On the possible mathematical connections between Ramanujan formulas, equations concerning Feynman Rules of Quantum Field Theory, formulas of fermionic higher-spin fields and some sectors of Number Theory. II

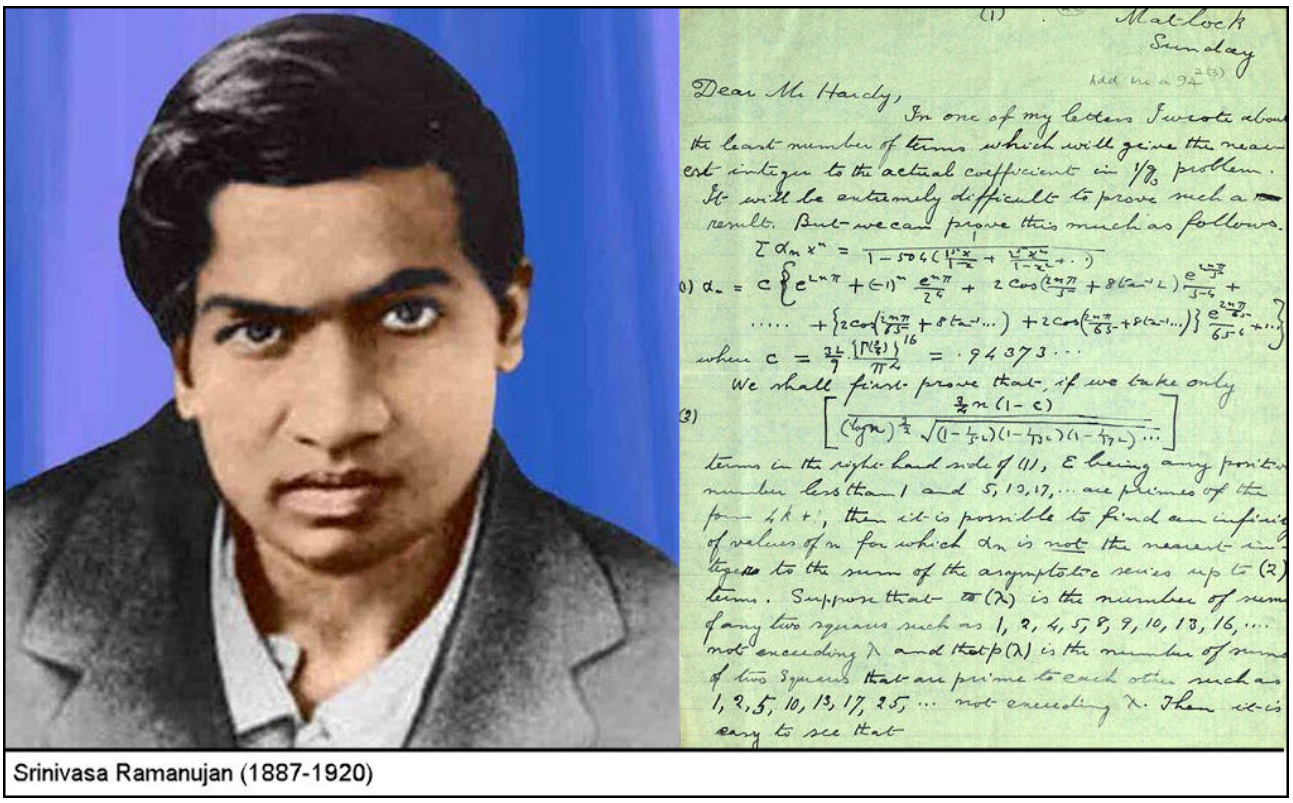
Michele Nardelli[1], Antonio Nardelli[2]

Abstract

In this research thesis, we describe and analyze the possible mathematical connections between Ramanujan formulas, equations concerning Feynman Rules of Quantum Field Theory, formulas of fermionic higher-spin fields and some sectors of Number Theory.

[1] M.Nardelli studied at Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

[2] A. Nardelli studies at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**



Srinivasa Ramanujan (1887-1920)

https://the-1000-year-view.com/2020/04/25/ramanujan-and-me/

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

From:

The Quantum Theory of Fields Volume I - Foundations
Steven Weinberg - University of Texas at Austin – © Steven Weinberg 1995

We consider always

$m = 9.1093837015(28)\times10^{-31}$ kg (electron mass)

p = 0.72 MeV that regard p, i.e. momentum of the electron emitted in the beta decay;
m = 9.1093837e-31 , we obtain:

convert 0.72 MeV/c^2 to kilograms

1.28×10^{-30} kg (kilograms)
$1.28*10^{-30}$ kg

Now, we have, with regard the Feynman rules and the calculation of the propagator, the following equations:

This can be combined with the Fourier integral (6.2.9) for $\Delta_+(x)$. We introduce new integration variables, $\mathbf{q} \equiv \mathbf{p}$, $q^0 = p^0 + s$ in the first term of Eq. (6.2.13), yielding

$$-i\Delta_F(x) - -\frac{1}{2\pi i}\int d^3q \int_{-\infty}^{\infty} dq^0 \frac{\exp(i\mathbf{q}\cdot\mathbf{x} - iq^0x^0)}{(2\pi)^3\sqrt{2\sqrt{\mathbf{q}^2+m^2}}} \times \left[\left(q^0 - \sqrt{\mathbf{q}^2+m^2} - i\epsilon\right)^{-1} + \left(-q^0 - \sqrt{\mathbf{q}^2+m^2} - i\epsilon\right)^{-1}\right].$$

$$\left(\text{for } p^0 = \sqrt{\mathbf{p}^2+m^2}\right)$$

Combining denominators and adopting a four-dimensional notation, we have simply

$$\Delta_F(x) = (2\pi)^{-4} \int d^4q \, \frac{\exp(iq \cdot x)}{q^2 + m^2 - i\epsilon} , \qquad (6.2.16)$$

where $q^2 \equiv \mathbf{q}^2 - (q^0)^2$. (In the denominator we have replaced $2\epsilon\sqrt{\mathbf{q}^2 + m^2}$

For:

$s = -i\epsilon.$

$\mathbf{q} = \mathbf{p}, q^0 = p^0 + s$

p = 1.28e-30 ; **q** = 1.28e-30 ; m = 9.1093837e-31 ;

sqrt[(1.28e-30)^2+(9.1093837e-31)^2]

Input interpretation:

$$\sqrt{(1.28 \times 10^{-30})^2 + (9.1093837 \times 10^{-31})^2}$$

Result:

$1.57105... \times 10^{-30}$

$1.57105...*10^{-30} = p^0$

$$q^0 = p^0 + s$$

$s = -i\epsilon.$

Input interpretation:

$$1.57105 \times 10^{-30} - i \times \frac{1}{24}$$

i is the imaginary unit

Result:

$1.57105 \times 10^{-30} -$
$0.041666666666666666666666666666666667... \, i$

Polar coordinates:

$r = 0.0416667$ (radius), $\theta = -90°$ (angle)

$0.0416667 = q^0$

$$q^2 \equiv \mathbf{q}^2 - (q^0)^2$$

q^2 = (1.28e-30)^2-(0.0416667)^2

From:

$$\Delta_F(x) = (2\pi)^{-4} \int d^4q \, \frac{\exp(iq \cdot x)}{q^2 + m^2 - i\epsilon} \, ,$$

we obtain:

(1/(2Pi)^4) * integrate(1.28e-30 * ((exp(i*1.28e-30)))/((((1.28e-30)^2-(0.0416667)^2)+ (9.1093837e-31)^2-i*1/24)))d^4x

Input interpretation:

$$\frac{1}{(2\pi)^4} \int \left(1.28 \times 10^{-30} \times \frac{\exp(i \times 1.28 \times 10^{-30})}{((1.28 \times 10^{-30})^2 - 0.0416667^2) + (9.1093837 \times 10^{-31})^2 - i \times \frac{1}{24}} \right) d^4x \, dx$$

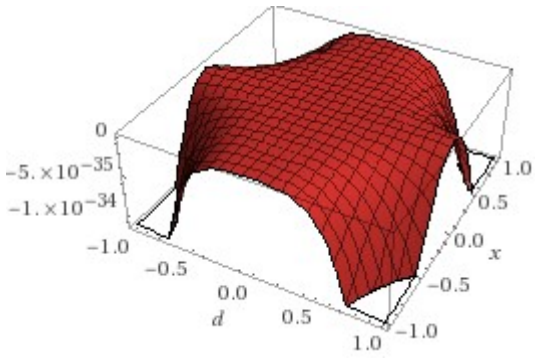
i is the imaginary unit

Result:

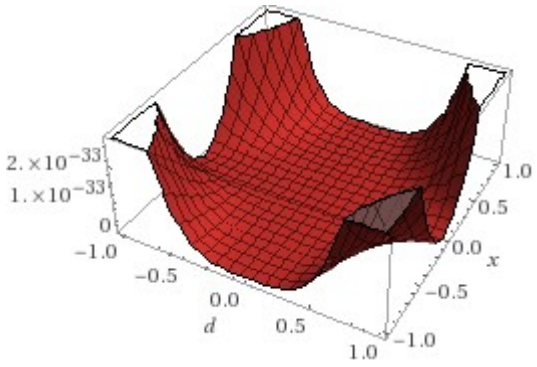
$(-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i)\, d^4x^2$

3D plots:

