Ramanujan and Hardy's mathematics: New possible mathematical connections with some sectors of Particle Physics and a possible theoretical value of Dark Matter mass

Michele Nardelli[1], Antonio Nardelli

Abstract

In this research thesis, we have described some new mathematical connections between Hardy and Ramanujan mathematics and some sectors of Particle Physics and a possible theoretical value of Dark Matter mass

[1] M.Nardelli have studied by 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

https://www.pinterest.it/pin/444237950734694507/?lp=true

https://citacoes.in/autores/g-h-hardy/

From:

COLLECTED PAPERS OF G. H. HARDY

INCLUDING JOINT PAPERS WITH J. E. LITTLEWOOD AND OTHERS

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I assume that $u(x)$ is an integral function. Then the sums of the series (1) and (2) are defined as

$$\int_0^\infty e^{-x} u(x)\, dx, \quad \int_0^\infty e^{-x} \frac{d}{dx} u(x)\, dx$$

respectively. Since

$$\int_0^X e^{-x} u(x)\, dx = -\left[e^{-x} u(x)\right]_0^X + \int_0^X e^{-x} u'(x)\, dx,$$

it follows that if

$$\lim_{x=\infty} e^{-x} u(x) = 0,$$

the summability of either (1) or (2) involves that of the other, and the relation

$$(3)\ \ s = u_0 + s'.$$

Again, if both are summable, $e^{-x} u(x)$ has a limit for $x = \infty$, which can only be zero; so that (3) must be true.

But it can be shown that if (2) is summable, (1) must be so. The converse is not true; if, for instance

$$u_n = 2^n \sum_{\nu=0}^{\infty} \frac{(-)^\nu (\nu+1)^n}{2\nu+1\,!} = R\left[\frac{1}{i} \sum_{p=0}^{\infty} \frac{i^p (p+1)^n}{p\,!}\right],$$

$$u(x) = R\left[\frac{1}{i} \sum_{n=0}^{\infty} \frac{x^n}{n\,!} \sum_{p=0}^{\infty} \frac{i^p (p+1)^n}{p\,!}\right]$$

$$= R\left[\frac{1}{i} \sum_{p=0}^{\infty} \frac{i^p}{p\,!} e^{(p+1)x}\right]$$

$$= e^x \sin e^x,$$

Thence:

$$\int_0^X e^{-x} u(x)\, dx = -\left[e^{-x} u(x)\right]_0^X + \int_0^X e^{-x} u'(x)\, dx,$$

$$u(x) = R\left[\frac{1}{i} \sum_{n=0}^{\infty} \frac{x^n}{n\,!} \sum_{p=0}^{\infty} \frac{i^p (p+1)^n}{p\,!}\right]$$

$$= e^x \sin e^x$$

For x = 8, we have that:

e^8 sin (e^8)

Input:

$e^8 \sin(e^8)$

Decimal approximation:

1197.638538846852199821934129923324179692699944826913248228...

1197.6385… result practically equal to the rest mass of Sigma baryon 1197.449

Alternate form:

$$\frac{1}{2} i e^{8-i e^8} - \frac{1}{2} i e^{8+i e^8}$$

Series representations:

$$e^8 \sin(e^8) = e^8 \sum_{k=0}^{\infty} \frac{(-1)^k e^{8+16k}}{(1+2k)!}$$

$$e^8 \sin(e^8) = 2 e^8 \sum_{k=0}^{\infty} (-1)^k J_{1+2k}(e^8)$$

$$e^8 \sin(e^8) = e^8 \sum_{k=0}^{\infty} \frac{(-1)^k \left(e^8 - \frac{\pi}{2}\right)^{2k}}{(2k)!}$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

More information »

- **Integral representations:**

$$e^8 \sin(e^8) = e^{16} \int_0^1 \cos(e^8 t)\, dt$$

- $$e^8 \sin(e^8) = -\frac{i e^{16}}{4\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-e^{16}/(4s)+s}}{s^{3/2}}\, ds \quad \text{for } \gamma > 0$$

- $$e^8 \sin(e^8) = -\frac{i e^8}{2\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{2^{-1+2s} e^{8-16s}\, \Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)}\, ds \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

Furthermore, we have, calculating the eleventh root and multiplying by 10^{19} GeV:

(((e^8 sin (e^8))))^1/11 * 10^19 GeV

Input interpretation:

$\sqrt[11]{e^8 \sin(e^8)} \times 10^{19}$ GeV (gigaelectronvolts)

Result:

1.905×10^{19} GeV (gigaelectronvolts)

Unit conversions:

1.905×10^{28} eV (electronvolts)

1.9047930…* 10^{19}GeV practically near to the mean value 1.962 * 10^{19} of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV

From 0.0814135 and 1.227343217 that are two Ramanujan mock theta functions, we obtain:

(1.9047930 + 0.0814135) / 1.227343217 = 1,6182975328

Indeed:

Input:

$\sqrt[11]{e^8 \sin(e^8)} \times 10^{19}$

Exact result:

$10\,000\,000\,000\,000\,000\,000\, e^{8/11} \sqrt[11]{\sin(e^8)}$

Decimal approximation:

$1.904793044818673626996642889246595733366396054482190 8... \times 10^{19}$

Series representations:

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = 10\,000\,000\,000\,000\,000\,000\, e^{8/11} \sqrt[11]{\sum_{k=0}^{\infty} \frac{(-1)^k e^{8+16k}}{(1+2k)!}}$$

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = 10\,000\,000\,000\,000\,000\,000\ \sqrt[11]{2}\ e^{8/11}\ \sqrt[11]{\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(e^8)}$$

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = 10\,000\,000\,000\,000\,000\,000\ e^{8/11}\ \sqrt[11]{\sum_{k=0}^{\infty}\frac{(-1)^k \left(e^8 - \frac{\pi}{2}\right)^{2k}}{(2k)!}}$$

$n!$ is the factorial function

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Integral representations:

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = 10\,000\,000\,000\,000\,000\,000\ e^{16/11}\ \sqrt[11]{\int_0^1 \cos(e^8 t)\,dt}$$

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = \frac{5\,000\,000\,000\,000\,000\,000 \times 2^{9/11}\ e^{16/11}\ \sqrt[11]{-i \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-e^{16}/(4s)+s}}{s^{3/2}}\,ds}}{\sqrt[22]{\pi}} \quad \text{for } \gamma > 0$$

$$\sqrt[11]{e^8 \sin(e^8)}\ 10^{19} = \frac{5\,000\,000\,000\,000\,000\,000 \times 2^{10/11}\ e^{8/11}\ \sqrt[11]{-i \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{2^{-1+2s}\, e^{8-16s}\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds}}{\sqrt[22]{\pi}} \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

And:

(((e^8 sin (e^8))))^1/14

Input:

$$\sqrt[14]{e^8 \sin(e^8)}$$

Exact result:

$$e^{4/7} \sqrt[14]{\sin(e^8)}$$

Decimal approximation:

1.659129982496649247779052120101039323912136416274858681573...

1.65912998…. is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

Series representations:

$$\sqrt[14]{e^8 \sin(e^8)} = e^{4/7} \sqrt[14]{\sum_{k=0}^{\infty} \frac{(-1)^k e^{8+16k}}{(1+2k)!}}$$

$$\sqrt[14]{e^8 \sin(e^8)} = \sqrt[14]{2}\, e^{4/7} \sqrt[14]{\sum_{k=0}^{\infty} (-1)^k J_{1+2k}(e^8)}$$

$$\sqrt[14]{e^8 \sin(e^8)} = e^{4/7} \sqrt[14]{\sum_{k=0}^{\infty} \frac{(-1)^k \left(e^8 - \frac{\pi}{2}\right)^{2k}}{(2k)!}}$$

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Integral representations:

$$\sqrt[14]{e^8 \sin(e^8)} = e^{8/7} \sqrt[14]{\int_0^1 \cos(e^8 t)\, dt}$$

$$\sqrt[14]{e^8 \sin(e^8)} = \frac{e^{8/7} \sqrt[14]{-i \int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{e^{-e^{16}/(4 s)+s}}{s^{3/2}} \, ds}}{\sqrt[7]{2} \sqrt[28]{\pi}} \quad \text{for } \gamma > 0$$

$$\sqrt[14]{e^8 \sin(e^8)} = \frac{e^{4/7} \sqrt[14]{-i \int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{2^{-1+2 s} e^{8-16 s} \Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)} \, ds}}{\sqrt[14]{2} \sqrt[28]{\pi}} \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

More information »

We have also that:

24^2 + e^8 sin (e^8)

Input:

$24^2 + e^8 \sin(e^8)$

Exact result:

$576 + e^8 \sin(e^8)$

Decimal approximation:

1773.638538846852199821934129923324179692699944826913248228...

1773.6385…. result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV).

