 + \tfrac{1}{2}(n_B + n_F)\hat{V}_8\,. \end{aligned}$$

For:

$V_8 - S_8 = 5 - 3 = 2$; $\eta = 2, 3, 7$ and $\vartheta = 1, 2, 2$

$$O_8 = \frac{\vartheta_3^4 + \vartheta_4^4}{2\eta^4} = 1 + 28q + \;\ldots\,,$$

$n_B = 1$ and $n_F = 0$

(2^4+2^4)/(2*2^4) = 1

we obtain:

1/2(1+5) = 3; (a)

-1/2 + 1/2*5

$$-\frac{1}{2}+\frac{1}{2}\times 5$$

2

2

and

$$\tilde{\mathcal{A}} = \frac{2^{-5}}{2}\left[|n_B+n_F|^2 V_8 + |n_B-n_F|^2 O_8\right] ,$$
$$\mathcal{A} = (n_B\bar{n}_B + n_F\bar{n}_F)(O_8+V_8) - (n_B\bar{n}_F + n_F\bar{n}_B)(S_8+C_8)$$

(2^(-5))/2 (5+1)

$$\frac{1}{2^5\times 2}(5+1)$$

$$\frac{3}{32}$$

0.09375

0.09375 (b)

(1+5)-0 = 6 (c)

From the results (a), (b) and (c), we obtain from the following expression:

1/2(1+5) * (2^(-5))/2 (5+1) + (1+5)

Input:

$$\frac{1}{2}(1+5)\times\frac{1}{2^5\times 2}(5+1)+(1+5)$$

Exact result:

$$\frac{201}{32}$$

Decimal form:

6.28125

6.28125

$2\pi \approx 6.2831853$

Now, we have that:

$$\tilde{\mathcal{M}} = -(n_1 + n_5 + n_9 + n_{13})\,\hat{\chi}_9^{\mathrm{R}} - (n_1 - n_5 + n_9 - n_{13})\,\hat{\chi}_9^{\mathrm{NS}}\,, \tag{530}$$

where we have introduced a minimal set of Chan-Paton multiplicities, that are to be subjected to the R-R tadpole conditions

$$\begin{aligned} &n_1 + n_5 + n_9 + n_{13} = 32\,, \\ &n_1 + n_5 - n_9 - n_{13} = 0\,, \\ &n_1 - n_5 + n_9 - n_{13} = 0\,, \\ &n_1 - n_5 - n_9 + n_{13} = 0\,. \end{aligned} \tag{531}$$

Finally, S and P modular transformations and a suitable relabelling of the multiplicities,

$$n_1 = n\,, \quad n_9 = \bar{n}\,, \quad n_5 = m\,, \quad n_{13} = \bar{m}\,, \tag{532}$$

give the direct-channel amplitudes

$$\begin{aligned} \mathcal{A} = &(n\bar{n} + m\bar{m})\chi_1 + (n\bar{m} + \bar{n}m)\tilde{\chi}_1 \\ &+ \tfrac{1}{2}(n^2 + \bar{n}^2 + m^2 + \bar{m}^2)\chi_9 + (nm + \bar{n}\bar{m})\tilde{\chi}_9\,, \end{aligned} \tag{533}$$

From (530), we obtain:

-32 – 0 = - 32

From (533), for n = 12, 14 ; m = 2, 4 ; we obtain:

(12*14+2*4)+(12*4+14*2)+1/2(12^2+14^2+2^2+4^2)+(12*2+14*4)

Input:

$$(12\times 14 + 2\times 4) + (12\times 4 + 14\times 2) + \frac{1}{2}\left(12^2 + 14^2 + 2^2 + 4^2\right) + (12\times 2 + 14\times 4)$$

Exact result:

512

512

We note that 512 = 64 * 8 and, dividing (533) by (530), we obtain:

(((12*14+2*4)+(12*4+14*2)+1/2(12^2+14^2+2^2+4^2)+(12*2+14*4))) / (-32)

Input:

$$-\frac{1}{32}\left((12\times 14+2\times 4)+(12\times 4+14\times 2)+\frac{1}{2}\left(12^2+14^2+2^2+4^2\right)+(12\times 2+14\times 4)\right)$$

Exact result:

-16

-16

From which, multiplying by -4 (where 4 is a Lucas number):

-4* (((12*14+2*4)+(12*4+14*2)+1/2(12^2+14^2+2^2+4^2)+(12*2+14*4))) / (-32)

Input:

$$-4\left(-\frac{1}{32}\left((12\times 14+2\times 4)+(12\times 4+14\times 2)+\frac{1}{2}\left(12^2+14^2+2^2+4^2\right)+(12\times 2+14\times 4)\right)\right)$$

Exact result:

64

64

and:

27* -4* (((12*14+2*4)+(12*4+14*2)+1/2(12^2+14^2+2^2+4^2)+(12*2+14*4))) / (-32) +1

Input:

$$27\times(-4)\left(-\frac{1}{32}\left((12\times 14+2\times 4)+(12\times 4+14\times 2)+\frac{1}{2}\left(12^2+14^2+2^2+4^2\right)+(12\times 2+14\times 4)\right)\right)+1$$

Exact result:

1729

1729

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

and:

[27* -4* (((12*14+2*4)+(12*4+14*2)+1/2(12^2+14^2+2^2+4^2)+(12*2+14*4))) / (-32) +1]^1/15

Input:

$$\left(27\times(-4)\left(-\frac{1}{32}\left((12\times14+2\times4)+(12\times4+14\times2)+\frac{1}{2}\left(12^2+14^2+2^2+4^2\right)+(12\times2+14\times4)\right)\right)+1\right)\hat{}\,(1/15)$$

Result:

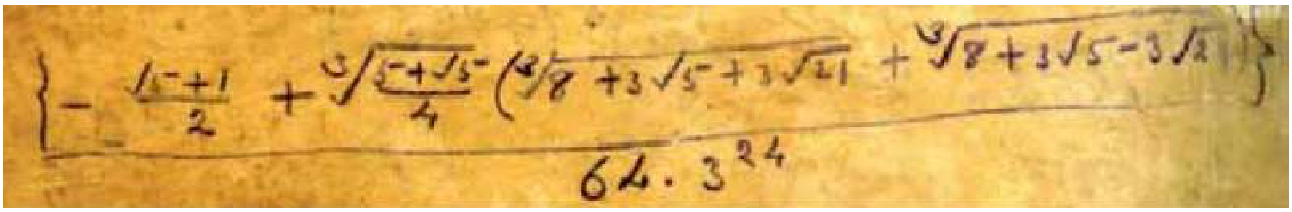
$$\sqrt[15]{1729}$$

Decimal approximation:

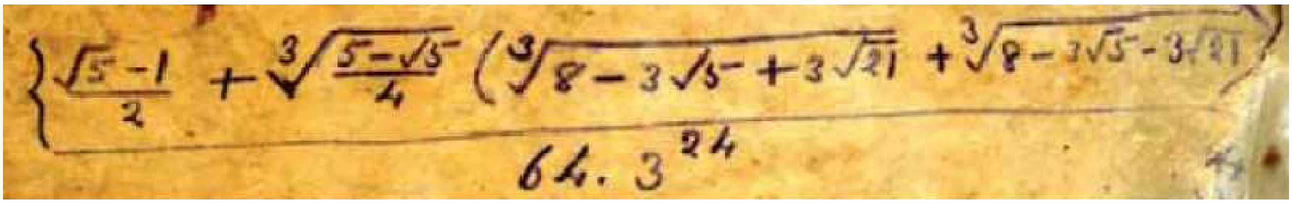
1.643815228748728130580088031324769514329283143699940172645...

$1.6438152\ldots. \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

From (**Manuscript Book 1 of Srinivasa Ramanujan**)



$$\frac{\left\{-\frac{\sqrt{5}+1}{2}+\sqrt[3]{\frac{5+\sqrt{5}}{4}}\left(\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}\right)\right\}}{64\cdot3^{24}}$$



$$\frac{\left\{\frac{\sqrt{5}-1}{2}+\sqrt[3]{\frac{5-\sqrt{5}}{4}}\left(\sqrt[3]{8-3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8-3\sqrt{5}-3\sqrt{21}}\right)\right.}{64.3^{24}}$$

We have:

[-((sqrt5+1)/2)+((5+sqrt5)/4)^(1/3) ((((8+3sqrt5+3sqrt21)^(1/3)+(8+3sqrt5-3sqrt21)^(1/3))))] / (64*3^24)

Input:

$$\frac{-\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)+\sqrt[3]{\frac{1}{4}\left(5+\sqrt{5}\right)}\left(\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}\right)}{64\times 3^{24}}$$

Result:

$$\frac{\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt[3]{5+\sqrt{5}}\left(\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}}{18\,075\,490\,334\,784}$$

Decimal approximation:

$1.8279599561322372839255373860016878509597369354090463\ldots\times 10^{-13}$

1.827959956…*10^{-13}

Alternate forms:

$$\frac{1}{36\,150\,980\,669\,568}\left(\sqrt[3]{2\left(55+23\sqrt{5}-15\sqrt{21}-3\sqrt{105}\right)}-\sqrt{5}+\sqrt[3]{2\left(55+23\sqrt{5}+15\sqrt{21}+3\sqrt{105}\right)}-1\right)$$

$$\frac{\boxed{\text{root of } x^6+6x^5-31\,104\,x+46\,656 \text{ near } x=6.60825}}{36\,150\,980\,669\,568}$$

root of
$47\,842\,404\,123\,805\,450\,009\,888\,355\,056\,253\,402\,699\,267\,854\,509\,007\,322\,416\,933\,021\,546\,481\,140\,629\,504\,x^6+7\,940\,432\,580\,974\,931\,735\,767\,800\,427\,068\,528\,151\,773\,115\,681\,168\,876\,033\,034\,682\,368\,x^5-24\,100\,653\,779\,712\,x+1$ near $x=1.82796\times 10^{-13}$

Minimal polynomial:

$$47842404123805450009888355056253402699267854509007322416933\cdot.\ 021546481140629504\,x^6 + 7940432580974931735767800427068528151773115681168876033034\cdot.\ 682368\,x^5 - 24100653779712\,x + 1$$

[((sqrt5-1)/2)+((5-sqrt5)/4)^(1/3) ((((8-3sqrt5+3sqrt21)^(1/3)+(8-3sqrt5-3sqrt21)^(1/3))))] / (64*3^24)

Input:

$$\frac{\frac{1}{2}\left(\sqrt{5}-1\right)+\sqrt[3]{\frac{1}{4}\left(5-\sqrt{5}\right)}\left(\sqrt[3]{8-3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8-3\sqrt{5}-3\sqrt{21}}\right)}{64\times 3^{24}}$$

Result:

$$\frac{\frac{1}{2}\left(\sqrt{5}-1\right)+\frac{\sqrt[3]{5-\sqrt{5}}\left(\sqrt[3]{8-3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8-3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}}{18075490334784}$$

Decimal approximation:

$2.1160891809279416610258928248508647072005801250915\ldots\times 10^{-13} + 9.8187242776351529979346008207321140609453291418362\ldots\times 10^{-14}\,i$

Polar coordinates:

$r \approx 2.33279\times 10^{-13}$ (radius), $\theta \approx 24.8915°$ (angle)