Real part

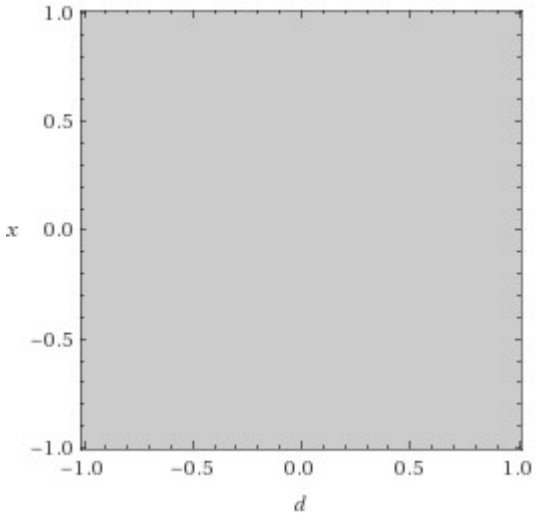


Imaginary part

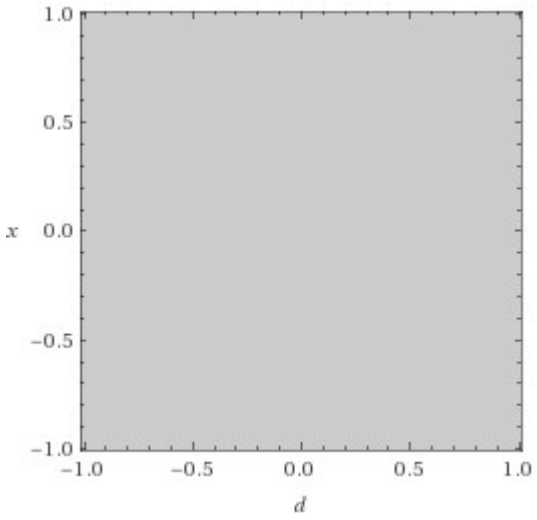


Contour plots:

Real part



Imaginary part



Alternate form assuming d and x are real:

$$-4.09928\times10^{-34}\,d^4\,x^2 + i\,(9.83826\times10^{-33}\,d^4\,x^2 + 0) + 0$$

(-4.09928×10^-34 + 9.83826×10^-33 i)

Input interpretation:

$$-4.09928\times10^{-34} + 9.83826\times10^{-33}\,i$$

i is the imaginary unit

Result:

$$-4.09928\ldots\times10^{-34} + 9.83826\ldots\times10^{-33}\,i$$

Polar coordinates:

$r = 9.8468\times10^{-33}$ (radius), $\theta = 92.3859°$ (angle)

$9.8468*10^{-33}$

Now:

$$P_{\ell m}(p) = \left[(-i\gamma_\mu p^\mu + m)\beta\right]_{\ell m},$$

(-i*1.28e-30 + 9.1093837e-31)

Input interpretation:

$$-i \times 1.28 \times 10^{-30} + 9.1093837 \times 10^{-31}$$

i is the imaginary unit

Result:

$9.10938... \times 10^{-31} - 1.28 \times 10^{-30}\, i$

Polar coordinates:

$r = 1.57105 \times 10^{-30}$ (radius), $\theta = -54.5617°$ (angle)

$1.57105*10^{-30}$

From

$$\Delta_{\ell m}(x, y) = (2\pi)^{-4} \int d^4 q \, \frac{P_{\ell m}^{(L)}(q) e^{iq \cdot (x-y)}}{q^2 + m^2 - i\epsilon} \,. \qquad (6.2.18)$$

$\mathbf{q} = \mathbf{p}, \, q^0 = p^0 + s$

p = 1.28e-30 ; **q** = 1.28e-30 ; m = 9.1093837e-31 ;

q^2 = (1.28e-30)^2-(0.0416667)^2

we obtain:

(1/(2Pi)^4) * integrate(((1.28e-30)^2 -(0.0416667)^2) * 1.57105e-30 * ((exp(i*1.28e-30)))/((((1.28e-30)^2-(0.0416667)^2)+ (9.1093837e-31)^2-i*1/24)))d^4x

Input interpretation:

$$\frac{1}{(2\pi)^4} \int \left(((1.28 \times 10^{-30})^2 - 0.0416667^2) \times 1.57105 \times 10^{-30} \times \frac{\exp(i \times 1.28 \times 10^{-30})}{((1.28 \times 10^{-30})^2 - 0.0416667^2) + (9.1093837 \times 10^{-31})^2 - i \times \frac{1}{24}} \right) d^4 x \, dx$$

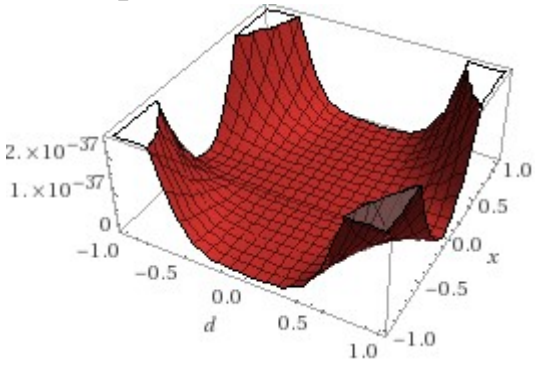
i is the imaginary unit

Result:

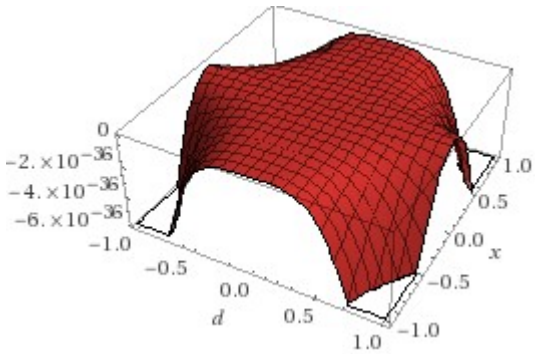
$$(8.73506\times10^{-37} - 2.09641\times10^{-35}\, i)\, d^4\, x^2$$

3D plots:

Real part

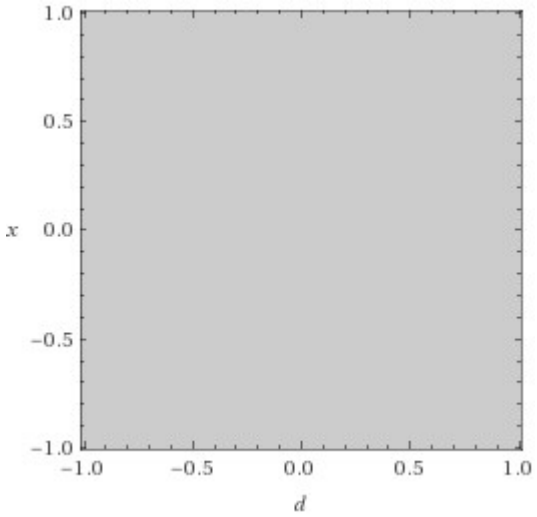


Imaginary part

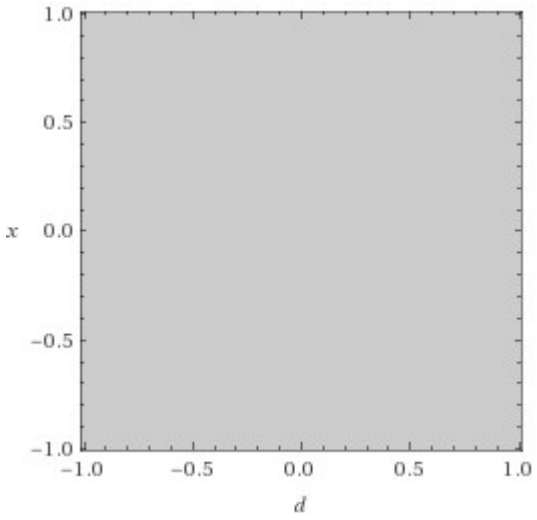


Contour plots:

Real part



Imaginary part



Alternate form assuming d and x are real:

$$8.73506\times10^{-37}\,d^4\,x^2+i\,(0-2.09641\times10^{-35}\,d^4\,x^2)+0$$

(8.73506×10^-37 - 2.09641×10^-35 i)

Input interpretation:

$$8.73506\times10^{-37}-2.09641\times10^{-35}\,i$$

i is the imaginary unit

Result:

$$8.73506\ldots\times10^{-37}-2.09641\ldots\times10^{-35}\,i$$

Polar coordinates:

$r = 2.09823\times10^{-35}$ (radius), $\theta = -87.6141°$ (angle)

$2.09823*10^{-35}$

From the ratio of the two results, we obtain:

(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)

Input interpretation:

$$\frac{-4.09928\times10^{-34}+9.83826\times10^{-33}\,i}{8.73506\times10^{-37}-2.09641\times10^{-35}\,i}$$

i is the imaginary unit

Result:

$-469.291... + 0.0000171599... i$

Polar coordinates:

$r = 469.291$ (radius), $\theta = 180.°$ (angle)

469.291

From which:

-2[(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]

Input interpretation:

$$-2 \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i}$$

i is the imaginary unit

Result:

$938.582... - 0.0000343198... i$

Polar coordinates:

$r = 938.582$ (radius), $\theta = -2.09506 \times 10^{-6}°$ (angle)

938.582 result practically equal to the rest mass of proton

((-1/3 (1655/38)^(1/3) π)) * [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]