Series representations:

$$24^2 + e^8 \sin(e^8) = 576 + e^8 \sum_{k=0}^{\infty} \frac{(-1)^k e^{8+16k}}{(1+2k)!}$$

$$24^2 + e^8 \sin(e^8) = 576 + 2 e^8 \sum_{k=0}^{\infty} (-1)^k J_{1+2k}(e^8)$$

$$24^2 + e^8 \sin(e^8) = 576 + e^8 \sum_{k=0}^{\infty} \frac{(-1)^k \left(e^8 - \frac{\pi}{2}\right)^{2k}}{(2k)!}$$

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Integral representations:

$$24^2 + e^8 \sin(e^8) = 576 + e^{16} \int_0^1 \cos(e^8 t)\, dt$$

$$24^2 + e^8 \sin(e^8) = 576 - \frac{i e^{16}}{4\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-e^{16}/(4s)+s}}{s^{3/2}}\, ds \quad \text{for } \gamma > 0$$

$$24^2 + e^8 \sin(e^8) = 576 - \frac{i e^8}{2\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{2^{-1+2s} e^{8-16s} \Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)}\, ds \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

More information »

And:

(((24^2 + e^8 sin (e^8))))^1/15

Input:

$$\sqrt[15]{24^2 + e^8 \sin(e^8)}$$

Exact result:

$$\sqrt[15]{576 + e^8 \sin(e^8)}$$

Decimal approximation:

1.646610982748644028610952777831898242951804137376419935147...

1.64661098…. ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Series representations:

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 + e^8 \sum_{k=0}^{\infty} \frac{(-1)^k e^{8+16k}}{(1+2k)!}}$$

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 + 2 e^8 \sum_{k=0}^{\infty} (-1)^k J_{1+2k}(e^8)}$$

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 + e^8 \sum_{k=0}^{\infty} \frac{(-1)^k \left(e^8 - \frac{\pi}{2}\right)^{2k}}{(2k)!}}$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

More information »

Integral representations:

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 + e^{16} \int_0^1 \cos(e^8 t)\, dt}$$

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 - \frac{i e^{16}}{4\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-e^{16}/(4s)+s}}{s^{3/2}}\, ds} \quad \text{for } \gamma > 0$$

$$\sqrt[15]{24^2 + e^8 \sin(e^8)} = \sqrt[15]{576 - \frac{i e^8}{2\sqrt{\pi}} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{2^{-1+2s} e^{8-16s} \Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)}\, ds} \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

More information »

Now, we have that:

Some particular cases of the formulæ (1)–(5) are interesting. Thus

$$L\cos ax = L\sin ax = 0,$$

$$L(\cos^2 ax)^{\frac{1}{2}m} = L(\sin^2 ax)^{\frac{1}{2}m} = \frac{1}{\pi}\int_0^\pi (\cos^2 x)^{\frac{1}{2}m}\,dx$$

$$= \frac{\Gamma\left(\frac{m+1}{2}\right)}{\sqrt{\pi}\,\Gamma\left(\frac{m}{2}+1\right)},$$

if $m > 0$; and if $2n$ is a positive integer

Thence:

$$\frac{1}{\pi}\int_0^\pi (\cos^2 x)^{\frac{1}{2}m}\,dx = \frac{\Gamma\left(\frac{m+1}{2}\right)}{\sqrt{\pi}\,\Gamma\left(\frac{m}{2}+1\right)},$$

We obtain for m = 2:

gamma (3/2) / sqrt((((Pi* gamma ((2)))

Input:

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$\frac{1}{2}$$

Decimal form:

0.5

0.5

Series representations:

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{\sum_{k=0}^{\infty} \frac{\left(\frac{3}{2}-z_0\right)^k \Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(2)}\,\sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} (-1+\pi\,\Gamma(2))^{-k}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{\Gamma\left(\frac{3}{2}\right)}{\exp\left(i\,\pi\left\lfloor\frac{\arg(-x+\pi\,\Gamma(2))}{2\,\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\,(-x+\pi\,\Gamma(2))^k\left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(2)}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,(-1+\pi\,\Gamma(2))^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$ for ($z_0 \notin \mathbb{Z}$ or $z_0 > 0$)

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

$\mathbb{Z}$ is the set of integers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

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

i is the imaginary unit

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

More information »

Integral representations:

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{1}{\sqrt{\pi\int_0^1 \log\left(\frac{1}{t}\right)dt}}\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt$$

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{1}{\sqrt{\pi\int_0^\infty e^{-t}\,t\,dt}}\int_0^\infty e^{-t}\sqrt{t}\,dt$$

$$\frac{\Gamma\left(\frac{3}{2}\right)}{\sqrt{\pi\,\Gamma(2)}} = \frac{\exp\left(\int_0^1 \frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)}{\sqrt{e^{\int_0^1 (-1+x)/\log(x)\,dx}\,\pi}}$$

log(x) is the natural logarithm

For m =3:

gamma (2) / sqrt((((Pi* gamma ((2.5))))

Input:

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}}$$

Γ(x) is the gamma function

Result:

0.489336...

0.489336…

Series representations:

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{\sum_{k=0}^{\infty} \frac{(2-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(2.5)}\,\sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k}(-1+\pi\,\Gamma(2.5))^{-k}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{\Gamma(2)}{\exp\left(i\,\pi\left\lfloor\frac{\arg(-x+\pi\,\Gamma(2.5))}{2\,\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty} \frac{(-1)^k\,x^{-k}\,(-x+\pi\,\Gamma(2.5))^k\left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{\sum_{k=0}^{\infty} \frac{(2-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(2.5)}\,\sum_{k=0}^{\infty} \frac{(-1)^k\,(-1+\pi\,\Gamma(2.5))^{-k}\left(-\frac{1}{2}\right)_k}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

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i is the imaginary unit

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More information »

Integral representations:

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{1}{\sqrt{\pi \int_0^1 \log^{1.5}\left(\frac{1}{t}\right) dt}} \int_0^1 \log\left(\frac{1}{t}\right) dt$$

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{1}{\sqrt{\pi \int_0^\infty e^{-t}\, t^{1.5}\, dt}} \int_0^\infty e^{-t}\, t\, dt$$

$$\frac{\Gamma(2)}{\sqrt{\pi\,\Gamma(2.5)}} = \frac{e^{\int_0^1 (-1+x)/\log(x)\, dx}}{\sqrt{e^{\int_0^1 \frac{1.5-2.5\,x+x^{2.5}}{(-1+x)\log(x)}\, dx}\, \pi}}$$

For m = 5:

gamma (3) / sqrt((((Pi* gamma ((5/2)+1))))

Input:

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$\frac{4\sqrt{\frac{2}{15}}}{\pi^{3/4}}$$

Decimal approximation:

0.6189662299891828494988527518920109269190438012299405447 73...

0.618966229… result very near to the reciprocal of the golden ratio

Property:

$\frac{4\sqrt{\frac{2}{15}}}{\pi^{3/4}}$ is a transcendental number

Series representations:

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{\sum_{k=0}^{\infty} \frac{(3-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma\left(\frac{7}{2}\right)}\,\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\pi\,\Gamma\left(\frac{7}{2}\right)\right)^{-k}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{\Gamma(3)}{\exp\left(i\,\pi\left\lfloor\frac{\arg\left(-x+\pi\,\Gamma\left(\frac{7}{2}\right)\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\left(-x+\pi\,\Gamma\left(\frac{7}{2}\right)\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

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

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{\sum_{k=0}^{\infty} \frac{(3-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma\left(\frac{7}{2}\right)}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\pi\,\Gamma\left(\frac{7}{2}\right)\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

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

$\mathbb{Z}$ is the set of integers

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

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

i is the imaginary unit

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

More information »

Integral representations:

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{1}{\sqrt{\pi \int_0^1 \log^{5/2}\left(\frac{1}{t}\right) dt}} \int_0^1 \log^2\left(\frac{1}{t}\right) dt$$

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{1}{\sqrt{\pi \int_0^\infty e^{-t}\, t^{5/2}\, dt}} \int_0^\infty e^{-t}\, t^2\, dt$$

$$\frac{\Gamma(3)}{\sqrt{\pi\,\Gamma\left(\frac{5}{2}+1\right)}} = \frac{e^{\int_0^1 ((-1+x)(2+x))/\log(x)\, dx}}{\sqrt{\exp\left(\int_0^1 \frac{\frac{5}{2}-\frac{7x}{2}+x^{7/2}}{(-1+x)\log(x)}\, dx\right)\pi}}$$

For m = 8:

gamma (4.5) / sqrt((((Pi* gamma ((5)))))

Input:

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}}$$

$\Gamma(x)$ is the gamma function

Result:

1.33956...

1.33956…

Series representations:

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{\sum_{k=0}^{\infty} \frac{(4.5-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(5)}\,\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}(-1+\pi\,\Gamma(5))^{-k}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{\Gamma(4.5)}{\exp\left(i\,\pi\left\lfloor\frac{\arg(-x+\pi\,\Gamma(5))}{2\,\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\,(-x+\pi\,\Gamma(5))^k\left(-\frac{1}{2}\right)_k}{k!}}$$
$$\text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{\sum_{k=0}^{\infty} \frac{(4.5-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(5)}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,(-1+\pi\,\Gamma(5))^{-k}\left(-\frac{1}{2}\right)_k}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

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

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i is the imaginary unit

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More information »

Integral representations:

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{1}{\sqrt{\pi\int_0^1 \log^4\left(\frac{1}{t}\right)dt}}\int_0^1 \log^{3.5}\left(\frac{1}{t}\right)dt$$

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{1}{\sqrt{\pi\int_0^\infty e^{-t}\,t^4\,dt}}\int_0^\infty e^{-t}\,t^{3.5}\,dt$$

$$\frac{\Gamma(4.5)}{\sqrt{\pi\,\Gamma(5)}} = \frac{e^{\int_0^1 \frac{3.5-4.5\,x+x^{4.5}}{(-1+x)\log(x)}\,dx}}{\sqrt{e^{\int_0^1 \left(-4+x+x^2+x^3+x^4\right)/\log(x)\,dx}\,\pi}}$$

For m = 13:

gamma (7) / sqrt((((Pi* gamma ((7.5))))

Input:

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}}$$

$\Gamma(x)$ is the gamma function

Result:

9.39055...