$2.33279*10^{-13}$

Alternate forms:

$$\frac{\left(\sqrt[3]{8-3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8-3\sqrt{5}+3\sqrt{21}}\right)\sqrt[3]{2\left(5-\sqrt{5}\right)}+\sqrt{5}-1}{36150980669568}$$

$$\frac{1}{36150980669568}\left(-1+\sqrt{5}+\sqrt[3]{2\left(55-23\sqrt{5}+15\sqrt{21}-3\sqrt{105}\right)}+\sqrt[3]{-2\left(-55+23\sqrt{5}+15\sqrt{21}-3\sqrt{105}\right)}\right)$$

$$\frac{-1+\sqrt{5}+\sqrt[3]{2\left(5-\sqrt{5}\right)\left(8-3\sqrt{5}+3\sqrt{21}\right)}+\sqrt[3]{-2\left(5-\sqrt{5}\right)\left(-8+3\sqrt{5}+3\sqrt{21}\right)}}{36150980669568}$$

Minimal polynomial:

$$1668604915979881695351737454408267987625601632216058736336592\cdot\!\!.\; 858529554743319494776204467151611007291101038284070287254603\cdot\!\!.\; 970031779306429864069351433163505664\,x^{12} + 553878722538064302872403744164877015187938094105204645688870\cdot\!\!.\; 677855728804290487098365818584744526132984211924514097188\cdot\!\!.\; 573936696108322137284018176\,x^{11} + 45963792318722989345088202385733762972755650778306932667861\cdot\!\!.\; 168383615592733329389682591259303075991021838152576559844\cdot\!\!.\; 887739913732096\,x^{10} - 50857588333602736867709001979785042654708519406787959401107\cdot\!\!.\; 420464505537713089153096983050287496843127761400761291898\cdot\!\!.\; 880\,x^9 - 4220432258681281227297818679881133792596343639348511722006\cdot\!\!.\; 373401582839175818995723384976627108269239828480\,x^8 + 1354237514278969982996680120746381893553208087686925862560\cdot\!\!.\; 692836413368416233089301338679934976\,x^7 + 604536618508405666324949254490817996507948609575816526060365\cdot\!\!.\; 660261335692994412544\,x^6 - 3430266874981170509851689784493604161565985974264954446270\cdot\!\!.\; 982782976\,x^5 - 6404888879159579418700897962727301826902341890248540160\,x^4 - 433083549822625895381277739795522608168960\,x^3 + 184925416577064307026584887296\,x^2 - 9471556935426816\,x + 139$$

Expanded form:

$$-\frac{1}{36150980669568} + \frac{\sqrt{5}}{36150980669568} + \frac{\sqrt[3]{(5-\sqrt{5})(8-3\sqrt{5}+3\sqrt{21})}}{18075490334784 \times 2^{2/3}} + \frac{\sqrt[3]{-(5-\sqrt{5})(-8+3\sqrt{5}+3\sqrt{21})}}{18075490334784 \times 2^{2/3}}$$

(2.33279*10^-13 / 1.827959956132 × 10^-13)^2

Input interpretation:

$$\left(\frac{2.33279 \times 10^{-13}}{1.827959956132 \times 10^{-13}}\right)^2$$

Result:

1.628613140077691830068197350737835805479086883658031886471...

1.62861314007…. result equal to a golden number

(2.33279*10^-13 / 1.827959956132 × 10^-13)^17 + ((1/18 (2 π! + 7 - 2 π)))

Input interpretation:

$$\left(\frac{2.33279\times 10^{-13}}{1.827959956132\times 10^{-13}}\right)^{17}+\frac{1}{18}\,(2\,\pi!+7-2\,\pi)$$

$n!$ is the factorial function

Result:

64.0000...

64

[-((sqrt5+1)/2)+((5+sqrt5)/4)^(1/3) ((((8+3sqrt5+3sqrt21)^(1/3)+(8+3sqrt5-3sqrt21)^(1/3))))] / (x*3^24) = 1.8279599561e-13

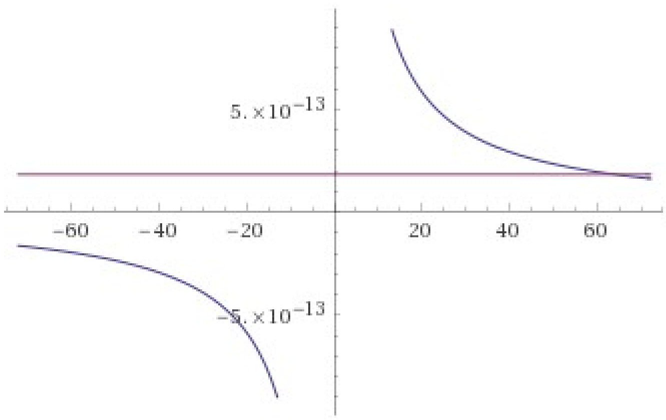
Input interpretation:

$$\frac{-\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)+\sqrt[3]{\frac{1}{4}\left(5+\sqrt{5}\right)}\left(\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}\right)}{x\times 3^{24}}=$$
$$1.8279599561\times 10^{-13}$$

Result:

$$\frac{\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt[3]{5+\sqrt{5}}\left(\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}}{282\,429\,536\,481\,x}=1.8279599561\times 10^{-13}$$