Input interpretation:

$$\left(-\frac{1}{3}\sqrt[3]{\frac{1655}{38}}\,\pi\right) \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i}$$

i is the imaginary unit

Result:

1729.06... –
0.0000632240... i

Polar coordinates:

$r = 1729.06$ (radius), $\theta = -2.09506 \times 10^{-6}{}^\circ$ (angle)

1729.06

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:

((((((-1/3 (1655/38)^(1/3) π)) * [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)])))^1/15

Input interpretation:

$$\sqrt[15]{\left(-\frac{1}{3}\sqrt[3]{\frac{1655}{38}}\,\pi\right)\times\frac{-4.09928\times10^{-34}+9.83826\times10^{-33}\,i}{8.73506\times10^{-37}-2.09641\times10^{-35}\,i}}$$

i is the imaginary unit

Result:

1.643819... –
4.007149... × 10^{-9} i

Polar coordinates:

$r = 1.64382$ (radius), $\theta = -1.3967 \times 10^{-7}{}^\circ$ (angle)

$1.64382 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

and:

1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+18-1

Input interpretation:

$$\frac{1}{3} \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i} + 18 - 1$$

i is the imaginary unit

Result:

$$-139.430... + 5.71997... \times 10^{-6}\, i$$

Polar coordinates:

$r = 139.43$ (radius), $\theta = 180.°$ (angle)

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

1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+29+2

Input interpretation:

$$\frac{1}{3} \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i} + 29 + 2$$

i is the imaginary unit

Result:

$$-125.430... + 5.71997... \times 10^{-6}\, i$$

Polar coordinates:

$r = 125.43$ (radius), $\theta = 180.°$ (angle)

125.43 result very near to the Higgs boson mass 125.18 GeV

and again:

1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+18+2/5

Input interpretation:

$$\frac{1}{3} \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i} + 18 + \frac{2}{5}$$

i is the imaginary unit

Result:

$$-138.030... + 5.71997... \times 10^{-6}\, i$$

Polar coordinates:

$r = 138.03$ (radius), $\theta = 180.°$ (angle)

138.03

1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+21+2/5

Input interpretation:

$$\frac{1}{3} \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i} + 21 + \frac{2}{5}$$

i is the imaginary unit

Result:

$$-135.030... + 5.71997... \times 10^{-6}\, i$$

Polar coordinates:

$r = 135.03$ (radius), $\theta = 180.°$ (angle)

135.03

1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]-18+2+2/5

Input interpretation:

$$\frac{1}{3} \times \frac{-4.09928 \times 10^{-34} + 9.83826 \times 10^{-33}\, i}{8.73506 \times 10^{-37} - 2.09641 \times 10^{-35}\, i} - 18 + 2 + \frac{2}{5}$$

i is the imaginary unit

Result:

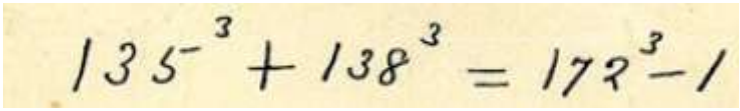
$-172.030... + 5.71997... \times 10^{-6}\, i$

Polar coordinates:

$r = 172.03$ (radius), $\theta = 180.°$ (angle)

172.03

From the Ramanujan taxicab numbers:



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

Input:

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

Result:

True

Left hand side:

$135^3 + 138^3 = 5\,088\,447$

Right hand side:

$172^3 - 1 = 5\,088\,447$

Result:

5.088447×10^6

$5.088447*10^6$

We obtain:

((((1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+21+2/5))))^3 + ((((1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]+18+2/5))))^3

Input interpretation:

$$\left(\frac{1}{3}\times\frac{-4.09928\times10^{-34}+9.83826\times10^{-33}\,i}{8.73506\times10^{-37}-2.09641\times10^{-35}\,i}+21+\frac{2}{5}\right)^3+\left(\frac{1}{3}\times\frac{-4.09928\times10^{-34}+9.83826\times10^{-33}\,i}{8.73506\times10^{-37}-2.09641\times10^{-35}\,i}+18+\frac{2}{5}\right)^3$$

i is the imaginary unit

Result:

$-5.09183... \times 10^6 + 0.639816... \, i$

Polar coordinates:

$r = 5.09183\times10^6$ (radius), $\theta = 180.°$ (angle)

$5.09183*10^6$

((((1/3* [(-4.09928×10^-34 + 9.83826×10^-33 i)/(8.73506×10^-37 - 2.09641×10^-35 i)]-18+2+2/5))))^3 – 1

Input interpretation:

$$\left(\frac{1}{3}\times\frac{-4.09928\times10^{-34}+9.83826\times10^{-33}\,i}{8.73506\times10^{-37}-2.09641\times10^{-35}\,i}-18+2+\frac{2}{5}\right)^3-1$$

i is the imaginary unit

Result:

$-5.09114... \times 10^6 + 0.507837... \, i$

Polar coordinates:

$r = 5.09114\times10^6$ (radius), $\theta = 180.°$ (angle)

$5.09114*10^6$

Note that, from the difference between the two results, we obtain:

5091140 - 5088447 = 2693 result very near to the rest mass of charmed Omega baryon 2695.2

Now, we have the following equations:

The general real solution may be expressed as

$$\phi(x) = (2\pi)^{-3/2} \int d^3p (2p^0)^{-1/2} \left[e^{ip\cdot x} a(\mathbf{p}) + e^{-ip\cdot x} a^\dagger(\mathbf{p}) \right] \qquad (7.2.29)$$

with $p^0 = \sqrt{\mathbf{p}^2 + m^2}$ understood, and $a(\mathbf{p})$ some as-yet-unknown operator function of $\mathbf{p}$. Eq. (7.2.26) then gives the canonical conjugate as

$$\pi(x) = -i(2\pi)^{-3/2} \int d^3p \, (p^0/2)^{1/2} \left[e^{ip\cdot x} a(\mathbf{p}) - e^{-ip\cdot x} a^\dagger(\mathbf{p}) \right] . \qquad (7.2.30)$$

For:

p = 1.28e-30 ; **q** = 1.28e-30 ; m = 9.1093837e-31 ; 1.57105…*10^{-30} = p^0

From

$$\phi(x) = (2\pi)^{-3/2} \int d^3p (2p^0)^{-1/2} \left[e^{ip\cdot x} a(\mathbf{p}) + e^{-ip\cdot x} a^\dagger(\mathbf{p}) \right] \quad (7.2.29)$$

we obtain:

(2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]d^3x

Input interpretation:

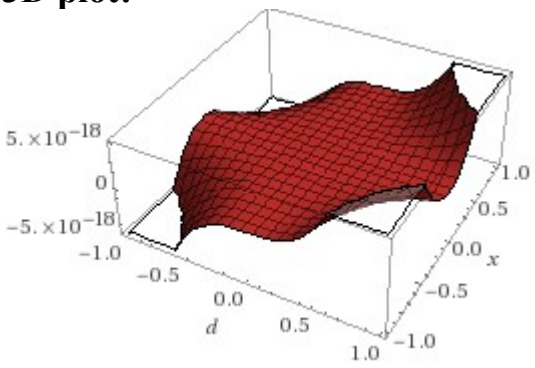
$$\frac{1}{(2\pi)^{1.5}} \int \frac{(\exp(i \times 1.57105 \times 10^{-30}) \times 1.28 \times 10^{-30} + \exp(-(i \times 1.57105 \times 10^{-30}))) \times 1.28 \times 10^{-30}}{(2 \times 1.57105 \times 10^{-30})^{0.5}} \, d^3x \, dx$$

i is the imaginary unit

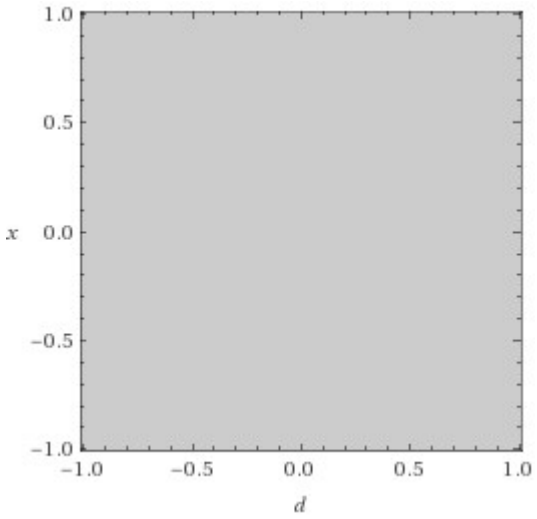
Result:

$(2.29245 \times 10^{-17} - 3.60156 \times 10^{-47}\, i)\, d^3 x^2$

3D plot:



Contour plot:



Alternate form:

$2.29245 \times 10^{-17}\, d^3\, x^2$

Alternate form assuming d and x are real:

$2.29245 \times 10^{-17}\, d^3\, x^2 + i\,(0 - 3.60156 \times 10^{-47}\, d^3\, x^2) + 0$

Input interpretation:

$2.29245 \times 10^{-17} - 3.60156 \times 10^{-47}\, i$

i is the imaginary unit

Result:

$2.29245\ldots \times 10^{-17} -$
$3.60156\ldots \times 10^{-47}\, i$

Alternate form:

2.29245×10^{-17}

$2.29245*10^{-17}$

From which:

(2.29245×10^-17)*(((7 π^4)/(139*2)))