9.39055…

Series representations:

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{\sum_{k=0}^{\infty} \frac{(7-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(7.5)}\,\sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} (-1+\pi\,\Gamma(7.5))^{-k}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{\Gamma(7)}{\exp\left(i\,\pi \left\lfloor \frac{\arg(-x+\pi\,\Gamma(7.5))}{2\,\pi} \right\rfloor\right) \sqrt{x}\,\sum_{k=0}^{\infty} \frac{(-1)^k\,x^{-k}\,(-x+\pi\,\Gamma(7.5))^k \left(-\frac{1}{2}\right)_k}{k!}}$$
$$\text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{\sum_{k=0}^{\infty} \frac{(7-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sqrt{-1+\pi\,\Gamma(7.5)}\,\sum_{k=0}^{\infty} \frac{(-1)^k\,(-1+\pi\,\Gamma(7.5))^{-k} \left(-\frac{1}{2}\right)_k}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

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

$\mathbb{Z}$ is the set of integers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

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

i is the imaginary unit

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

More information »

Integral representations:

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{1}{\sqrt{\pi \int_0^1 \log^{6.5}\left(\frac{1}{t}\right) dt}} \int_0^1 \log^6\left(\frac{1}{t}\right) dt$$

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{1}{\sqrt{\pi \int_0^\infty e^{-t}\, t^{6.5}\, dt}} \int_0^\infty e^{-t}\, t^6\, dt$$

$$\frac{\Gamma(7)}{\sqrt{\pi\,\Gamma(7.5)}} = \frac{e^{\int_0^1 \frac{-6+x+x^2+x^3+x^4+x^5+x^6}{\log(x)} dx}}{\sqrt{e^{\int_0^1 \frac{6.5-7.5\,x+x^{7.5}}{(-1+x)\log(x)} dx}\,\pi}}$$

More information »

We note that the values of m: 2, 3, 5, 8 and 13 are all Fibonacci's numbers. Now, we add the results obtained and carry out various calculations and observations on what we get.

gamma (3/2) / sqrt((((Pi* gamma ((2))) + gamma (2) / sqrt((((Pi* gamma ((2.5))) + gamma (3) / sqrt((((Pi* gamma ((5/2)+1))) + gamma (4.5) / sqrt((((Pi* gamma ((5))) + gamma (7) / sqrt((((Pi* gamma ((7.5)))

(0.5+0.489336+0.618966229+1.33956+9.39055)

Input interpretation:

0.5 + 0.489336 + 0.618966229 + 1.33956 + 9.39055

Result:

12.338412229

12.338412229 result that is very near to the black hole entropy 12.1904 that is the result of ln(196883)

log(196 883)

12.190364922657093458766455576004905429718973818061244670 83...

12.19036492….

log(196 883) is a transcendental number

We have that:

(0.5+0.489336+0.618966229+1.33956+9.39055)^1/5

Input interpretation:

$\sqrt[5]{0.5 + 0.489336 + 0.618966229 + 1.33956 + 9.39055}$

Result:

1.652920...

1.652920... is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

11 * (0.5+0.489336+0.618966229+1.33956+9.39055)^2

Input interpretation:

$11 (0.5 + 0.489336 + 0.618966229 + 1.33956 + 9.39055)^2$

Result:

1674.600579660104232851

1674.6005…. result very near to the rest mass of Omega baryon 1672.45

27*2 +11*(0.5+0.489336+0.618966229+1.33956+9.39055)^2

Input interpretation:

$27\times 2+11\,(0.5+0.489336+0.618966229+1.33956+9.39055)^2$

Result:

1728.600579660104232851

Repeating decimal:

1728.600579660104232851

1728.60057….

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

We can to obtain, calculating the eleventh root and multiplying by 10^{19} GeV:

(((((27*2 +11*(0.5+0.489336+0.618966229+1.33956+9.39055)^2)))))^1/11 * 10^19 GeV

Input interpretation:

$\sqrt[11]{27\times 2+11\,(0.5+0.489336+0.618966229+1.33956+9.39055)^2}\times 10^{19}$ GeV (gigaelectronvolts)

Result:

1.969×10^{19} GeV (gigaelectronvolts)

$1.969 * 10^{19}$GeV practically near to the mean value $1.962 * 10^{19}$ of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

From 0.0814135 and 1.227343217 that are two Ramanujan mock theta functions, we obtain:

(1.969 + 0.0814135) / 1.227343217 = 1.6706113429 result very near to the value of the formula:

$$m_{p'} = 2\times\frac{\eta}{R}m_P = 1.6714213\times 10^{-24}\ \text{gm}$$

that is the holographic proton mass (N. Haramein)

Unit conversions:

1.969×10^{28} eV (electronvolts)

3.155 GJ (gigajoules)

3.155×10^{9} J (joules)

$3.155 * 10^9$ J

Now, we have that:

according as $2n = 2k+1$ or $= 2k$. But

$$L(\cos x)^{2k+1} = L(\sin x)^{2k+1} = 0.$$

Some of these results may be easily deduced from first principles. Thus, *e.g.*, if $L\cos x$ is determinate, it must, by II., be equal to

$$L\cos(x+\pi) = -L\cos x,$$

and therefore $= 0$.

Again

$$G\int_0^\infty \cos ax\, dx = 0,$$

$$G\int_0^\infty \sin ax\, dx = \frac{1}{a},$$

$$G\int_0^\infty (\cos x)^{2k+1}\, dx = 0,$$

$$G\int_0^\infty (\sin x)^{2k+1}\, dx = \int_0^{\frac{1}{2}\pi} (\cos x)^{2k+1}\, dx$$

$$= \frac{2.4\ldots 2k}{3.5\ldots 2k+1}.$$

Again

$$G\int_0^\infty \cos ax\,(\cos x)^{2k}\, dx = 0,$$

$$G\int_0^\infty \sin ax\,(\sin x)^{2k}\, dx$$

$$= \frac{1}{\sin\frac{1}{2}a\pi}\int_0^{\frac{1}{2}\pi} \cos au\,(\cos u)^{2k}\, du$$

$$= \frac{\pi}{2^{2k+1}\sin\frac{1}{2}a\pi}\,\frac{\Gamma(2k+1)}{\Gamma(k+1-\frac{1}{2}a)\,\Gamma(k+1+\frac{1}{2}a)}$$

$$= \frac{2k!}{a(2^2-a^2)(4^2-a^2)\ldots(4k^2-a^2)},$$

provided a is not an even integer.

Thence:

$$G\int_0^\infty \sin ax\,(\sin x)^{2k}\, dx = \frac{\pi}{2^{2k+1}\sin\frac{1}{2}a\pi}\,\frac{\Gamma(2k+1)}{\Gamma(k+1-\frac{1}{2}a)\,\Gamma(k+1+\frac{1}{2}a)}$$

$$= \frac{2k!}{a(2^2-a^2)(4^2-a^2)\dots(4k^2-a^2)}$$

For k = 2, a = 3, we obtain:

(2*2)! / (((3(2^2-3^2) (4^2-3^2) (4*2^2-3^2)))

Input:

$$\frac{(2\times 2)!}{(3(2^2-3^2))(4^2-3^2)(4\times 2^2-3^2)}$$

$n!$ is the factorial function

Exact result:

$$-\frac{8}{245}$$

Decimal approximation:

-0.032653061224489795918367346938775510204081632653061224448...

-0.03265306…

Series representation:

$$\frac{(2\times 2)!}{((4^2-3^2)(4\times 2^2-3^2))3(2^2-3^2)} = -\frac{1}{735}\sum_{k=0}^{\infty}\frac{(4-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 4)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$\frac{(2\times 2)!}{((4^2-3^2)(4\times 2^2-3^2))3(2^2-3^2)} = -\frac{1}{735}\int_0^{\infty} e^{-t}\,t^4\,dt$$

$$\frac{(2\times 2)!}{((4^2-3^2)(4\times 2^2-3^2))3(2^2-3^2)} = -\frac{1}{735}\int_0^{1}\log^4\left(\frac{1}{t}\right)dt$$

$$\frac{(2\times 2)!}{((4^2-3^2)(4\times 2^2-3^2))3(2^2-3^2)} = -\frac{1}{735}\int_1^{\infty} e^{-t}\,t^4\,dt - \frac{1}{735}\sum_{k=0}^{\infty}\frac{(-1)^k}{(5+k)k!}$$

$\log(x)$ is the natural logarithm

More information »

We note that:

1.0061571663 * -1/2 * 10^2 * (2*2)! / (((3(2^2-3^2) (4^2-3^2) (4*2^2-3^2)))

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{2} \times 1.0061571663 \times (-1) \times 10^2 \times \frac{(2 \times 2)!}{(3(2^2-3^2))(4^2-3^2)(4 \times 2^2-3^2)}$$

$n!$ is the factorial function

Result:

1.642705577632653061224489795918367346938775510204081632653...