Plot:



$$\left(\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt[3]{5+\sqrt{5}}\left(\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}\right)\Big/(282429536481\,x)$$

$$1.8279599561\times 10^{-13}$$

Alternate form assuming x is real:

$$\frac{1.169894372\times10^{-11}}{x} = 1.827959956\times10^{-13}$$

Alternate forms:

$$\frac{\boxed{\text{root of } x^6+6x^5-31104x+46656 \text{ near } x = 6.60825}}{564859072962\,x} = 1.8279599561\times10^{-13}$$

$$\frac{\boxed{\begin{array}{l}\text{root of} \\ 696198609130885597695136021593547814689632716312296141651 \\ 066450089\,x^6 + \\ 7395104114874202511988394360121831439224179537192802907 \\ x^5 - 376572715308\,x + 1 \text{ near } x = 1.16989\times10^{-11}\end{array}}}{x}$$
$$= 1.8279599561\times10^{-13}$$

$$-\frac{1}{564859072962\,x}\left(1+\sqrt{5}-\sqrt[3]{2\left(55+23\sqrt{5}-15\sqrt{21}-3\sqrt{105}\right)}-\sqrt[3]{2\left(55+23\sqrt{5}+15\sqrt{21}+3\sqrt{105}\right)}\right) = 1.8279599561\times10^{-13}$$

Alternate form assuming x is positive:

$1.827959956\times10^{-13}\,x = 1.169894372\times10^{-11}$ (for $x \neq 0$)

Expanded form:

$$\frac{\sqrt[3]{(5+\sqrt{5})(8+3\sqrt{5}+3\sqrt{21})}}{282429536481\times2^{2/3}\,x}+\frac{\sqrt[3]{(5+\sqrt{5})(8+3\sqrt{5}-3\sqrt{21})}}{282429536481\times2^{2/3}\,x}-\frac{\sqrt{5}}{564859072962\,x}-\frac{1}{564859072962\,x} = 1.8279599561\times10^{-13}$$

Solution:

$x = 64$

64

[-((sqrt5+1)/2)+((5+sqrt5)/4)^(1/3) ((((8+3sqrt5+3sqrt21)^(1/3)+(8+3sqrt5-3sqrt21)^(1/3))))] / ((x/27)*3^24) = 1.8279599561e-13

Input interpretation:

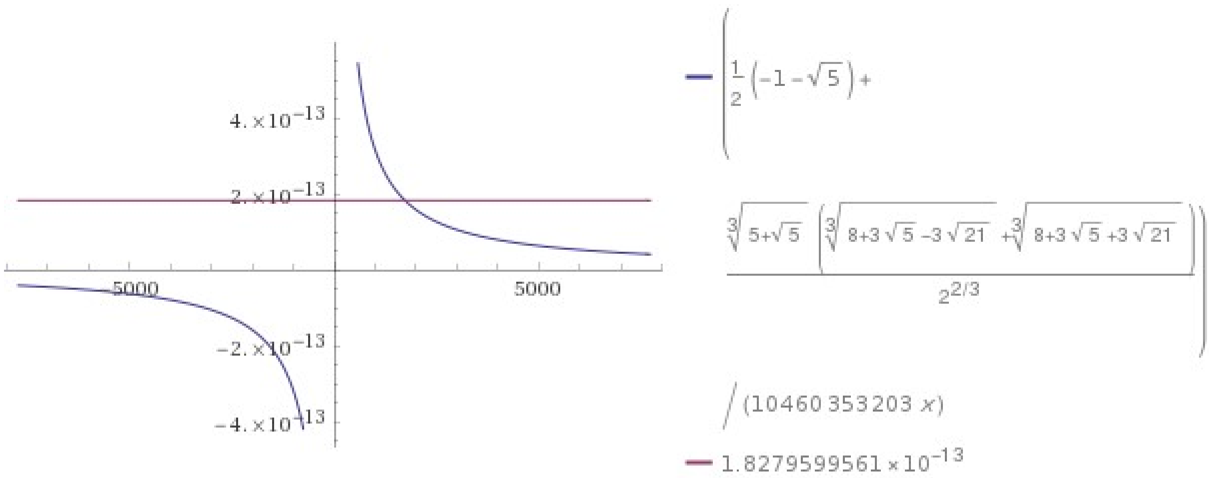
$$\frac{-\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)+\sqrt[3]{\frac{1}{4}\left(5+\sqrt{5}\right)}\left(\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}\right)}{\frac{x}{27}\times 3^{24}} =$$

$$1.8279599561\times 10^{-13}$$

Result:

$$\frac{\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt[3]{5+\sqrt{5}}\left(\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}}{10\,460\,353\,203\,x} = 1.8279599561\times 10^{-13}$$

Plot:



Alternate form assuming x is real:

$$\frac{3.158714804\times 10^{-10}}{x} = 1.827959956\times 10^{-13}$$

Alternate forms:

$$\frac{\boxed{\text{root of } x^6+6x^5-31\,104\,x+46\,656 \text{ near } x=6.60825}}{20\,920\,706\,406\,x} = 1.8279599561\times 10^{-13}$$

$$\frac{\text{root of } 1797010299914431210413179829509605039731475627537851106401\, x^6 + 515377520732011331036461129765621272702107522001\, x^5 - 13947137604\, x + 1 \text{ near } x = 3.15871\times10^{-10}}{x}$$

$$= 1.8279599561\times10^{-13}$$

$$-\frac{1}{20920706406\,x}\left(1+\sqrt{5}-\sqrt[3]{2\left(55+23\sqrt{5}-15\sqrt{21}-3\sqrt{105}\right)}-\sqrt[3]{2\left(55+23\sqrt{5}+15\sqrt{21}+3\sqrt{105}\right)}\right)=1.8279599561\times10^{-13}$$

Alternate form assuming x is positive:

$1.827959956\times10^{-13}\,x = 3.158714804\times10^{-10}$ (for $x \neq 0$)