Input interpretation:

$$2.29245 \times 10^{-17} \times \frac{7\,\pi^4}{139 \times 2}$$

Result:

$5.62280\ldots \times 10^{-17}$

$5.6228\ldots*10^{-17}$ result practically equal to the value of magnetic flux of Planck

5.622746×10^{-17} Wb

We obtain also:

(((207 * 0.06535142 - (54 π)/13)))[-ln(((((2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]x x, 0 to 1))))]^1/3

Input interpretation:

$$\left(207 \times 0.06535142 - \frac{54\,\pi}{13}\right) \sqrt[3]{-\log\left(\frac{\int_0^1 \frac{\left(\exp\left(i \times 1.57105 \times 10^{-30}\right) \times 1.28 \times 10^{-30} + \exp\left(-\left(i \times 1.57105 \times 10^{-30}\right)\right)\right) \times 1.28 \times 10^{-30}}{\left(2 \times 1.57105 \times 10^{-30}\right)^{0.5}} x\,x\,dx}{(2\,\pi)^{1.5}}\right)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

$1.61728 + 2.18737 \times 10^{-32}\,i$

Computation result:

$$\left(207 \times 0.06535142 - \frac{54\,\pi}{13}\right) \Bigg/ \sqrt[3]{-\log\left(\frac{\int_0^1 \frac{\left(\left(\exp\left(i\ 1.57105 \times 10^{-30}\right) 1.28 \times 10^{-30} + \exp\left(-\left(i\ 1.57105 \times 10^{-30}\right)\right)\right) 1.28 \times 10^{-30}\right) x\, x}{\left(2\ 1.57105 \times 10^{-30}\right)^{0.5}}\, dx}{(2\,\pi)^{1.5}}\right)} = 1.61728 + 2.18737 \times 10^{-32}\, i$$

Alternate form:

1.61728

1.61728 result that is a very good approximation to the value of the golden ratio 1.618033988749...

We observe with regard to 0.06535142

$$\mathcal{B} \approx 0.065351425923 0$$

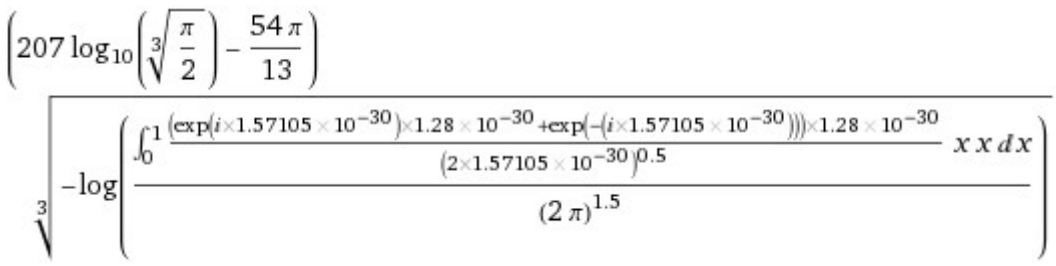
$$\frac{1}{7}\,(-e! + 2 + e) \approx 0.065351621 72$$

$$\frac{75}{1331\, C_{Ch2}} \approx 0.065351412416$$

We have also the following results:

(((207 * (log base 10 of (Pi/2)^1/3) - (54 π)/13)))[-ln(((((2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]x x, 0 to 1))))]^1/3

Input interpretation:



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

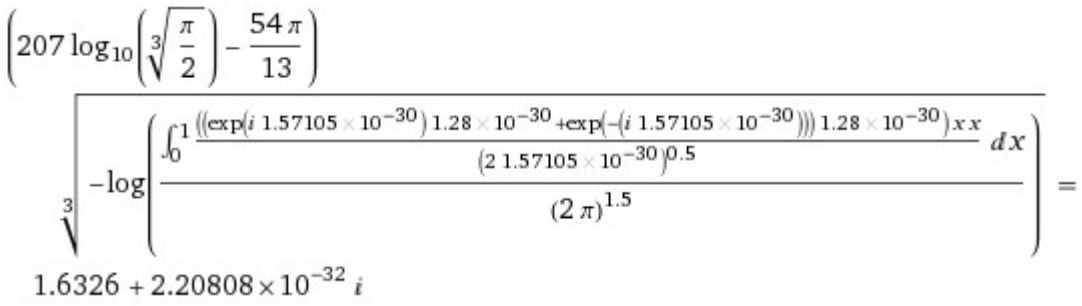
$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

$1.6326 + 2.20808 \times 10^{-32}\, i$

Computation result:



$1.6326 + 2.20808 \times 10^{-32}\, i$

Alternate form:

1.6326

1.6326

or:

(((207 * -(146-exponential integral (20/3)) - (54 π)/13)))[-ln(((((2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]x x, 0 to 1))))]^1/3

Input interpretation:

$$\left(207\times(-1)\left(146-\text{Ei}\left(\frac{20}{3}\right)\right)-\frac{54\,\pi}{13}\right)\left(-\log\left(\frac{1}{(2\,\pi)^{1.5}}\int_0^1(((\exp(i\times1.57105\times10^{-30})\times1.28\times10^{-30}+\exp(-(i\times1.57105\times10^{-30})))\times1.28\times10^{-30})/(2\times1.57105\times10^{-30})^{0.5}\,x\,x\,dx\right)\right)\text{ ^ }(1/3)$$

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

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

$$1.62226+2.1941\times10^{-32}\,i$$

Computation result:

$$\left(207\,(-1)\left(146-\text{Ei}\left(\frac{20}{3}\right)\right)-\frac{54\,\pi}{13}\right)\left(-\log\left(\frac{1}{(2\,\pi)^{1.5}}\int_0^1((((\exp(i\,1.57105\times10^{-30})\,1.28\times10^{-30}+\exp(-(i\,1.57105\times10^{-30})))\,1.28\times10^{-30})\,x\,x)/(2\,1.57105\times10^{-30})^{0.5})\,dx\right)\right)\text{ ^ }(1/3)=1.62226+2.1941\times10^{-32}\,i$$

Alternate form:

$$1.62226$$

1.62226

or:

(((207 * -(tan (Pi*(1/3-3sqrt5/2))) - (54 π)/13)))[-ln(((((2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]x x, 0 to 1))))]^1/3

Input interpretation:

$$\left(207\times(-1)\tan\left(\pi\left(\frac{1}{3}-3\times\frac{\sqrt{5}}{2}\right)\right)-\frac{54\,\pi}{13}\right)\left(-\log\left(\frac{1}{(2\,\pi)^{1.5}}\right.\right.$$
$$\left.\int_0^1((\exp(i\times1.57105\times10^{-30})\times1.28\times10^{-30}+\exp(-(i\times1.57105\times10^{-30})))\times\right.$$
$$\left.\left.1.28\times10^{-30})/(2\times1.57105\times10^{-30})^{0.5}\,x\,x\,dx\right)\right)\,\hat{}\,(1/3)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

$1.60881 + 2.17591\times10^{-32}\,i$

Computation result:

$$\left(207\,(-1)\tan\left(\pi\left(\frac{1}{3}-\frac{3\,\sqrt{5}}{2}\right)\right)-\frac{54\,\pi}{13}\right)\left(-\log\left(\frac{1}{(2\,\pi)^{1.5}}\right.\right.$$
$$\left.\int_0^1((((\exp(i\,1.57105\times10^{-30})\,1.28\times10^{-30}+\exp(-(i\,1.57105\times10^{-30})))\right.$$
$$\left.1.28\times10^{-30})\,x\,x)/(2\,1.57105\times10^{-30})^{0.5})\right.$$
$$\left.\left.dx\right)\right)\,\hat{}\,(1/3)=1.60881+2.17591\times10^{-32}\,i$$

Alternate form:

1.60881

1.60881

or:

(((207 * (-(2-(1/3+sqrt3)))))) - (54 π)/13)[-ln(((((2Pi)^-1.5 * integrate[(((2*(1.57105e-30))^-0.5*((e^(i*1.57105e-30))*1.28e-30+e^-(i*1.57105e-30))*1.28e-30))]x x, 0 to 1))))]^1/3

Input interpretation:

$$\left(207\left(-\left(2-\left(\frac{1}{3}+\sqrt{3}\right)\right)\right)-\frac{54\,\pi}{13}\right)\sqrt[3]{-\log\left(\frac{\int_0^1 \frac{\left(\exp\left(i\times 1.57105\times 10^{-30}\right)\times 1.28\times 10^{-30}+\exp\left(-\left(i\times 1.57105\times 10^{-30}\right)\right)\right)\times 1.28\times 10^{-30}}{\left(2\times 1.57105\times 10^{-30}\right)^{0.5}}\,x\,x\,dx}{(2\,\pi)^{1.5}}\right)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result:

$1.6402 + 2.21836\times 10^{-32}\,i$

Computation result:

$$\left(207\left(-\left(2-\left(\frac{1}{3}+\sqrt{3}\right)\right)\right)-\frac{54\,\pi}{13}\right)\left(-\log\left(\frac{1}{(2\,\pi)^{1.5}}\int_0^1 ((((\exp(i\,1.57105\times 10^{-30})\,1.28\times 10^{-30}+\exp(-(i\,1.57105\times 10^{-30})))\,1.28\times 10^{-30})\,x\,x)/(2\,1.57105\times 10^{-30})^{0.5})\,dx\right)\right)\wedge(1/3)=1.6402+2.21836\times 10^{-32}\,i$$

Alternate form:

1.6402

$1.6402 \approx \zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

Now, we have that:

For our next example, we shall calculate the shift in the magnetic moment and the charge radius of an electron or muon due to lowest-order radiative corrections. The one-loop graphs and renormalization corrections for the photon–lepton vertex are shown in Figure 11.4. Of these graphs, those involving insertions in incoming or outgoing lepton lines vanish because the lepton is on the mass shell, as discussed in Section 10.3. The graph involving an insertion in the external photon line is the vacuum polarization effect, discussed in the previous section. This leaves one one-loop graph (the last in Figure 11.4) that needs to be calculated here:

$$\Gamma^{\mu}_{1\text{ loop}}(p',p) = \int d^4k \left[e\gamma^{\rho}(2\pi)^4\right]\left[\frac{-i}{(2\pi)^4}\,\frac{-i(\not{p}'-\not{k})+m}{(p'-k)^2+m^2-i\epsilon}\right][\gamma^{\mu}] \times\left[\frac{-i}{(2\pi)^4}\,\frac{-i(\not{p}-\not{k})+m}{(p-k)^2+m^2-i\epsilon}\right]\left[e\gamma_{\rho}(2\pi)^4\right]\left[\frac{-i}{(2\pi)^4}\,\frac{1}{k^2-i\epsilon}\right], \tag{11.3.1}$$

where p' and p are the final and initial lepton four-momenta, respectively.