1.64270557….. ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

Series representation:

$$\frac{(1.00615716630000(-1)10^2)(2 \times 2)!}{2((3(2^2-3^2))(4^2-3^2)(4 \times 2^2-3^2))} = 0.0684460657346939 \sum_{k=0}^{\infty} \frac{(4-n_0)^k \Gamma^{(k)}(1+n_0)}{k!}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 4)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$\frac{(1.00615716630000(-1)10^2)(2 \times 2)!}{2((3(2^2-3^2))(4^2-3^2)(4 \times 2^2-3^2))} = 0.0684460657346939 \int_0^{\infty} e^{-t} t^4 \, dt$$

$$\frac{(1.00615716630000(-1)10^2)(2 \times 2)!}{2((3(2^2-3^2))(4^2-3^2)(4 \times 2^2-3^2))} = 0.0684460657346939 \int_0^1 \log^4\left(\frac{1}{t}\right) dt$$

$$\frac{(1.00615716630000(-1)\,10^2)(2\times 2)!}{2((3(2^2-3^2))(4^2-3^2)(4\times 2^2-3^2))} =$$

$$0.0684460657346939 \int_1^\infty e^{-t}\, t^4\, dt + 0.0684460657346939 \sum_{k=0}^{\infty} \frac{(-1)^k}{(5+k)\,k!}$$

$\log(x)$ is the natural logarithm

And:

((((-60* (2*2)! / (((3(2^2-3^2) (4^2-3^2) (4*2^2-3^2))))))) * 10^19 GeV

Input interpretation:

$$\left(-60\times \frac{(2\times 2)!}{(3(2^2-3^2))(4^2-3^2)(4\times 2^2-3^2)}\right)\times 10^{19}\ \text{GeV (gigaelectronvolts)}$$

Result:

1.959×10^{19} GeV (gigaelectronvolts)

1.959 * 10^{19}GeV result practically near to the mean value 1.962 * 10^{19} of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV.

And, as previously:

(1.959 + 0.0814135) / 1.227343217 = 1,66246366276

Input:

$$-60\times \frac{(2\times 2)!}{(3(2^2-3^2))(4^2-3^2)(4\times 2^2-3^2)}$$

$n!$ is the factorial function

Exact result:

$$\frac{96}{49}$$

Decimal approximation:

1.9591836734693877551020408163265306122448979591836734693877...

1.95918367…

Series representation:

$$-\frac{60\,(2\times 2)!}{(3\,(2^2-3^2))\,(4^2-3^2)\,(4\times 2^2-3^2)} = \frac{4}{49}\sum_{k=0}^{\infty}\frac{(4-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 4)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$-\frac{60\,(2\times 2)!}{(3\,(2^2-3^2))\,(4^2-3^2)\,(4\times 2^2-3^2)} = \frac{4}{49}\int_0^{\infty} e^{-t}\,t^4\,dt$$

$$-\frac{60\,(2\times 2)!}{(3\,(2^2-3^2))\,(4^2-3^2)\,(4\times 2^2-3^2)} = \frac{4}{49}\int_0^{1}\log^4\left(\frac{1}{t}\right)dt$$

$$-\frac{60\,(2\times 2)!}{(3\,(2^2-3^2))\,(4^2-3^2)\,(4\times 2^2-3^2)} = \frac{4}{49}\int_1^{\infty} e^{-t}\,t^4\,dt + \frac{4}{49}\sum_{k=0}^{\infty}\frac{(-1)^k}{(5+k)\,k!}$$

$\log(x)$ is the natural logarithm

For k = 5 and a = 13, we obtain:

(2*5)! / (((13(2^2-13^2) (4^2-13^2) (4*5^2-13^2)))

Input:

$$\frac{(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)}$$

$n!$ is the factorial function

Exact result:

$$-\frac{8960}{55\,913}$$

Decimal approximation:

−0.1602489582029223972957988303256845456333947382540732924 3...

-0.1602489582…

Series representation:

$$\frac{(2\times 5)!}{((4^2-13^2)(4\times 5^2-13^2))\,13\,(2^2-13^2)} = -\frac{\sum_{k=0}^{\infty} \frac{(10-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{22\,644\,765}$$
for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 10)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$\frac{(2\times 5)!}{((4^2-13^2)(4\times 5^2-13^2))\,13\,(2^2-13^2)} = -\frac{1}{22\,644\,765}\int_0^{\infty} e^{-t}\,t^{10}\,dt$$

$$\frac{(2\times 5)!}{((4^2-13^2)(4\times 5^2-13^2))\,13\,(2^2-13^2)} = -\frac{1}{22\,644\,765}\int_0^{1} \log^{10}\left(\frac{1}{t}\right)dt$$

$$\frac{(2\times 5)!}{((4^2-13^2)(4\times 5^2-13^2))\,13\,(2^2-13^2)} = -\frac{1}{22\,644\,765}\int_1^{\infty} e^{-t}\,t^{10}\,dt - \frac{\sum_{k=0}^{\infty} \frac{(-1)^k}{(11+k)\,k!}}{22\,644\,765}$$

$\log(x)$ is the natural logarithm

Note that:

-10 * (2*5)! / (((13(2^2-13^2) (4^2-13^2) (4*5^2-13^2)))

Input:

$$-10\times\frac{(2\times 5)!}{(13\,(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)}$$

$n!$ is the factorial function

Exact result:

$$\frac{89\,600}{55\,913}$$

Decimal approximation:

1.602489582029223972957988303256845456333947382540732924364...

1.6024895…. result very near to the electric charge of positron

Series representation:

$$-\frac{10\,(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)} = \frac{2\sum_{k=0}^{\infty}\frac{(10-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{4528\,953}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 10)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$-\frac{10\,(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)} = \frac{2}{4528\,953}\int_0^{\infty} e^{-t}\,t^{10}\,dt$$

$$-\frac{10\,(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)} = \frac{2}{4528\,953}\int_0^{1} \log^{10}\left(\frac{1}{t}\right)dt$$

$$-\frac{10\,(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)} = \frac{2}{4528\,953}\int_1^{\infty} e^{-t}\,t^{10}\,dt + \frac{2\sum_{k=0}^{\infty}\frac{(-1)^k}{(11+k)\,k!}}{4528\,953}$$

$\log(x)$ is the natural logarithm

More information »

(((((-12 * (2*5)! / (((13(2^2-13^2) (4^2-13^2) (4*5^2-13^2))))))) * 10^19 GeV

Input interpretation:

$$\left(-12\times\frac{(2\times 5)!}{(13\,(2^2-13^2))\,(4^2-13^2)\,(4\times 5^2-13^2)}\right)\times 10^{19}\text{ GeV (gigaelectronvolts)}$$

Result:

1.923×10^{19} GeV (gigaelectronvolts)

$1.923 * 10^{19}$GeV result practically near to the mean value $1.962 * 10^{19}$ of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV.

And, as previously:

(1.923 + 0.0814135) / 1.227343217 = 1,63313201412

Input:

$$-12 \times \frac{(2\times 5)!}{(13(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)}$$

$n!$ is the factorial function

Exact result:

$$\frac{107520}{55913}$$

Decimal approximation:

1.922987498435068767549585963908214547600736859048879509237...

1.922987498…

Series representation:

$$-\frac{12(2\times 5)!}{(13(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)} = \frac{4\sum_{k=0}^{\infty}\frac{(10-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{7548255}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 10)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$-\frac{12(2\times 5)!}{(13(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)} = \frac{4}{7548255}\int_0^{\infty} e^{-t}\,t^{10}\,dt$$

$$-\frac{12(2\times 5)!}{(13(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)} = \frac{4}{7548255}\int_0^{1} \log^{10}\left(\frac{1}{t}\right)dt$$

$$-\frac{12(2\times 5)!}{(13(2^2-13^2))(4^2-13^2)(4\times 5^2-13^2)} = \frac{4}{7548255}\int_1^{\infty} e^{-t}\,t^{10}\,dt + \frac{4\sum_{k=0}^{\infty}\frac{(-1)^k}{(11+k)k!}}{7548255}$$

$\log(x)$ is the natural logarithm

For k = 8 and a = 21, we obtain:

(((((2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))

Input:

$$\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}$$

$n!$ is the factorial function

Exact result:

$$-\frac{7970586624}{274873}$$

Decimal approximation:

- More digits

−28997.3428601572362509231536018452157905650973358605610591...

-28997.34286….