Expanded form:

$$\frac{\sqrt[3]{(5+\sqrt{5})(8+3\sqrt{5}+3\sqrt{21})}}{10460353203\times2^{2/3}\,x}+\frac{\sqrt[3]{(5+\sqrt{5})(8+3\sqrt{5}-3\sqrt{21})}}{10460353203\times2^{2/3}\,x}-\frac{\sqrt{5}}{20920706406\,x}-\frac{1}{20920706406\,x}=1.8279599561\times10^{-13}$$

Solution:

$x = 1728$

1728

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

[-((sqrt5+1)/2)+((5+sqrt5)/4)^(1/3) ((((8+3sqrt5+3sqrt21)^(1/3)+(8+3sqrt5-3sqrt21)^(1/3))))] / (((x^15)/27)*3^24) = 1.8279599561e-13

Input interpretation:

$$\frac{-\left(\frac{1}{2}\left(\sqrt{5}+1\right)\right)+\sqrt[3]{\frac{1}{4}\left(5+\sqrt{5}\right)}\left(\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}\right)}{\frac{x^{15}}{27}\times 3^{24}} = 1.8279599561\times 10^{-13}$$

Result:

$$\frac{\frac{1}{2}\left(-1-\sqrt{5}\right)+\frac{\sqrt[3]{5+\sqrt{5}}\left(\sqrt[3]{8+3\sqrt{5}-3\sqrt{21}}+\sqrt[3]{8+3\sqrt{5}+3\sqrt{21}}\right)}{2^{2/3}}}{10\,460\,353\,203\,x^{15}} = 1.8279599561\times 10^{-13}$$

Alternate form assuming x is real:

$$\frac{2.301945821\times 10^{9}\,x^{15}-3.977762379\times 10^{12}}{x} = 0$$

Alternate forms:

$$\frac{\boxed{\text{root of } x^6+6x^5-31\,104\,x+46\,656 \text{ near } x=6.60825}}{20\,920\,706\,406\,x^{15}} = 1.8279599561\times 10^{-13}$$

$$\frac{\boxed{\begin{array}{l}\text{root of}\\ 1\,797\,010\,299\,914\,431\,210\,413\,179\,829\,509\,605\,039\,731\,475\,627\,537\,851\,106\,401\\ x^6+515\,377\,520\,732\,011\,331\,036\,461\,129\,765\,621\,272\,702\,107\,522\,001\,x^5-\\ 13\,947\,137\,604\,x+1 \text{ near } x=3.15871\times 10^{-10}\end{array}}}{x^{15}} = 1.8279599561\times 10^{-13}$$

$$-\frac{1}{20\,920\,706\,406\,x^{15}}\left(1+\sqrt{5}-\sqrt[3]{2\left(55+23\sqrt{5}-15\sqrt{21}-3\sqrt{105}\right)}-\sqrt[3]{2\left(55+23\sqrt{5}+15\sqrt{21}+3\sqrt{105}\right)}\right) = 1.8279599561\times 10^{-13}$$

Alternate form assuming x is positive:

$2.301945821\times 10^{9}\,x^{15} = 3.977762379\times 10^{12}$ (for $x \neq 0$)

Expanded form:

$$\frac{\sqrt[3]{\left(5+\sqrt{5}\right)\left(8+3\sqrt{5}+3\sqrt{21}\right)}}{10\,460\,353\,203\times 2^{2/3}\,x^{15}}+\frac{\sqrt[3]{\left(5+\sqrt{5}\right)\left(8+3\sqrt{5}-3\sqrt{21}\right)}}{10\,460\,353\,203\times 2^{2/3}\,x^{15}}-\frac{\sqrt{5}}{20\,920\,706\,406\,x^{15}}-\frac{1}{20\,920\,706\,406\,x^{15}} = 1.8279599561\times 10^{-13}$$

Real solution:

$x \approx 1.64375182952$

$1.64375182952 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

From:

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

$$\frac{32}{\pi} = (5\sqrt{5}-1) + \frac{47\sqrt{5}+29}{64}\left(\frac{1}{2}\right)^3\left(\frac{\sqrt{5}-1}{2}\right)^8 + \frac{89\sqrt{5}+59}{64^2}\left(\frac{1\cdot 3}{2\cdot 4}\right)^3\left(\frac{\sqrt{5}-1}{2}\right)^{16} + \cdots,$$

(5sqrt5-1)+1/64*(47sqrt5+29)*1/8*((sqrt5-1)/2)^8+1/64^2 * (89sqrt5+59)*(3/8)^3*((sqrt5-1)/2)^16

Input:

$$\left(5\sqrt{5}-1\right)+\frac{1}{64}\left(47\sqrt{5}+29\right)\times\frac{1}{8}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8+\frac{1}{64^2}\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}$$

Result:

$$-1+5\sqrt{5}+\frac{\left(\sqrt{5}-1\right)^8\left(29+47\sqrt{5}\right)}{131072}+\frac{27\left(\sqrt{5}-1\right)^{16}\left(59+89\sqrt{5}\right)}{137438953472}$$

Decimal approximation:

10.18591635745234529933672773439453907823343935074991009694...

10.18591635…

Alternate forms:

$$\frac{15\left(1041875\sqrt{5}-905609\right)}{2097152}$$

$$\frac{15628125\sqrt{5}}{2097152}-\frac{13584135}{2097152}$$

$$\frac{15\,628\,125\sqrt{5} - 13\,584\,135}{2\,097\,152}$$

Minimal polynomial:

$$1\,099\,511\,627\,776\, x^2 + 14\,243\,997\,941\,760\, x - 259\,165\,682\,844\,975$$

From which:

32/((((5sqrt5-1)+1/64*(47sqrt5+29)*1/8*((sqrt5-1)/2)^8+1/64^2 * (89sqrt5+59)*(3/8)^3*((sqrt5-1)/2)^16)))

Input:

$$\frac{32}{(5\sqrt{5} - 1) + \frac{1}{64}(47\sqrt{5} + 29) \times \frac{1}{8}\left(\frac{1}{2}(\sqrt{5} - 1)\right)^8 + \frac{1}{64^2}(89\sqrt{5} + 59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5} - 1)\right)^{16}}$$

Result:

$$\frac{32}{-1 + 5\sqrt{5} + \frac{(\sqrt{5}-1)^8 (29+47\sqrt{5})}{131072} + \frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137\,438\,953\,472}}$$

Decimal approximation:

3.141592653722094110325513887398231062068309787569351629942...