From Eq. (11.3.13), we find

$$-G(0) = \frac{e^2}{8\pi^2} = 0.001161\,. \tag{11.3.16}$$

$$\mu = \frac{e}{2m}\left(1 - G(0)\right).$$

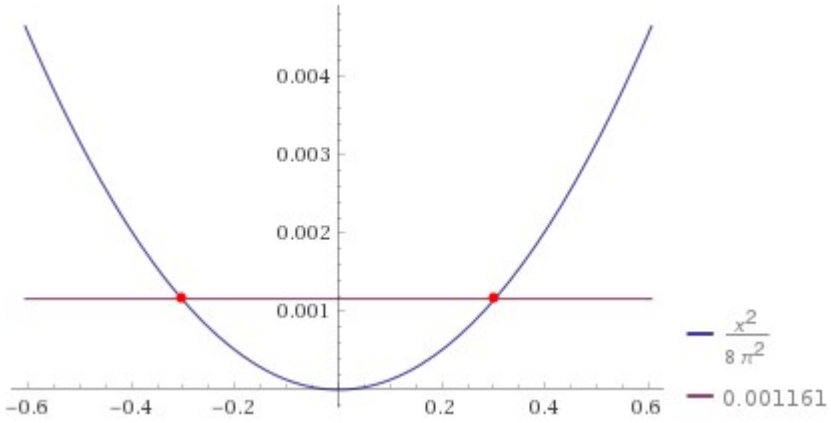
Thence:

(x^2)/(8Pi^2) = 0.001161

Input:

$$\frac{x^2}{8\,\pi^2} = 0.001161$$

Plot:



Alternate form:

$$\frac{x^2}{8\pi^2} - 0.001161 = 0$$

Solutions:

$x \approx -0.302769$

$x \approx 0.302769$

0.302769

From

$$\mu = \frac{e}{2m}\left(1 - G(0)\right) .$$

we obtain:

[(0.302769) / (2*9.1093837e-31)]*(1+0.001161)

Input interpretation:

$$\frac{0.302769}{2 \times 9.1093837 \times 10^{-31}} (1 + 0.001161)$$

Result:

$1.6637816826675113048536971826096204510520289094859403\ldots \times 10^{29}$

$\mu = 1.6637816826\ldots * 10^{29}$

From:

$$\ln(m_\mu^2/m_e^2) = 10.663$$

ln 1^2/0.00483681^2

Input interpretation:

$$\log\left(\frac{1^2}{0.00483681^2}\right)$$

$\log(x)$ is the natural logarithm

Result:

10.66300...

10.66300…

Alternative representations:

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \log_e\left(\frac{1}{0.00483681^2}\right)$$

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \log(a)\log_a\left(\frac{1}{0.00483681^2}\right)$$

$$\log\left(\frac{1^2}{0.00483681^2}\right) = -\text{Li}_1\left(1 - \frac{1}{0.00483681^2}\right)$$

Series representations:

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \log(42\,743.7) - \sum_{k=1}^{\infty} \frac{(-1)^k\, e^{-10.663\,k}}{k}$$

$$\log\left(\frac{1^2}{0.00483681^2}\right) = 2\,i\,\pi\left\lfloor\frac{\arg(42\,744.7 - x)}{2\,\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(42\,744.7 - x)^k\,x^{-k}}{k}$$

for $x < 0$

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \left\lfloor\frac{\arg(42\,744.7 - z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor\frac{\arg(42\,744.7 - z_0)}{2\,\pi}\right\rfloor\log(z_0) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(42\,744.7 - z_0)^k\,z_0^{-k}}{k}$$

Integral representations:

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \int_1^{42\,744.7}\frac{1}{t}\,dt$$

$$\log\left(\frac{1^2}{0.00483681^2}\right) = \frac{1}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-10.663\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1 < \gamma < 0$$

From

$$\mu_\mu = \frac{e}{2m_\mu}\left(\frac{e^2}{8\pi^2} + \frac{e^4}{96\pi^2}\left[\ln\frac{m_\mu^2}{m_e^2} + O(1)\right]\right) . \qquad (11.3.18)$$

we obtain:

((((([(0.302769^2) / (8Pi^2)] + [(0.302769)^4 / (96*Pi^2)] * 10.663+1))))

Input interpretation:

$$\frac{0.302769^2}{8\,\pi^2} + \frac{0.302769^4}{96\,\pi^2}\times 10.663 + 1$$

Result:

1.0012556...

1.0012556…

Alternative representations:

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.302769^2}{48\,\zeta(2)}+\frac{10.663\times 0.302769^4}{576\,\zeta(2)}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.302769^2}{8\,(180\,^\circ)^2}+\frac{10.663\times 0.302769^4}{96\,(180\,^\circ)^2}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.302769^2}{8\,\cos^{-1}(-1)^2}+\frac{10.663\times 0.302769^4}{96\,\cos^{-1}(-1)^2}$$

Series representations:

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.0007745}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^2}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.003098}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}\right)^2}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.012392}{\left(\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^2}$$

Integral representations:

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.003098}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.0007745}{\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2}$$

$$\frac{0.302769^2}{8\,\pi^2}+\frac{10.663\times 0.302769^4}{96\,\pi^2}+1=1+\frac{0.003098}{\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2}$$

From which:

1/(((([(0.302769^2) / (8Pi^2)] + [(0.302769)^4 / (96*Pi^2)] * 10.663+1))))

Input interpretation:

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\times 10.663+1}$$

Result:

0.99874600...

0.99874600… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the Omega mesons ($\omega/\omega_3 \mid 5+3 \mid m_{u/d}=255-390 \mid 0.988-1.18$) Regge slope value (0.988) connected to the dilaton scalar field $\mathbf{0.989117352243 = \phi}$

A_1^{**} above the two low-lying pseudo-scalars. (bound states of gluons, or 'glueballs').

A_1^{**}	0.943(39) [2.5]	0.988(38)	0.152(53)
A_4	1.03(10) [2.5]	0.999(32)	0.035(21)

(**Glueball Regge trajectories -** *Harvey Byron Meyer*, Lincoln College -Thesis submitted for the degree of Doctor of Philosophy at the University of Oxford Trinity Term, 2004)

Alternative representations:

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.302769^2}{48\zeta(2)}+\frac{10.663\times 0.302769^4}{576\zeta(2)}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.302769^2}{8(180^\circ)^2}+\frac{10.663\times 0.302769^4}{96(180^\circ)^2}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.302769^2}{8\cos^{-1}(-1)^2}+\frac{10.663\times 0.302769^4}{96\cos^{-1}(-1)^2}}$$

Series representations:

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.0007745}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.003098}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.012392}{\left(x+2\sum_{k=1}^{\infty}\frac{\sin(kx)}{k}\right)^2}}\quad\text{for}\ (x\in\mathbb{R}\ \text{and}\ x>0)$$

Integral representations:

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.003098}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.0007745}{\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2}}$$

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{10.663\times 0.302769^4}{96\pi^2}+1}=\frac{1}{1+\frac{0.003098}{\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2}}$$

and:

((1/(((([(0.302769^2) / (8Pi^2)] + [(0.302769)^4 / (96*Pi^2)] * 10.663+1))))))^1/2

Input interpretation:

$$\sqrt{\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\times 10.663+1}}$$

Result:

0.999372804...

0.999372804… result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the Omega mesons ($\omega/\omega_3 \mid 5+3 \mid m_{u/d}=255-390 \mid 0.988-1.18$) Regge slope value (0.988) connected to the dilaton scalar field $\mathbf{0.989117352243 = \phi}$

A_1^{**} above the two low-lying pseudo-scalars. (bound states of gluons, or 'glueballs').