Series representation:

$$\frac{(2\times 8)!}{((4^2-21^2)(4\times 8^2-21^2))\,21\,(2^2-21^2)} = -\frac{\sum_{k=0}^{\infty}\frac{(16-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{721541625}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 16)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$\frac{(2\times 8)!}{((4^2-21^2)(4\times 8^2-21^2))\,21\,(2^2-21^2)} = -\frac{1}{721541625}\int_0^{\infty} e^{-t}\,t^{16}\,dt$$

$$\frac{(2\times 8)!}{((4^2-21^2)(4\times 8^2-21^2))\,21\,(2^2-21^2)} = -\frac{1}{721541625}\int_0^{1}\log^{16}\left(\frac{1}{t}\right)dt$$

$$\frac{(2\times 8)!}{((4^2-21^2)(4\times 8^2-21^2))\,21\,(2^2-21^2)} = -\frac{1}{721541625}\int_1^{\infty} e^{-t}\,t^{16}\,dt - \frac{\sum_{k=0}^{\infty}\frac{(-1)^k}{(17+k)k!}}{721541625}$$

$\log(x)$ is the natural logarithm

More information »

And:

(((((2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2))))) * -1/(27*8)

Input:

$$\frac{\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}\times(-1)}{27\times 8}$$

$n!$ is the factorial function

Exact result:

$$\frac{36\,900\,864}{274\,873}$$

Decimal approximation:

134.24695768591313079131089630483896199335693211046556045 88...

134.246957…. result very near to the rest mass of Pion meson

Mixed fraction:

$$134\frac{67882}{274873}$$

Alternative representations:

$$-\frac{(2\times 8)!}{(27\times 8)((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))} = -\frac{\Gamma(17)}{216(21(4-21^2)(4^2-21^2)(4\times 8^2-21^2))}$$

-

$$-\frac{(2\times 8)!}{(27\times 8)((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))} = -\frac{\Gamma(17,0)}{216(21(4-21^2)(4^2-21^2)(4\times 8^2-21^2))}$$

-

$$-\frac{(2\times 8)!}{(27\times 8)((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))} = -\frac{(1)_{16}}{216(21(4-21^2)(4^2-21^2)(4\times 8^2-21^2))}$$

$\Gamma(x)$ is the gamma function

$\Gamma(a, x)$ is the incomplete gamma function

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

((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))^1/20

Input:

$$\sqrt[20]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}}$$

$n!$ is the factorial function

Exact result:

$$\sqrt[20]{\frac{1001}{274\,873}}\ 2^{3/4}\ \sqrt[4]{3}$$

Decimal approximation:

1.671544374041458031109581054371556871680303096174576248305...

1.671544374…. a result practically equal to the value of the formula:

$m_{p\prime} = 2 \times \frac{\eta}{R} m_P = 1.6714213 \times 10^{-24}$ gm

that is the holographic proton mass (N. Haramein)

We have also that:

1.0061571663*((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))^1/21

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$1.0061571663\sqrt[21]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}}$$

$n!$ is the factorial function

Result:

1.6411907954...

1.6411907954.... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Series representation:

$$1.00615716630000 \sqrt[21]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}} = 0.380928839666646 \sqrt[21]{\sum_{k=0}^{\infty} \frac{(16-n_0)^k \Gamma^{(k)}(1+n_0)}{k!}}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 16)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$1.00615716630000 \sqrt[21]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}} = 0.380928839666646 \sqrt[21]{\int_0^{\infty} e^{-t}\, t^{16}\, dt}$$

$$1.00615716630000 \sqrt[21]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}} = 0.380928839666646 \sqrt[21]{\int_0^{1} \log^{16}\left(\frac{1}{t}\right) dt}$$

$$1.00615716630000 \sqrt[21]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}} = 0.380928839666646 \sqrt[21]{\int_1^{\infty} e^{-t}\, t^{16}\, dt + \sum_{k=0}^{\infty} \frac{(-1)^k}{(17+k)\,k!}}$$

$\log(x)$ is the natural logarithm

More information »

(((((1.0061571663^5 * ((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))^1/16))))) * 10^19 GeV

Input interpretation:

$$\left(1.0061571663^5 \sqrt[16]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}}\right)\times 10^{19}\text{ GeV}$$

(gigaelectronvolts)

Result:

1.9598666×10^{19} GeV (gigaelectronvolts)

1.959866…* 10^{19} GeV result practically near to the mean value 1.962 * 10^{19} of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV.

And, as previously:

(1.959866 + 0.0814135) / 1.227343217 = 1,66316925186

Unit conversions:

- More

1.9598666×10^{28} eV (electronvolts)

(((((1.0061571663^5 * ((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))^1/16)))))

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$1.0061571663^5 \sqrt[16]{-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}}$$

$n!$ is the factorial function

Result:

1.959866600...

1.959866.....

Series representation:

$$1.00615716630000^5 \sqrt[16]{-\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}} =$$

$$0.28819589267433 \sqrt[16]{\sum_{k=0}^{\infty} \frac{(16-n_0)^k\, \Gamma^{(k)}(1+n_0)}{k!}}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 16)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$1.00615716630000^5 \sqrt[16]{-\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}} =$$

$$0.28819589267433 \sqrt[16]{\int_0^{\infty} e^{-t}\, t^{16}\, dt}$$

$$1.00615716630000^5 \sqrt[16]{-\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}} =$$

$$0.28819589267433 \sqrt[16]{\int_0^{1} \log^{16}\left(\frac{1}{t}\right) dt}$$

$$1.00615716630000^5 \sqrt[16]{-\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}} =$$

$$0.28819589267433 \sqrt[16]{\int_1^{\infty} e^{-t}\, t^{16}\, dt + \sum_{k=0}^{\infty} \frac{(-1)^k}{(17+k)\,k!}}$$

$\log(x)$ is the natural logarithm

More information »

1/8 * ((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))

Input:

$$\frac{1}{8}\left(-\frac{(2\times 8)!}{(21\,(2^2-21^2))\,(4^2-21^2)\,(4\times 8^2-21^2)}\right)$$

$n!$ is the factorial function

Exact result:

$$\frac{996323328}{274873}$$

Decimal approximation:

3624.667857519654531365394200230651973820637166982570132388...

3624.66785… result very near to the rest mass of double charmed Xi baryon 3621.40

Series representation:

$$-\frac{(2\times 8)!}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))8} = \frac{\sum_{k=0}^{\infty} \frac{(16-n_0)^k \Gamma^{(k)}(1+n_0)}{k!}}{5772333000}$$

for $((n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 16)$

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$-\frac{(2\times 8)!}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))8} = \frac{1}{5772333000}\int_0^{\infty} e^{-t}\, t^{16}\, dt$$

$$-\frac{(2\times 8)!}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))8} = \frac{1}{5772333000}\int_0^{1} \log^{16}\left(\frac{1}{t}\right) dt$$

$$-\frac{(2\times 8)!}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))8} = \frac{1}{5772333000}\int_1^{\infty} e^{-t}\, t^{16}\, dt + \frac{\sum_{k=0}^{\infty} \frac{(-1)^k}{(17+k)k!}}{5772333000}$$

$\log(x)$ is the natural logarithm

More information »

1.0061571663^6 * 1/17 * ((((-(2*8)! / (((21(2^2-21^2) (4^2-21^2) (4*8^2-21^2)))))

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$1.0061571663^6 \times \frac{1}{17}\left(-\frac{(2\times 8)!}{(21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2)}\right)$$

$n!$ is the factorial function

Result:

1769.718663239028866351698335267571099347734762806592059433...

Repeating decimal:

1769.718663239028866351698335267571099347734762806592059433...

(period 26928)

1769.718663.... result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV).

Series representation:

$$\frac{1.00615716630000^6 (-(2\times 8)!)}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))\,17} = 8.4583302356538\times 10^{-11} \sum_{k=0}^{\infty} \frac{(16-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}$$

for ($(n_0 \notin \mathbb{Z}$ or $n_0 \geq 0)$ and $n_0 \to 16$)

$\mathbb{Z}$ is the set of integers

More information »

Integral representations:

$$\frac{1.00615716630000^6 (-(2\times 8)!)}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))\,17} = 8.4583302356538\times 10^{-11} \int_0^{\infty} e^{-t}\, t^{16}\, dt$$

$$\frac{1.00615716630000^6 (-(2\times 8)!)}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))\,17} = 8.4583302356538\times 10^{-11} \int_0^{1} \log^{16}\left(\frac{1}{t}\right) dt$$

$$\frac{1.00615716630000^6 (-(2\times 8)!)}{((21(2^2-21^2))(4^2-21^2)(4\times 8^2-21^2))\,17} = 8.4583302356538\times 10^{-11} \int_1^{\infty} e^{-t}\, t^{16}\, dt + 8.4583302356538\times 10^{-11} \sum_{k=0}^{\infty} \frac{(-1)^k}{(17+k)\,k!}$$

$\log(x)$ is the natural logarithm

From Collected Papers of G. H. Hardy – Vol. VI:

I. *Further researches in the Theory of Divergent Series and Integrals.*

By G. H. HARDY, M.A.

[*Received*, April 2, 1908. *Read*, May 18, 1908.]