3.1415926537… ≈ π

Alternate forms:

$$\frac{16\,777\,216\,(905\,609 + 1\,041\,875\sqrt{5})}{17\,277\,712\,189\,665}$$

$$\frac{15\,193\,597\,804\,544 + 17\,479\,761\,920\,000\sqrt{5}}{17\,277\,712\,189\,665}$$

$$\frac{3\,495\,952\,384\,000\sqrt{5}}{3\,455\,542\,437\,933} + \frac{15\,193\,597\,804\,544}{17\,277\,712\,189\,665}$$

Minimal polynomial:

$$259\,165\,682\,844\,975\, x^2 - 455\,807\,934\,136\,320\, x - 1\,125\,899\,906\,842\,624$$

Multiplying by 2π the principal expression, we obtain:

2Pi* ((((5sqrt5-1)+1/64*(47sqrt5+29)*1/8*((sqrt5-1)/2)^8+1/64^2 * (89sqrt5+59)*(3/8)^3*((sqrt5-1)/2)^16)))

Input:

$$2\pi\left(\left(5\sqrt{5}-1\right)+\frac{1}{64}\left(47\sqrt{5}+29\right)\times\frac{1}{8}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8+\frac{1}{64^2}\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}\right)$$

Result:

$$2\left(-1+5\sqrt{5}+\frac{\left(\sqrt{5}-1\right)^8\left(29+47\sqrt{5}\right)}{131072}+\frac{27\left(\sqrt{5}-1\right)^{16}\left(59+89\sqrt{5}\right)}{137438953472}\right)\pi$$

Decimal approximation:

63.9999999730478877037356118727778112992174448981692286347...

63.9999… ≈ 64

Property:

$$2\left(-1+5\sqrt{5}+\frac{\left(-1+\sqrt{5}\right)^8\left(29+47\sqrt{5}\right)}{131072}+\frac{27\left(-1+\sqrt{5}\right)^{16}\left(59+89\sqrt{5}\right)}{137438953472}\right)\pi$$

is a transcendental number

Alternate forms:

$$\frac{\pi\, 15\left(1041875\sqrt{5}-905609\right)}{1048576}$$

$$\frac{\left(15628125\sqrt{5}-13584135\right)\pi}{1048576}$$

$$\frac{15628125\sqrt{5}\,\pi}{1048576}-\frac{13584135\,\pi}{1048576}$$

Series representations:

$$2\pi\left(\left(5\sqrt{5}-1\right)+\frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64\times 8}+\frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2}\right)=$$
$$2\pi\left(-1+5\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+\frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^8\left(29+47\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{131072}+\frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{137438953472}\right)$$

$$2\pi\left(\left(5\sqrt{5}-1\right)+\frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64\times 8}+\frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2}\right)=$$
$$2\pi\left(-1+5\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^8\left(29+47\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{131072}+\frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{137438953472}\right)$$

$$2\pi\left(\left(5\sqrt{5}-1\right)+\frac{\left(47\sqrt{5}+29\right)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8}{64\times 8}+\frac{\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}}{64^2}\right)=$$

$$2\pi\left(-1+5\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\frac{\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^8\left(29+47\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)}{131\,072}+\frac{1}{137\,438\,953\,472}\,27\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^{16}\left(59+89\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)$$

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

27*2Pi((((5sqrt5-1)+1/64*(47sqrt5+29)*1/8*((sqrt5-1)/2)^8+1/64^2 *(89sqrt5+59)*(3/8)^3*((sqrt5-1)/2)^16)))

Input:

$$27\times 2\pi\left(\left(5\sqrt{5}-1\right)+\frac{1}{64}\left(47\sqrt{5}+29\right)\times\frac{1}{8}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8+\frac{1}{64^2}\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}\right)$$

Result:

$$54\left(-1+5\sqrt{5}+\frac{\left(\sqrt{5}-1\right)^8\left(29+47\sqrt{5}\right)}{131\,072}+\frac{27\left(\sqrt{5}-1\right)^{16}\left(59+89\sqrt{5}\right)}{137\,438\,953\,472}\right)\pi$$

Decimal approximation:

1727.999999272292968000861520565000905078871012250569173 13...

1727.9999 ≈ 1728

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

Property:

$$54\left(-1+5\sqrt{5}+\frac{(-1+\sqrt{5})^8(29+47\sqrt{5})}{131072}+\frac{27(-1+\sqrt{5})^{16}(59+89\sqrt{5})}{137438953472}\right)\pi$$

is a transcendental number

Alternate forms:

$$\frac{405\pi(1041875\sqrt{5}-905609)}{1048576}$$

$$\frac{(421959375\sqrt{5}-366771645)\pi}{1048576}$$

$$\frac{421959375\sqrt{5}\,\pi}{1048576}-\frac{366771645\pi}{1048576}$$

Series representations:

$$27\times 2\pi\left((5\sqrt{5}-1)+\frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64\times 8}+\frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2}\right)=$$

$$54\pi\left(-1+5\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+\frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^8\left(29+47\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{131072}+\frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{137438953472}\right)$$

$$27 \times 2\pi \left(\left(5\sqrt{5}-1\right) + \frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64 \times 8} + \frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2} \right) =$$

$$54\pi \left(-1 + 5\sqrt{4} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k}{k!} + \frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^8 \left(29+47\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{131\,072} + \frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{137\,438\,953\,472} \right)$$

$$27 \times 2\pi \left(\left(5\sqrt{5}-1\right) + \frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64 \times 8} + \frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2} \right) =$$

$$54\pi \left(-1 + 5\sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (5-z_0)^k z_0^{-k}}{k!} + \frac{\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^8 \left(29+47\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)}{131\,072} + \frac{1}{137\,438\,953\,472}\, 27 \left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^{16} \left(59+89\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right) \right)$$