A_1^{**}	0.943(39) [2.5]	0.988(38)	0.152(53)
A_4	1.03(10) [2.5]	0.999(32)	0.035(21)

(**Glueball Regge trajectories -** *Harvey Byron Meyer*, Lincoln College -Thesis submitted for the degree of Doctor of Philosophy at the University of Oxford Trinity Term, 2004)

For $m_\mu = 1$; $m_e = 0.00483681$; $e = 0.302769$

From:

$$\ln(m_\mu^2/m_e^2) = 10.663$$

ln (1^2/0.00483681^2)

$$\log\left(\frac{1^2}{0.00483681^2}\right)$$

10.66300…

From

$$\mu_\mu = \frac{e}{2m_\mu}\left(\frac{e^2}{8\pi^2}+\frac{e^4}{96\pi^2}\left[\ln\frac{m_\mu^2}{m_e^2} - \frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\ln 2 + O\left(\frac{m_e}{m_\mu}\right)\right]\right) . \quad (11.3.19)$$

we obtain:

0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*((((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681))))

Input interpretation:

$$\frac{0.302769}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)$$

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

$\log(x)$ is the natural logarithm

Result:

0.000181840...

0.000181840…

Alternative representations:

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 0.151385$$

$$\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\,\log(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 0.151385$$

$$\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\,\log(2)\,\pi^2+\frac{9\,\zeta\left(3,\frac{1}{2}\right)}{2\times 7}\right)}{96\,\pi^2}\right)$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 0.151385$$

$$\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\,\log_e(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)$$

Series representations:

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 6.62561\times10^{-6}+\frac{0.00192958}{\pi^2}-0.0000397537\log(2)+\frac{0.0000596305\sum_{k=1}^{\infty}\frac{1}{k^3}}{\pi^2}$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 6.62561\times10^{-6}+\frac{0.00192958}{\pi^2}+\frac{0.0000596305\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3\,j}}{j}\right)}{\pi^2}-0.0000397537\log(2)$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)}{96\,\pi^2}\right)$$

$$0.302769 = 6.62561\times10^{-6}+\frac{0.00192958}{\pi^2}+\frac{0.0000596305\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)}{\pi^2}-0.0000397537\log(2)$$

Integral representations:

$$\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)$$

$$0.302769=6.62561\times10^{-6}+\frac{0.00192958}{\pi^2}+\int_1^2\left(-\frac{0.0000397537}{t}-\frac{0.0000198768\log^3(-(-2+t)t)}{\pi^2(-1+t)^3\,1!}\right)dt$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)$$

$$0.302769=6.62561\times10^{-6}+\frac{0.00192958}{\pi^2}-\frac{0.0000198768}{\pi^2\,1!}\int_0^1\frac{\log^3(1-t^2)}{t^3}\,dt-0.0000397537\log(2)$$

$$\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)$$

$$0.302769=6.62561\times10^{-6}+\frac{0.00198921}{\pi^2}+\frac{0.000119261}{\pi^2}\int_0^\infty\frac{\sin(3\tan^{-1}(t))}{\left(-1+e^{2\pi t}\right)(1+t^2)^{3/2}}\,dt-0.0000397537\log(2)$$

From which:

1+((2.26644* [0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2))*((((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681))))]))

Input interpretation:

$$1 + 2.26644\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\,\pi^2} + \frac{0.302769^4}{96\,\pi^2}\right)\left(10.663 - \frac{25}{6} + \frac{197}{24} + \frac{\pi^2}{2} + \frac{9\,\zeta(3)}{2} - 3\,\pi^2\log(2) + 0.00483681\right)\right)$$

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

$\log(x)$ is the natural logarithm

Result:

1.00181840382629117251461397083003384648848226826964291662...

1.001818403… result practically equal to the value of the following Rogers-Ramanujan continued fraction

$$\frac{e^{-\frac{2\pi}{5}}}{\sqrt{\varphi\sqrt{5}} - \varphi} = 1 + \frac{e^{-2\pi}}{1 + \frac{e^{-4\pi}}{1 + \frac{e^{-6\pi}}{1 + \frac{e^{-8\pi}}{1 + \frac{}{1 + \ldots}}}}}} \approx 1.0018674362$$

= 1.0018674362

Alternative representations:

$$1 + \frac{1}{2} \times 2.26644 \times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2} + \frac{0.302769^4}{96\,\pi^2}\right)\left(10.663 - \frac{25}{6} + \frac{197}{24} + \frac{\pi^2}{2} + \frac{9\,\zeta(3)}{2} - 3\,\pi^2\log(2) + 0.00483681\right)\right) =$$

$$1 + 0.343104\left(\frac{0.302769^2}{8\,\pi^2} + \frac{0.302769^4}{96\,\pi^2}\right)\left(10.6678 - \frac{25}{6} + \frac{197}{24} + \frac{\pi^2}{2} - 3\log(2)\,\pi^2 + \frac{9\,\zeta(3,\,1)}{2}\right)$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)=$$
$$1+0.343104\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\,\pi^2+\frac{9\,\zeta\left(3,\frac{1}{2}\right)}{2\times 7}\right)$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)=$$
$$1+0.343104\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log_e(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)$$

Series representations:

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)=$$
$$1.00198+\frac{0.0582722}{\pi^2}-0.0118846\log(2)+\frac{0.0178269\sum_{k=1}^{\infty}\frac{1}{k^3}}{\pi^2}$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)=$$
$$1.00198+\frac{0.0582722}{\pi^2}+\frac{0.0178269\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3\,j}}{j}\right)}{\pi^2}-0.0118846\log(2)$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)=$$
$$1.00198+\frac{0.0582722}{\pi^2}+\frac{0.0178269\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)}{\pi^2}-0.0118846\log(2)$$

Integral representations:

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)=1.00198+\frac{0.0582722}{\pi^2}+\int_1^2\left(-\frac{0.0118846}{t}-\frac{0.0059423\log^3(-(-2+t)t)}{\pi^2(-1+t)^3\,1!}\right)dt$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)=1.00198+\frac{0.0582722}{\pi^2}-\frac{0.0059423}{\pi^2\,1!}\int_0^1\frac{\log^3(1-t^2)}{t^3}\,dt-0.0118846\log(2)$$

$$1+\frac{1}{2}\times 2.26644\times 0.302769\left(\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\right)\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)=1.00198+\frac{0.0760991}{\pi^2}+\frac{0.0356538}{\pi^2}\int_0^\infty\frac{\sin(3\tan^{-1}(t))}{(-1+e^{2\pi t})(1+t^2)^{3/2}}\,dt-0.0118846\log(2)$$

We have also:

1/(((0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*(((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681)))))))-89+5

Input interpretation:

$$1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)\right)-89+5$$

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

$\log(x)$ is the natural logarithm

Result:

5415.33...

5415.33…

Alternative representations:

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$

$$5=-84+\frac{1}{0.151385\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\pi^2+\frac{9\zeta(3,1)}{2}\right)}{96\pi^2}\right)}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$

$$5=-84+\frac{1}{0.151385\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log_e(2)\pi^2+\frac{9\zeta(3,1)}{2}\right)}{96\pi^2}\right)}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$

$$5=-84+\frac{1}{0.151385\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\pi^2+\frac{9\zeta\left(3,\frac{1}{2}\right)}{2\times 7}\right)}{96\pi^2}\right)}$$

Series representations:

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-$$

$$89+5=-84-\frac{25\,154.9\,\pi^2}{-48.5384+\pi^2\,(-0.166667+\log(2))-1.5\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$
$$5=-84-\frac{25\,154.9\,\pi^2}{-48.5384-1.5\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$
$$5=-84-\frac{25\,154.9\,\pi^2}{-48.5384-1.5\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3\,j}}{j}\right)+\pi^2\,(-0.166667+\log(2))}$$

Integral representations:

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$
$$5=-84-\frac{25\,154.9\,\pi^2\,1!}{0.5\int_0^1\frac{\log^3(1-t^2)}{t^3}\,dt+1!\,(-48.5384+\pi^2\,(-0.166667+\log(2)))}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-$$
$$89+5=-84-\frac{25\,154.9\,\pi^2\,1!}{(-48.5384-0.166667\,\pi^2)\,1!+\int_1^2\left(\frac{\pi^2\,1!}{t}+\frac{0.5\log^3(-(-2+t)t)}{(-1+t)^3}\right)dt}$$

$$\frac{1}{\frac{1}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)0.302769}-89+$$
$$5=-84-\frac{25\,154.9\,\pi^2}{-50.0384-3.\int_0^{\infty}\frac{\sin\left(3\tan^{-1}(t)\right)}{(-1+e^{2\pi t})(1+t^2)^{3/2}}\,dt+\pi^2\,(-0.166667+\log(2))}$$

1/Pi*1/(((0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*(((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681)))))))-21-1/2

Input interpretation:

$$\frac{1}{\pi}\times 1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}$$

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

$\log(x)$ is the natural logarithm

Result:

1728.991806146089656132778395294313771801350418396956832418...