We have that (pg.235):

More generally we may take

$$x^{\mu} F(x) = x^{\rho-1} J_{\alpha}(x),$$

where $\rho + \alpha > 0$, and express

$$G\int_0^{\infty} x^{\rho-1} \begin{matrix}\cos \\ \sin\end{matrix} mx\, J_{\alpha}(x)\, dx$$

as a hypergeometric series. When $-\alpha < \rho < \frac{3}{2}$ we obtain a known expression of an ordinary integral. An interesting special case is that in which $\rho - 1 = \alpha$. In this case we find

$$G\int_0^{\infty} x^{\alpha} J_{\alpha}(x)\, e^{-mix}\, dx = \Sigma \frac{(-)^n}{2^{\alpha+2n}\, n!\, \Gamma(n+\alpha+1)} G\int_0^{\infty} e^{-mix} x^{2n+2\alpha}\, dx$$

$$= \Sigma \frac{(-)^n}{2^{\alpha+2n}\, n!\, \Gamma(n+\alpha+1)} \frac{\Gamma(2n+2\alpha+1)}{m^{2n+2\alpha+1}} e^{-\frac{1}{2}(2n+2\alpha+1)\pi i}.$$

Using the formula

$$\Gamma(\alpha)\,\Gamma(\alpha+\tfrac{1}{2}) = \Gamma(2\alpha)\, 2^{\frac{1}{2}-2\alpha} \sqrt{2\pi},$$

we can reduce this series to

$$\frac{2^{\alpha}\,\Gamma(\alpha+\frac{1}{2})\, e^{(-\alpha+\frac{1}{2})\pi i}}{m^{2\alpha+1}\sqrt{\pi}} \Sigma \frac{(\alpha+\frac{1}{2})(\alpha+\frac{3}{2})\ldots(\alpha+n-\frac{1}{2})}{1\,.\,2\ldots n} \left(\frac{1}{m^2}\right)^n$$

$$= \frac{2^{\alpha} e^{(-\alpha+\frac{1}{2})\pi i}\,\Gamma(\alpha+\frac{1}{2})}{\sqrt{\pi}\,(m^2-1)^{\alpha+\frac{1}{2}}}.$$

Thence,

$$= \frac{2^{\alpha} e^{(-\alpha+\frac{1}{2})\pi i}\,\Gamma(\alpha+\frac{1}{2})}{\sqrt{\pi}\,(m^2-1)^{\alpha+\frac{1}{2}}}.$$

for m = 3, α = – 2, we obtain:

[2^(-2)* exp(((2+1/2)*Pi*i)) * gamma (-2+1/2)] / [(sqrt(Pi) * (3^2-1)^(-2+1/2)]

Input:

$$\frac{\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{2^2}}{\sqrt{\pi}\,(3^2-1)^{-2+1/2}}$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

Exact result:

$$\frac{16 i \sqrt{2}}{3}$$

Decimal approximation:

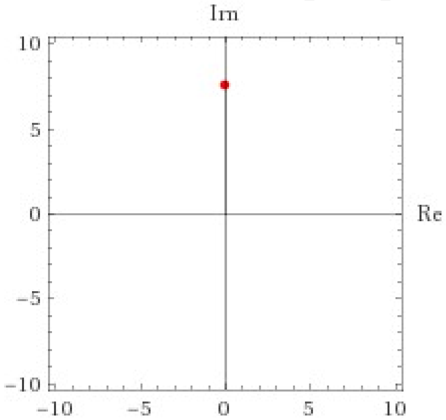
7.542472332656506926942339862451723085704916668677056390275... i

7.5424723…i

Polar coordinates:

$r \approx 7.54247$ (radius), $\theta = 90°$ (angle)

Position in the complex plane:



Alternative representations:

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2} = \frac{\exp\left(\frac{5 i \pi}{2}\right)e^{-\log G(-3/2)+\log G(-1/2)}}{\frac{4\sqrt{\pi}}{8^{3/2}}}$$

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2} = \frac{\exp\left(\frac{5 i \pi}{2}\right)(1)_{-\frac{5}{2}}}{\frac{4\sqrt{\pi}}{8^{3/2}}}$$

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)2^2} = -\frac{\sqrt[8]{e}\exp\left(\frac{5 i \pi}{2}\right)}{\frac{4\times 2^{23/24} A^{3/2} \pi^{3/4}\left(-3\sqrt[8]{e}\right)\sqrt{\pi}}{\left(4\times 2^{23/24} A^{3/2}\pi^{5/4}\right)8^{3/2}}}$$

$\log G(z)$ gives the logarithm of the Barnes G-function

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)2^2} = \frac{4\sqrt{2}\exp\left(\frac{5 i \pi}{2}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{2}-z_0\right)^k \Gamma^{(k)}(z_0)}{k!}}{\exp\left(\pi \mathcal{A}\left\lfloor\frac{\arg(\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k (\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

for ($x \in \mathbb{R}$ and ($z_0 \notin \mathbb{Z}$ or $z_0 > 0$) and $x < 0$)

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)2^2} =$$

$$\frac{4\sqrt{2}\exp\left(\frac{5 i \pi}{2}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor} z_0^{-1/2-1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}}{\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\pi-z_0)^k z_0^{-k}}{k!}}$$

for ($z_0 \notin \mathbb{Z}$ or $z_0 > 0$)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

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

$\mathbb{Z}$ is the set of integers

Integral representations:

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)2^2} = \frac{8\sqrt{2}\,\pi\mathcal{A}\exp\left(\frac{5 i \pi}{2}\right)}{\sqrt{\pi}\oint_L e^t\, t^{3/2}\, dt}$$

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,(3^2-1)^{-2+1/2}\right)2^2} = \frac{4\sqrt{2}\,\exp\left(\frac{5i\pi}{2}\right)}{\sqrt{\pi}} \int_0^\infty \frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{5/2}}\,dt \quad \text{for } \left(n\in\mathbb{Z} \text{ and } \frac{1}{2}<n<\frac{3}{2}\right)$$

$$\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,(3^2-1)^{-2+1/2}\right)2^2} = \frac{4i\sqrt{\frac{2}{\pi}}}{-1+e^{-3\pi\mathcal{A}}} \oint_L \frac{e^{-t}}{t^{5/2}}\,dt$$

More information »

1+((((1/sqrt(((((((ln(((([2^(-2)* exp(((2+1/2)*Pi*i)) * gamma (-2+1/2)] / [(sqrt(Pi) * (3^2-1)^(-2+1/2)])))))))))))))

Input:

$$1+\frac{1}{\sqrt{\log\left(\frac{\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{2^2}}{\sqrt{\pi}\,(3^2-1)^{-2+1/2}}\right)}}$$

$\Gamma(x)$ is the gamma function

$\log(x)$ is the natural logarithm

i is the imaginary unit

Exact result:

$$1+\frac{1}{\sqrt{\log\left(\frac{16i\sqrt{2}}{3}\right)}}$$

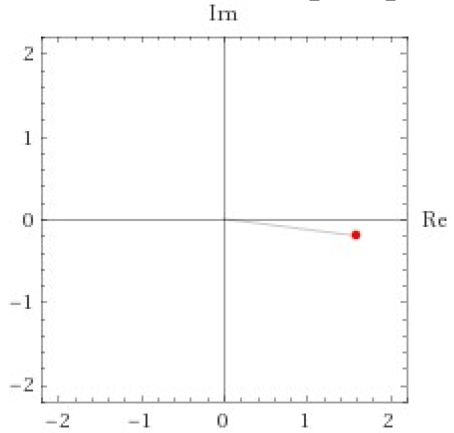
Decimal approximation:

1.5912746589484317635445499066411535727722302880807179205... −
0.20279523999003103209699953850147171928561504466158608857... i

Property:

$1+\frac{1}{\sqrt{\log\left(\frac{16i\sqrt{2}}{3}\right)}}$ is a transcendental number

Position in the complex plane:



Alternate forms:

$$1+\frac{1}{\sqrt{\frac{i\pi}{2}+\frac{\log(2)}{2}+\log\left(\frac{16}{3}\right)}}$$

$$1+\frac{1}{\sqrt{\frac{1}{2}\,i\,(\pi-i\,(9\log(2)-2\log(3)))}}$$

$$\frac{1+\sqrt{\log\left(\frac{16\,i\,\sqrt{2}}{3}\right)}}{\sqrt{\log\left(\frac{16\,i\,\sqrt{2}}{3}\right)}}$$

Alternative representations:

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi\,i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\frac{5\,i\,\pi}{2}\right)e^{-\log G(-3/2)+\log G(-1/2)}}{\frac{4\sqrt{\pi}}{8^{3/2}}}\right)}}$$

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi\,i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=1+\frac{1}{\sqrt{\log_e\left(\frac{\exp\left(\frac{5\,i\,\pi}{2}\right)\Gamma\left(-\frac{3}{2}\right)}{\frac{4\sqrt{\pi}}{8^{3/2}}}\right)}}$$

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\frac{5 i \pi}{2}\right)(1)_{-\frac{5}{2}}}{\frac{4\sqrt{\pi}}{8^{3/2}}}\right)}}$$

$\log G(z)$ gives the logarithm of the Barnes G-function

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

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

More information »

Series representations:

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=1+\frac{1}{\sqrt{\log\left(-1+\frac{16 i\sqrt{2}}{3}\right)-\sum_{k=1}^{\infty}\frac{\left(\frac{3 i}{3 i+16\sqrt{2}}\right)^k}{k}}}$$

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=$$
$$1+\frac{1}{\sqrt{2 i\pi\left\lfloor\frac{\arg\left(\frac{16 i\sqrt{2}}{3}-x\right)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{16 i\sqrt{2}}{3}-x\right)^k x^{-k}}{k}}}\quad \text{for } x<0$$