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

[27*2Pi((((5sqrt5-1)+1/64*(47sqrt5+29)*1/8*((sqrt5-1)/2)^8+1/64^2 * (89sqrt5+59)*(3/8)^3*((sqrt5-1)/2)^16)))]^1/15

Input:

$$\left(27\times 2\pi\left(\left(5\sqrt{5}-1\right)+\frac{1}{64}\left(47\sqrt{5}+29\right)\times\frac{1}{8}\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8+\frac{1}{64^2}\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}\right)\right)\hat{}\,(1/15)$$

Exact result:

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131\,072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137\,438\,953\,472}\right)\pi}$$

Decimal approximation:

1.643751829512610909819205335727061993363805434231177509417...

1.6437518295…. ≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

Property:

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(-1+\sqrt{5})^8(29+47\sqrt{5})}{131\,072}+\frac{27(-1+\sqrt{5})^{16}(59+89\sqrt{5})}{137\,438\,953\,472}\right)\pi}$$

is a transcendental number

Alternate forms:

$$\sqrt[5]{3}\ \sqrt[15]{2\left(\frac{15\,628\,125\sqrt{5}}{2\,097\,152}-\frac{13\,584\,135}{2\,097\,152}\right)\pi}$$

$$\frac{\sqrt[5]{3}\ \sqrt[15]{(15\,628\,125\sqrt{5}-13\,584\,135)\pi}}{2\sqrt[3]{2}}$$

$$\frac{3^{4/15}\ \sqrt[15]{5(1\,041\,875\sqrt{5}-905\,609)\pi}}{2\sqrt[3]{2}}$$

All 15th roots of 54 (-1 + 5 sqrt(5) + ((sqrt(5) - 1)^8 (29 + 47 sqrt(5)))/131072 + (27 (sqrt(5) - 1)^16 (59 + 89 sqrt(5)))/137438953472) π:

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137438953472}\right)\pi}\ e^0$$

≈ 1.64375 (real, principal root)

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137438953472}\right)\pi}\ e^{(2i\pi)/15} \approx 1.5016+0.6686\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137438953472}\right)\pi}\ e^{(4i\pi)/15} \approx 1.0999+1.2215\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137438953472}\right)\pi}\ e^{(2i\pi)/5} \approx 0.5079+1.5633\,i$$

$$\sqrt[5]{3}\ \sqrt[15]{2\left(-1+5\sqrt{5}+\frac{(\sqrt{5}-1)^8(29+47\sqrt{5})}{131072}+\frac{27(\sqrt{5}-1)^{16}(59+89\sqrt{5})}{137438953472}\right)\pi}\ e^{(8i\pi)/15} \approx -0.17182+1.63475\,i$$

Series representations:

$$\left(27\times 2\pi\left(\left(5\sqrt{5}-1\right)+\frac{(47\sqrt{5}+29)\left(\frac{1}{2}(\sqrt{5}-1)\right)^8}{64\times 8}+\frac{(89\sqrt{5}+59)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}(\sqrt{5}-1)\right)^{16}}{64^2}\right)\right)^\wedge(1/15) = \sqrt[15]{2}\ \sqrt[5]{3}\left(\pi\left(-1+5\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+\frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^8\left(29+47\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{131072}+\frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}{137438953472}\right)\right)^\wedge(1/15)$$

$$\left(27\times 2\pi\left(\left(5\sqrt{5}-1\right)+\frac{\left(47\sqrt{5}+29\right)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8}{64\times 8}+\frac{\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}}{64^2}\right)\right)^\wedge$$

$$(1/15)=\sqrt[15]{2}\,\sqrt[5]{3}\left(\pi\left(-1+5\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\frac{\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^8\left(29+47\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{131\,072}+\frac{27\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^{16}\left(59+89\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}{137\,438\,953\,472}\right)\right)^\wedge(1/15)$$

$$\left(27\times 2\pi\left(\left(5\sqrt{5}-1\right)+\frac{\left(47\sqrt{5}+29\right)\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^8}{64\times 8}+\frac{\left(89\sqrt{5}+59\right)\left(\frac{3}{8}\right)^3\left(\frac{1}{2}\left(\sqrt{5}-1\right)\right)^{16}}{64^2}\right)\right)^\wedge(1/15)=$$

$$\sqrt[15]{2}\,\sqrt[5]{3}\left(\pi\left(-1+5\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\frac{1}{131\,072}\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^8\left(29+47\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)+\frac{1}{137\,438\,953\,472}\,27\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^{16}\left(59+89\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\right)^\wedge$$

$$(1/15)\quad \text{for (not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$$

Integral representation:

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

We note that the various values, very close to ζ (2), are recurrent and have, although with slight variations, a "repetitive" trend, typical of fractal mathematics.