1728.9918061…

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:

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)}{96\,\pi^2}\right)\right)\pi}-21-\frac{1}{2}=-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)\right)}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-$$

$$21-\frac{1}{2}=$$

$$-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log_e(2)\pi^2+\frac{9\zeta(3,1)}{2}\right)}{96\pi^2}\right)\right)}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-$$

$$21-\frac{1}{2}=$$

$$-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\pi^2+\frac{9\zeta\left(3,\frac{1}{2}\right)}{2\times 7}\right)}{96\pi^2}\right)\right)}$$

Series representations:

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-$$

$$21-\frac{1}{2}=-\frac{43}{2}-\frac{25\,154.9\,\pi}{-48.5384+\pi^2\,(-0.166667+\log(2))-1.5\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-$$

$$21-\frac{1}{2}=$$

$$-\frac{43}{2}-\frac{25\,154.9\,\pi}{-48.5384-1.5\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-21-\frac{1}{2}=-\frac{43}{2}-\frac{25\,154.9\,\pi}{-48.5384-1.5\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3j}}{j}\right)+\pi^2\,(-0.166667+\log(2))}$$

Integral representations:

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-21-\frac{1}{2}=-\frac{43}{2}-\frac{25\,154.9\,\pi\,1!}{0.5\int_0^1\frac{\log^3(1-t^2)}{t^3}\,dt+1!\left(-48.5384+\pi^2\,(-0.166667+\log(2))\right)}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-21-\frac{1}{2}=-\frac{43}{2}-\frac{25\,154.9\,\pi\,1!}{\left(-48.5384-0.166667\,\pi^2\right)1!+\int_1^2\left(\frac{\pi^2\,1!}{t}+\frac{0.5\log^3(-(-2+t)t)}{(-1+t)^3}\right)dt}$$

$$\frac{1}{\frac{1}{2}\left(0.302769\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)}{96\pi^2}\right)\right)\pi}-21-\frac{1}{2}=-\frac{43}{2}-\frac{25\,154.9\,\pi}{-50.0384-3.\int_0^{\infty}\frac{\sin(3\tan^{-1}(t))}{(-1+e^{2\pi t})(1+t^2)^{3/2}}\,dt+\pi^2\,(-0.166667+\log(2))}$$

[1/Pi*1/(((0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*(((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681)))))))-21-1/2]^1/15

Input interpretation:

$$\left(\frac{1}{\pi}\times 1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)-21-\frac{1}{2}\right)\right)\wedge(1/15)$$

$\zeta(s)$ is the Riemann zeta function
$\log(x)$ is the natural logarithm

Result:

1.643814709403764643092895263390395044296461101211922232864...

$1.6438147094\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

1/12*[1/Pi*1/(((0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*(((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681)))))))-21-1/2]-5

Input interpretation:

$$\frac{1}{12}\left(\frac{1}{\pi}\times 1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)-21-\frac{1}{2}\right)-5$$

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

$\log(x)$ is the natural logarithm

Result:

139.083...

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

Alternative representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-5+\frac{1}{12\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)\right)}\right)}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-5+\frac{1}{12}\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log_{e'}(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)\right)}\right)$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-5+\frac{1}{12}\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\,\pi^2+\frac{9\,\zeta\left(3,\frac{1}{2}\right)}{2\times7}\right)}{96\,\pi^2}\right)\right)}\right)$$

Series representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{163}{24}-\frac{2096.24\,\pi}{-48.5384-1.5\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{163}{24}-\frac{2096.24\,\pi}{-48.5384-1.5\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3\,j}}{j}\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{6.79167\left(-48.5384+308.649\,\pi-0.166667\,\pi^2+\pi^2\,\log(2)-1.5\sum_{k=1}^{\infty}\frac{1}{k^3}\right)}{-48.5384-0.166667\,\pi^2+\pi^2\,\log(2)-1.5\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

Integral representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{163}{24}-\frac{2096.24\,\pi\,1!}{0.5\int_0^1\frac{\log^3\left(1-t^2\right)}{t^3}\,dt+1!\left(-48.5384+\pi^2\,(-0.166667+\log(2))\right)}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{163}{24}-\frac{2096.24\,\pi\,1!}{\left(-48.5384-0.166667\,\pi^2\right)1!+\int_1^2\left(\frac{\pi^2\,1!}{t}+\frac{0.5\log^3(-(-2+t)\,t)}{(-1+t)^3}\right)dt}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-5=-\frac{163}{24}-\frac{2096.24\,\pi}{-50.0384-3.\int_0^\infty \frac{\sin(3\tan^{-1}(t))}{(-1+e^{2\,\pi\,t})(1+t^2)^{3/2}}\,dt+\pi^2\,(-0.166667+\log(2))}$$

1/12*[1/Pi*1/(((0.302769 / 2 ((0.302769^2)/(8Pi^2)+(0.302769^4)/(96Pi^2)*(((10.663-25/6+197/24+(Pi^2)/2+(9 zeta(3))/2-3Pi^2* ln(2) + 0.00483681)))))))-21-1/2]-18-1

Input interpretation:

$$\frac{1}{12}\left(\frac{1}{\pi}\times 1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4}{96\,\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\log(2)+0.00483681\right)\right)-21-\frac{1}{2}\right)-18-1$$

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

$\log(x)$ is the natural logarithm

Result:

125.083...

125.083… result very near to the Higgs boson mass 125.18 GeV

Alternative representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)\right)-21-\frac{1}{2}\right)-18-1=-19+\frac{1}{12}\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)\right)}\right)$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)\right)-21-\frac{1}{2}\right)-18-1=-19+\frac{1}{12}\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log_{e^{\prime}}(2)\,\pi^2+\frac{9\,\zeta(3,1)}{2}\right)}{96\,\pi^2}\right)\right)}\right)$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)\right)-21-\frac{1}{2}\right)-18-1=-19+\frac{1}{12}\left(-\frac{43}{2}+\frac{1}{\pi\left(0.151385\left(\frac{0.302769^2}{8\,\pi^2}+\frac{0.302769^4\left(10.6678-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}-3\log(2)\,\pi^2+\frac{9\,\zeta\left(3,\frac{1}{2}\right)}{2\times 7}\right)}{96\,\pi^2}\right)\right)}\right)$$

Series representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)\right)-21-\frac{1}{2}\right)-18-1=-\frac{499}{24}-\frac{2096.24\,\pi}{-48.5384-1.5\exp\left(-\sum_{k=1}^{\infty}\log\left(1-\frac{1}{(p_k)^3}\right)\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)\right)-21-\frac{1}{2}\right)-18-1=-\frac{499}{24}-\frac{2096.24\,\pi}{-48.5384-1.5\exp\left(\sum_{k=1}^{\infty}\sum_{j=1}^{\infty}\frac{(p_k)^{-3\,j}}{j}\right)+\pi^2\,(-0.166667+\log(2))}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-18-$$

$$1=-\frac{20.7917\left(-48.5384+100.821\,\pi-0.166667\,\pi^2+\pi^2\,\log(2)-1.5\,\sum_{k=1}^{\infty}\frac{1}{k^3}\right)}{-48.5384-0.166667\,\pi^2+\pi^2\,\log(2)-1.5\,\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

Integral representations:

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-18-$$

$$1=-\frac{499}{24}-\frac{2096.24\,\pi\,1!}{0.5\int_0^1\frac{\log^3(1-t^2)}{t^3}\,dt+1!\left(-48.5384+\pi^2\,(-0.166667+\log(2))\right)}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-18-$$

$$1=-\frac{499}{24}-\frac{2096.24\,\pi\,1!}{\left(-48.5384-0.166667\,\pi^2\right)1!+\int_1^2\left(\frac{\pi^2\,1!}{t}+\frac{0.5\log^3(-(-2+t)t)}{(-1+t)^3}\right)dt}$$

$$\frac{1}{12}\left(1\Big/\left(\frac{1}{2}\,\pi\left(0.302769\left(\frac{0.302769^2}{8\,\pi^2}+\frac{1}{96\,\pi^2}\,0.302769^4\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\,\zeta(3)}{2}-3\,\pi^2\,\log(2)+0.00483681\right)\right)\right)-21-\frac{1}{2}\right)-18-$$

$$1=-\frac{499}{24}-\frac{2096.24\,\pi}{-50.0384-3.\int_0^{\infty}\frac{\sin\left(3\tan^{-1}(t)\right)}{\left(-1+e^{2\,\pi\,t}\right)\left(1+t^2\right)^{3/2}}\,dt+\pi^2\,(-0.166667+\log(2))}$$

Now, we have the following equations:

hand, Eq. (11.3.13) shows that $G(q^2)$ has a finite derivative at $q^2 = 0$,

$$G'(0) = \frac{e^2}{48\pi^2 m^2} . \qquad (11.3.28)$$

$$F_1(q^2) = F(q^2) + G(q^2) . \qquad (11.3.30)$$

For $|q^2| \ll m^2$, this form factor is approximately

$$F_1(q^2) \simeq 1 + \frac{e^2}{24\pi^2}\left(\frac{q^2}{m^2}\right)\left[\ln\left(\frac{\mu^2}{m^2}\right) + \frac{2}{5} + \frac{3}{4}\right] . \qquad (11.3.31)$$

(This definition is motivated by the fact that the average of $\exp(i\mathbf{q}\cdot\mathbf{x})$ over a spherical shell of radius a goes as $1 - \mathbf{q}^2a^2/6$ for $\mathbf{q}^2a^2 \ll 1$.) We see that the charge radius of the electron is given by

$$a^2 = -\frac{e^2}{4\pi^2 m^2}\left[\ln\left(\frac{\mu^2}{m^2}\right) + \frac{2}{5} + \frac{3}{4}\right] . \qquad (11.3.33)$$

For $q^2 << m^2 = 1/2.528248e101$ where 2,528 248 × 10^{101} V/m·H is the magnetic current density of Planck

e = 0.302769

m = 9.1093837e-31; m^2 = 8.2980858640689 × 10^-61

μ = 1.6637816826…*10^{29}

from (11.3.31), we obtain:

1+(0.302769^2)/(24Pi^2)*(1/2.528248e101)/(8.2980858640689e-61)
[ln(((1.6637816826e+29)^2/(9.1093837e-31)^2))+2/5+3/4]