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)2^2}\right)}}=$$
$$1+\frac{1}{\sqrt{\log(z_0)+\left\lfloor\frac{\arg\left(\frac{16 i\sqrt{2}}{3}-z_0\right)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{16 i\sqrt{2}}{3}-z_0\right)^k z_0^{-k}}{k}}}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,(3^2-1)^{-2+1/2}\right)2^2}\right)}}=1+\frac{1}{\sqrt{\int_1^{\frac{16 i\sqrt{2}}{3}}\frac{1}{t}\,dt}}$$

$$1+\frac{1}{\sqrt{\log\left(\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{\left(\sqrt{\pi}\,(3^2-1)^{-2+1/2}\right)2^2}\right)}}=1+\frac{\sqrt{2\pi}}{\sqrt{-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(-1+\frac{16 i\sqrt{2}}{3}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}$$

for $-1<\gamma<0$

More information »

1.5912746589484317635445499066411535727722302880807179205... −
0.2027952399900310320969995385014717192856150446615860857... i

(1.5912746589484317635445499-0.2027952399900310320969995i)

Input interpretation:

1.5912746589484317635445499 + i × (−0.2027952399900310320969995)

i is the imaginary unit

Result:

1.5912746589484317635445499... −
0.2027952399900310320969995... i

Polar coordinates:

r = 1.6041449278584719281499017 (radius)
, θ = −7.262738953958388120124847° (angle)

1.6041449278…. result very near to the electric charge of positron

And:

(1.6041449278)* 1.369955709 – (0.50970737445/2)

Where 1.369955709 and 0.50970737445 are two Ramanujan mock theta functions

Input interpretation:

$$1.6041449278\times1.369955709-\frac{0.50970737445}{2}$$

Result:

1.9427538146780028102

1.9427538…. result practically near to the mean value $1.962 * 10^{19}$ of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

We have also that:

sqrt(9^3-1)+10^3+10^2((([2^(-2)* exp(((2+1/2)*Pi*i)) * gamma (-2+1/2)] / [(sqrt(Pi) * (3^2-1)^(-2+1/2)]))i

Input:

$$\sqrt{9^3-1}+10^3+10^2\times\frac{\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi\, i\right)\Gamma\left(-2+\frac{1}{2}\right)}{2^2}}{\left(\sqrt{\pi}\,\left(3^2-1\right)^{-2+1/2}\right)i}$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

Exact result:

$$1000+\frac{1600\sqrt{2}}{3}+2\sqrt{182}$$

Decimal approximation:

1781.228708392114775625334597468163398515402403068140661736...

1781.2287…. result in the range of the hypothetical mass of Gluino (gluino = 1785.16 GeV).

Alternate forms:

$$\frac{2}{3}\left(1500+800\sqrt{2}+3\sqrt{182}\right)$$

$$2\sqrt{182}+\frac{200}{3}\left(15+8\sqrt{2}\right)$$

$$\frac{2}{3}\left(1500+\sqrt{2\left(640819+4800\sqrt{91}\right)}\right)$$

Alternative representations:

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$
$$10^3+\frac{\exp\left(\frac{5i\pi}{2}\right)10^2\,e^{-\log G(-3/2)+\log G(-1/2)}}{\frac{4\left(i\sqrt{\pi}\right)}{8^{3/2}}}+\sqrt{-1+9^3}$$

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$
$$10^3+\frac{\exp\left(\frac{5i\pi}{2}\right)(1)_{-\frac{5}{2}}\,10^2}{\frac{4\left(i\sqrt{\pi}\right)}{8^{3/2}}}+\sqrt{-1+9^3}$$

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$
$$10^3-\frac{\sqrt[8]{e}\,\exp\left(\frac{5i\pi}{2}\right)10^2}{\frac{4\times 2^{23/24}A^{3/2}\pi^{3/4}\left(-3\sqrt[8]{e}\right)\left(i\sqrt{\pi}\right)}{\left(4\times 2^{23/24}A^{3/2}\pi^{5/4}\right)8^{3/2}}}+\sqrt{-1+9^3}$$

$\log G(z)$ gives the logarithm of the Barnes G-function

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$

$$\left(1000\,i\exp\left(\pi\mathcal{A}\left\lfloor\frac{\arg(\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+400\sqrt{2}\exp\left(\frac{5i\pi}{2}\right)\right.$$
$$\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}+i\exp\left(\pi\mathcal{A}\left\lfloor\frac{\arg(728-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\mathcal{A}\left\lfloor\frac{\arg(\pi-x)}{2\pi}\right\rfloor\right)$$
$$\left.\sqrt{x}^2\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(728-x)^{k_1}(\pi-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right)/$$
$$\left(i\exp\left(\pi\mathcal{A}\left\lfloor\frac{\arg(\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

for ($x\in\mathbb{R}$ and ($z_0\notin\mathbb{Z}$ or $z_0>0$) and $x<0$)

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}z_0^{-1/2-1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}\left(1000\,i\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}\right.\right.$$
$$z_0^{1/2+1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\pi-z_0)^k z_0^{-k}}{k!}+400\sqrt{2}\exp\left(\frac{5i\pi}{2}\right)$$
$$\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}+i\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(728-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}$$
$$z_0^{1+1/2\lfloor\arg(728-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\pi-z_0)/(2\pi)\rfloor}$$
$$\left.\left.\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(728-z_0)^{k_1}(\pi-z_0)^{k_2}z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\right)/$$
$$\left(i\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\pi-z_0)^k z_0^{-k}}{k!}\right)\text{ for }(z_0\notin\mathbb{Z}\text{ or }z_0>0)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

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

$\mathbb{Z}$ is the set of integers

Integral representations:

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$

$$1000+\sqrt{728}+\frac{800\sqrt{2}\,\pi\,\mathcal{A}\exp\left(\frac{5i\pi}{2}\right)}{i\sqrt{\pi}\oint_L e^t\,t^{3/2}\,dt}$$

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$

$$1000+\sqrt{728}+\frac{400\sqrt{2}\exp\left(\frac{5i\pi}{2}\right)}{i\sqrt{\pi}}\int_0^\infty\frac{e^{-t}-\sum_{k=0}^n\frac{(-t)^k}{k!}}{t^{5/2}}\,dt$$

$$\text{for }\left(n\in\mathbb{Z}\text{ and }\frac{1}{2}<n<\frac{3}{2}\right)$$

$$\sqrt{9^3-1}+10^3+\frac{10^2\left(\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)\right)}{2^2\left(\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i\right)}=$$

$$1000+\sqrt{728}+\frac{400\sqrt{\frac{2}{\pi}}}{-1+e^{-3\pi\mathcal{A}}}\oint_L\frac{e^{-t}}{t^{5/2}}\,dt$$

And:

-5-27^2+10^3+10^2(((([2^(-2)* exp(((2+1/2)*Pi*i)) * gamma (-2+1/2)] / [(sqrt(Pi) * (3^2-1)^(-2+1/2)]))))i

Input:

$$-5-27^2+10^3+10^2\times\frac{\frac{\exp\left(\left(2+\frac{1}{2}\right)\pi i\right)\Gamma\left(-2+\frac{1}{2}\right)}{2^2}}{\left(\sqrt{\pi}\left(3^2-1\right)^{-2+1/2}\right)i}$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

Exact result:

$$266+\frac{1600\sqrt{2}}{3}$$

Decimal approximation:

1020.247233265650692694233986245172308570491666867705639027...

1020.2472…. result very near to the rest mass of Phi meson 1019.461

Now, we have that (pg.237-238):

$$\int_0^\infty J_\alpha(mx)\, e^{-\tau x} x^\rho\, dx = \frac{m^\alpha}{\tau^{\alpha+\rho+1}} \frac{\Gamma(\alpha+\rho+1)}{2^\alpha\,\Gamma(\alpha+1)} F\left(\frac{\alpha+\rho+1}{2}, \frac{\alpha+\rho+2}{2}, \alpha+1, -\frac{m^2}{\tau^2}\right) \ldots(12),$$

$$\int_0^\infty J_\alpha(mx)\, e^{-\tau x} x^\rho\, dx = \frac{\Gamma(\alpha+\rho+1)}{\Gamma(\alpha+1)} \frac{(\frac{1}{2}m)^\alpha}{(m^2+\tau^2)^{\frac{1}{2}(\alpha+\rho+1)}} F\left(\frac{\alpha+\rho+1}{2}, \frac{\alpha-\rho}{2}, \alpha+1, \frac{m^2}{m^2+\tau^2}\right) \ldots(13).$$

In the limit for $\tau = 0$ this equation becomes

$$G\int_0^\infty J_\alpha(mx)\, x^\rho\, dx = \frac{2^\rho}{m^{\rho+1}} \frac{\Gamma\{\frac{1}{2}(\alpha+\rho+1)\}}{\Gamma\{\frac{1}{2}(\alpha-\rho+1)\}} \ldots\ldots\ldots\ldots(14).$$

This formula holds for $\alpha+\rho > -1$. If also $\rho < \frac{1}{2}$, the integral is convergent in the ordinary sense *.