Observations

From:
https://www.scientificamerican.com/article/mathematics-ramanujan/?fbclid=IwAR2caRXrn_RpOSvJ1QxWsVLBcJ6KVgd_Af_hrmDYBNyU8mpSjRs1BDeremA

Ramanujan's statement concerned the deceptively simple concept of partitions—the different ways in which a whole number can be subdivided into smaller numbers. Ramanujan's original statement, in fact, stemmed from the observation of patterns, such as the fact that p(9) = 30, p(9 + 5) = 135, p(9 + 10) = 490, p(9 + 15) = 1,575 and so on are all divisible by 5. Note that here the n's come at intervals of five units.

Ramanujan posited that this pattern should go on forever, and that similar patterns exist when 5 is replaced by 7 or 11—there are infinite sequences of p(n) that are all divisible by 7 or 11, or, as mathematicians say, in which the "moduli" are 7 or 11.

Then, in nearly oracular tone Ramanujan went on: "There appear to be corresponding properties," he wrote in his 1919 paper, "in which the moduli are powers of 5, 7 or 11...and no simple properties for any moduli involving primes other than these three." (Primes are whole numbers that are only divisible by themselves or by 1.) Thus, for instance, there should be formulas for an infinity of n's separated by 5^3 = 125 units, saying that the corresponding p(n)'s should all be divisible by 125.
In the past methods developed to understand partitions have later been applied to physics problems such as the theory of the strong nuclear force or the entropy of black holes.

From Wikipedia

In particle physics, Yukawa's interaction or Yukawa coupling, named after Hideki Yukawa, is an interaction between a scalar field ϕ and a Dirac field ψ. The Yukawa interaction can be used to describe the nuclear force between nucleons (which are fermions), mediated by pions (which are pseudoscalar mesons). The Yukawa interaction is also used in the Standard Model to describe the coupling between the Higgs field and massless quark and lepton fields (i.e., the fundamental fermion particles). Through spontaneous symmetry breaking, these fermions acquire a mass proportional to the vacuum expectation value of the Higgs field.

Can be this the motivation that from the development of the Ramanujan's equations we obtain results 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 and practically equal to the rest mass of Pion meson 139.57 MeV

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)

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.

In mathematics, the Fibonacci numbers, commonly denoted F_n, form a sequence, called the Fibonacci sequence, such that each number is the sum of the two preceding ones, starting from 0 and 1. Fibonacci numbers are strongly related to the golden ratio: Binet's formula expresses the nth Fibonacci number in terms of n and the golden ratio, and implies that the ratio of two consecutive Fibonacci numbers tends to the golden ratio as n increases.
Fibonacci numbers are also closely related to Lucas numbers ,in that the Fibonacci and Lucas numbers form a complementary pair of Lucas sequences

The beginning of the sequence is thus:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, 17711, 28657, 46368, 75025, 121393, 196418, 317811, 514229, 832040, 1346269, 2178309, 3524578, 5702887, 9227465, 14930352, 24157817, 39088169, 63245986, 102334155...

The Lucas numbers or Lucas series are an integer sequence named after the mathematician François Édouard Anatole Lucas (1842–91), who studied both that sequence and the closely related Fibonacci numbers. Lucas numbers and Fibonacci numbers form complementary instances of Lucas sequences.

The Lucas sequence has the same recursive relationship as the Fibonacci sequence, where each term is the sum of the two previous terms, but with different starting values. This produces a sequence where the ratios of successive terms approach the golden ratio, and in fact the terms themselves are roundings of integer powers of the golden ratio.[1] The sequence also has a variety of relationships with the Fibonacci numbers, like the fact that adding any two Fibonacci numbers two terms apart in the Fibonacci sequence results in the Lucas number in between.

The sequence of Lucas numbers is:

2, 1, 3, 4, 7, 11, 18, 29, 47, 76, 123, 199, 322, 521, 843, 1364, 2207, 3571, 5778, 9349, 15127, 24476, 39603, 64079, 103682, 167761, 271443, 439204, 710647, 1149851, 1860498, 3010349, 4870847, 7881196, 12752043, 20633239, 33385282, 54018521, 87403803……

All Fibonacci-like integer sequences appear in shifted form as a row of the Wythoff array; the Fibonacci sequence itself is the first row and the Lucas sequence is the second row. Also like all Fibonacci-like integer sequences, the ratio between two consecutive Lucas numbers converges to the golden ratio.

A Lucas prime is a Lucas number that is prime. The first few Lucas primes are:

2, 3, 7, 11, 29, 47, 199, 521, 2207, 3571, 9349, 3010349, 54018521, 370248451, 6643838879, ... (sequence A005479 in the OEIS).

In geometry, a golden spiral is a logarithmic spiral whose growth factor is φ, the golden ratio.[1] That is, a golden spiral gets wider (or further from its origin) by a factor of φ for every quarter turn it makes. Approximate logarithmic spirals can occur in nature, for example the arms of spiral galaxies[3] - golden spirals are one special case of these logarithmic spirals

We observe that 1728 and 1729 are results very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. 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).

Furthermore, we obtain as results of our computations, always values very near to the Higgs boson mass 125.18 GeV and practically equals to the rest mass of Pion meson 139.57 MeV. In conclusion we obtain also many results that are very good approximations to the value of the golden ratio 1.618033988749... and to ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

We note how the following three values: 137.508 (golden angle), 139.57 (mass of the Pion - meson Pi) and 125.18 (mass of the Higgs boson), are connected to each other. In fact, just add 2 to 137.508 to obtain a result very close to the mass of the Pion and subtract 12 to 137.508 to obtain a result that is also very close to the mass of the Higgs boson. We can therefore hypothesize that it is the golden angle (and the related golden ratio inherent in it) to be a fundamental ingredient both in the structures of the microcosm and in those of the macrocosm.

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

Original Ramanujan’s representation of Taxicab number 1729

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