Input interpretation:

$$1 + \frac{0.302769^2}{24\,\pi^2} \times \frac{\frac{1}{2.528248\times10^{101}}}{8.2980858640689\times10^{-61}}\left(\log\left(\frac{(1.6637816826\times10^{29})^2}{(9.1093837\times10^{-31})^2}\right) + \frac{2}{5} + \frac{3}{4}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.000000000000000000000000000000000000000000050554…

1

From (11.3.33), we obtain:

(-0.302769^2) / (4Pi^2*8.2980858640689e-61)
[ln(((1.6637816826e+29)^2/(9.1093837e-31)^2))+2/5+3/4]

Input interpretation:

$$-\frac{0.302769^2}{4\pi^2 \times 8.2980858640689 \times 10^{-61}}\left(\log\left(\frac{(1.6637816826 \times 10^{29})^2}{(9.1093837 \times 10^{-31})^2}\right)+\frac{2}{5}+\frac{3}{4}\right)$$

$\log(x)$ is the natural logarithm

Result:

$-7.66885... \times 10^{59}$

-7.66885…*10^{59}

From which:

-((2*(1 + e^2))/(5 + e))*(-0.302769^2) / (4Pi^2*8.2980858640689e-61)
[ln(((1.6637816826e+29)^2/(9.1093837e-31)^2))+2/5+3/4]

Input interpretation:

$$-\frac{2\left(1+e^2\right)}{5+e}\left(-\frac{0.302769^2}{4\pi^2 \times 8.2980858640689 \times 10^{-61}}\right)\left(\log\left(\frac{(1.6637816826 \times 10^{29})^2}{(9.1093837 \times 10^{-31})^2}\right)+\frac{2}{5}+\frac{3}{4}\right)$$

$\log(x)$ is the natural logarithm

Result:

$1.667066521158178962062219918857343783970333071247460 1... \times 10^{60}$

1.667066521…*10^{60} result practically equal to the value of Planck absorbed dose rate 1.667064×10^{60} Gy/s

Mathematical connections

From:

Unconstrained Higher Spins of Mixed Symmetry II. Fermi Fields –
A. Campoleoni, D. Francia, J. Mourad and A. Sagnotti -
arXiv:0904.4447v2 [hep-th] 1 Sep 2009

We have that:

$$E_{\bar{\psi}}^{constr}: \ \mathcal{E}_{\psi} + \frac{1}{18\,(3D+4)} \left\{ \frac{6}{3D-2}\, \eta_{(\mu_1\mu_2}\, \gamma_{\mu_3)} \left[4\, u_{\nu_1\nu_2} - (3D+2)\, v_{(\nu_1\,,\nu_2)} \right] \right.$$
$$+ \frac{2}{3D-2} \left(\eta_{(\mu_1\mu_2|}\, \gamma_{(\nu_1|} + \eta_{(\nu_1|(\mu_1}\gamma_{\mu_2|} \right) \left[3\, D\, u_{|\mu_3)\,|\nu_2)} - 2\, v_{|\mu_3)\,,|\nu_2)} - 2\, v_{|\nu_2)\,,|\mu_3)} \right]$$
$$- \frac{2}{3D-2} \left(\eta_{\nu_1\nu_2}\gamma_{(\mu_1|} + \gamma_{(\nu_1}\eta_{\nu_2)\,(\mu_1|} \right) \left[2\,(3D+2)\, u_{|\mu_2\mu_3)} - 3\,(D+2)\, v_{|\mu_2\,,\mu_3)} \right]$$
$$\left. + \frac{1}{D^2-2} \left(2\, \eta_{\nu_1\nu_2}\, \eta_{(\mu_1\mu_2}\, \omega_{\mu_3)} - \eta_{\nu_1(\mu_1}\, \eta_{\mu_2|\,\nu_1}\, \omega_{|\mu_3)} \right) \right\} = 0\,.$$

(2.180)

For D = 4, we obtain:

1+1/(18*16)*[6/10(4-14)+2/10*2*(3*4-2-2)-2/10*2*(2*14-3*6)+1/14*2-1]

Input:

$$1 + \frac{1}{18\times 16}\left(\frac{6}{10}(4-14) + \frac{2}{10}\times 2\,(3\times 4 - 2 - 2) - \frac{2}{10}\times 2\,(2\times 14 - 3\times 6) + \frac{1}{14}\times 2 - 1\right)$$

Exact result:

$$\frac{2453}{2520}$$

Decimal approximation:

0.9734126984126984126984126984126984126984126984126984126698...

Repeating decimal:

$0.9734126\overline{98}$ (period 6)

0.973412698 result very near to the spectral index n_s , to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

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

= 0.9568666373

From:

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

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

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

ω	6	$m_{u/d} = 0 - 60$	$0.910 - 0.918$	
	ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$
	ω/ω_3	$5+3$	$m_{u/d} = 240 - 345$	$0.937 - 1.000$
Ψ	3	$m_c = 1500$	0.979	-0.09

From the previous formula, we obtain:

$$\frac{1}{\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\times 10.663+1}$$

0.99874600...

0.99874600…

From:

$$N_{\text{d.o.f.}} = 2^{\left[\frac{D-2}{2}\right]}\frac{s_1-s_2+1}{(s_1+1)!\,s_2!}\frac{(D+s_1-5)!}{(D-4)!}\frac{(D+s_2-6)!}{(D-6)!}(D+s_1+s_2-4), \qquad (4.16)$$

For D = 10, $s_1 = s_2 = 3$, we obtain:

$$2^{\left[\frac{D-2}{2}\right]}\frac{s_1-s_2+1}{(s_1+1)!\,s_2!}\frac{(D+s_1-5)!}{(D-4)!}\frac{(D+s_2-6)!}{(D-6)!}(D+s_1+s_2-4)$$

2^4 (1)/((3+1)! 3!) * (10+3-5)! / (10-4)! * (10+3-6)! / (10-6)! * (10+3+3-4)

Input:

$$2^4\times\frac{1}{(3+1)!\times 3!}\times\frac{(10+3-5)!}{(10-4)!}\times\frac{(10+3-6)!}{(10-6)!}(10+3+3-4)$$

$n!$ is the factorial function

Result:

15 680

15680 = 245 * 8^2

From eq. (2.156)

$$(D+2n-2)(3D+4(s_1+s_2)-2n-18)(D+2(s_1+s_2)-2n-6)$$
$$\times(3D+2(s_1+s_2)+2n-14),$$

For D = 10, n = 2 and $s_1 = s_2 = 3$

(10+2*2-2)(10*3+4(3+3)-2*2-18)(10+2(3+3)-2*2-6)*(10*3+2(3+3)+2*2-14)

Input:

$$(10+2\times2-2)(10\times3+4(3+3)-2\times2-18)$$
$$((10+2(3+3)-2\times2-6)(10\times3+2(3+3)+2\times2-14))$$

Result:

147456

147456 = 64*2304

From the two results, we have:

15680; 147456

(15680 + 147456)/64

Input:

$$\frac{15\,680+147\,456}{64}$$

Result:

2549

2549 prime number

2/64(15680 + 147456)+322-7+2

Input:

$$\frac{2}{64}(15\,680+147\,456)+322-7+2$$

Exact result:

5415

5415

From the previous formula, we obtain:

$$1\Big/\left(\frac{0.302769}{2}\left(\frac{0.302769^2}{8\pi^2}+\frac{0.302769^4}{96\pi^2}\left(10.663-\frac{25}{6}+\frac{197}{24}+\frac{\pi^2}{2}+\frac{9\zeta(3)}{2}-3\pi^2\log(2)+0.00483681\right)\right)\right)-89+5$$

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

$\log(x)$ is the natural logarithm

5415.33...

5415.33…

(147456*34+15680*5-728-29-7)

where $728 = 9^3 - 1$, while 29 and 7 are Lucas numbers

Input:

$$147\,456\times 34+15\,680\times 5-728-29-7$$

Result:

5 091 140

5091140

From the previous formula, we obtain:

$$\left(\frac{1}{3}\times\frac{-4.09928\times 10^{-34}+9.83826\times 10^{-33}\,i}{8.73506\times 10^{-37}-2.09641\times 10^{-35}\,i}-18+2+\frac{2}{5}\right)^3-1$$

i is the imaginary unit

$$-5.09114...\times 10^6+0.507837...\,i$$

$r = 5.09114 \times 10^6$ (radius), $\theta = 180.^\circ$ (angle)
$5.09114*10^6$

5091140

5.09114*10^6*1/34-2549+233+34-sqrt2

Input interpretation:

$5.09114 \times 10^6 \times \frac{1}{34} - 2549 + 233 + 34 - \sqrt{2}$

Result:

147455.997551143509257892374781864025596039077386948152463 6...
147455.9975511…

From the above formula, we obtain:

$$(D+2n-2)(3D+4(s_1+s_2)-2n-18)(D+2(s_1+s_2)-2n-6) \times (3D+2(s_1+s_2)+2n-14),$$

For D = 10, n = 2 and $s_1 = s_2 = 3$

$(10+2\times2-2)(10\times3+4(3+3)-2\times2-18)$
$((10+2(3+3)-2\times2-6)(10\times3+2(3+3)+2\times2-14))$

147456
147456 = 64*2304

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

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

so that

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

Hence

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

Thence:

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

And

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

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.

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