Thence, we have:

$$G\int_0^\infty J_\alpha(mx)\, x^\rho\, dx = \frac{2^\rho}{m^{\rho+1}} \frac{\Gamma\{\frac{1}{2}(\alpha+\rho+1)\}}{\Gamma\{\frac{1}{2}(\alpha-\rho+1)\}} \ldots$$

For α = -1.5, m = 2 and ρ = 0.4, we obtain:

(((2^(0.4) / 2^(1.4)))) * (((gamma ((1/2*(-1.5+0.4+1))))) / (((gamma ((1/2*(-1.5-0.4+1)))))

Input:

$$\frac{2^{0.4}}{2^{1.4}} \times \frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}$$

$\Gamma(x)$ is the gamma function

Result:

2.87202...

2.87202…

Alternative representations:

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = -\frac{0.977273\times 2^{0.4}}{-\frac{0.0473736\times 0.659133\times 2^{1.4}}{0.183532}}$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{(-1.05)!\,2^{0.4}}{(-1.45)!\,2^{1.4}}$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \left(\frac{2^{0.4}\,e^{3.0267-3.14159\,i}}{2^{1.4}\,e^{1.27854-3.14159\,i}} = 0.5\,e^{1.74816+0\,i}\right)$$

$n!$ is the factorial function

Series representations:

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{4.5\sum_{k=0}^{\infty}\frac{(-0.05)^k\,\Gamma^{(k)}(1)}{k!}}{\sum_{k=0}^{\infty}\frac{(-0.45)^k\,\Gamma^{(k)}(1)}{k!}}$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} \propto \frac{(0.375899+1.1569\,i)\left((1+0\,i)+(1+0\,i)\sum_{k=1}^{\infty}\sum_{j=1}^{2k}\frac{(-1)^j\,(-0.05)^{-k}\,2^{-j-k}\,\mathcal{D}_{2(j+k),j}}{(j+k)!}\right)}{e^{0.4}\left(1+\sum_{k=1}^{\infty}\sum_{j=1}^{2k}\frac{(-1)^j\,(-0.45)^{-k}\,2^{-j-k}\,\mathcal{D}_{2(j+k),j}}{(j+k)!}\right)}$$

for False for $n \leq -1+3j$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{0.5\sum_{k=0}^{\infty}\frac{(-0.05-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sum_{k=0}^{\infty}\frac{(-0.45-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{0.5\sum_{k=0}^{\infty}(-0.45-z_0)^k\sum_{j=0}^{k}\frac{(-1)^j\pi^{-j+k}\sin\left(\frac{1}{2}\pi(-j+k+2z_0)\right)\Gamma^{(j)}(1-z_0)}{j!(-j+k)!}}{\sum_{k=0}^{\infty}(-0.05-z_0)^k\sum_{j=0}^{k}\frac{(-1)^j\pi^{-j+k}\sin\left(\frac{1}{2}\pi(-j+k+2z_0)\right)\Gamma^{(j)}(1-z_0)}{j!(-j+k)!}}$$

$\mathbb{Z}$ is the set of integers

Integral representations:

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{0.5\csc(-0.025\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.05}}\,dt}{\csc(-0.225\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.45}}\,dt}$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{0.5}{\oint_L e^t\,t^{0.05}\,dt}\oint_L e^t\,t^{0.45}\,dt$$

$$\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}} = \frac{0.5\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.05}}\,dt}{\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.45}}\,dt} \quad \text{for } (n \in \mathbb{Z} \text{ and } 0 \le n < 0.05)$$

$\csc(x)$ is the cosecant function

-(48/10^3)+sqrt [(((2^(0.4) / 2^(1.4)))) * (((gamma ((1/2*(-1.5+0.4+1))))) / (((gamma ((1/2*(-1.5-0.4+1)))))]

Input:

$$-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}}{2^{1.4}}\times\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}$$

$\Gamma(x)$ is the gamma function

Result:

1.64670...

$1.64670\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Alternative representations:

$$-\frac{48}{10^3} + \sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}} = -\frac{48}{10^3} + \sqrt{-\frac{0.977273 \times 2^{0.4}}{-\frac{0.0473736 \times 0.659133 \times 2^{1.4}}{0.183532}}}$$

$$-\frac{48}{10^3} + \sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}} = -\frac{48}{10^3} + \sqrt{\frac{(-1.05)!\, 2^{0.4}}{(-1.45)!\, 2^{1.4}}}$$

$$-\frac{48}{10^3} + \sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}} = \left(-\frac{48}{10^3} + \sqrt{\frac{2^{0.4}\, e^{3.0267-3.14159 i}}{2^{1.4}\, e^{1.27854-3.14159 i}}} = -\frac{6}{125} + \sqrt{0.5\, e^{1.74816+0 i}}\right)$$

$n!$ is the factorial function

Series representations:

$$-\frac{48}{10^3} + \sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}} = -\frac{6}{125} + \sqrt{-1 + \frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}} \sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} \left(-1 + \frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k}$$

$$-\frac{48}{10^3} + \sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}} = -\frac{6}{125} + \sqrt{-1 + \frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1 + \frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

$$-\frac{48}{10^3}+\sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}}=\frac{1}{125}\left(-6+125\sqrt{\frac{4.5\sum_{k=0}^{\infty}\frac{(-0.05)^k\,\Gamma^{(k)}(1)}{k!}}{\sum_{k=0}^{\infty}\frac{(-0.45)^k\,\Gamma^{(k)}(1)}{k!}}}\right)$$

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

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

Integral representations:

$$-\frac{48}{10^3}+\sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}}=\frac{1}{125}\left(-6+125\sqrt{\frac{0.5\csc(-0.025\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.05}}\,dt}{\csc(-0.225\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.45}}\,dt}}\right)$$

$$-\frac{48}{10^3}+\sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}}=-\frac{6}{125}+\sqrt{\frac{0.5}{\oint_L e^t\,t^{0.05}\,dt}\oint_L e^t\,t^{0.45}\,dt}$$

$$-\frac{48}{10^3}+\sqrt{\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)2^{0.4}}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)2^{1.4}}}=\frac{1}{125}\left(-6+125\sqrt{\frac{0.5\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.05}}\,dt}{\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.45}}\,dt}}\right)$$

for ($n \in \mathbb{Z}$ and $0 \leq n < 0.05$)

$\csc(x)$ is the cosecant function

$\mathbb{Z}$ is the set of integers

(0.5957823226*2)*((((((((-(48/10^3)+sqrt [(((2^(0.4) / 2^(1.4)))) * (((gamma ((1/2*(-1.5+0.4+1))))) / (((gamma ((1/2*(-1.5-0.4+1)))))]

where $\boldsymbol{\psi(q)}$ **= 0.5957823226...** is a Ramanujan mock theta function

Input interpretation:

$$(0.5957823226\times 2)\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}}{2^{1.4}}\times\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)$$

$\Gamma(x)$ is the gamma function

Result:

1.96215...

1.96215….. result practically equal to the mean value $1.962 * 10^{19}$ of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

Alternative representations:

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = 1.19156\left(-\frac{48}{10^3}+\sqrt{-\frac{0.977273\times 2^{0.4}}{-\frac{0.0473736\times 0.659133\times 2^{1.4}}{0.183532}}}\right)$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = 1.19156\left(-\frac{48}{10^3}+\sqrt{\frac{(-1.05)!\,2^{0.4}}{(-1.45)!\,2^{1.4}}}\right)$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = 1.19156\left(-\frac{48}{10^3}+\sqrt{\frac{(1)_{-1.05}\,2^{0.4}}{(1)_{-1.45}\,2^{1.4}}}\right)$$

$n!$ is the factorial function

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

Series representations:

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = -0.0571951+1.19156\sqrt{-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k}$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = -0.0571951+1.19156\sqrt{-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = 1.19156\left(-0.048+\sqrt{\frac{4.5\sum_{k=0}^{\infty}\frac{(-0.05)^k\,\Gamma^{(k)}(1)}{k!}}{\sum_{k=0}^{\infty}\frac{(-0.45)^k\,\Gamma^{(k)}(1)}{k!}}}\right)$$

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

Integral representations:

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 = 1.19156\left(-0.048+\sqrt{\frac{0.5\csc(-0.025\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.05}}\,dt}{\csc(-0.225\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.45}}\,dt}}\right)$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 =$$

$$-0.0571951+1.19156\sqrt{\frac{0.5}{\oint_L e^t\, t^{0.05}\, dt}\oint_L e^t\, t^{0.45}\, dt}$$

$$\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)0.595782\times 2 =$$

$$1.19156\left(-0.048+\sqrt{\frac{0.5\int_0^\infty \frac{e^{-t}-\sum_{k=0}^n \frac{(-t)^k}{k!}}{t^{1.05}}\,dt}{\int_0^\infty \frac{e^{-t}-\sum_{k=0}^n \frac{(-t)^k}{k!}}{t^{1.45}}\,dt}}\right) \text{ for } (n\in\mathbb{Z} \text{ and } 0\le n<0.05)$$

csc(x) is the cosecant function

$\mathbb{Z}$ is the set of integers

And:

5+10^3*(0.5957823226*2)*((((((((-(48/10^3)+sqrt [(((2^(0.4) / 2^(1.4)))) * (((gamma ((1/2*(-1.5+0.4+1))))) / (((gamma ((1/2*(-1.5-0.4+1)))))]

Input interpretation:

$$5+10^3\,(0.5957823226\times 2)\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}}{2^{1.4}}\times\frac{\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)$$

Γ(x) is the gamma function

Result:

1967.15…

1967.15… result very near to the rest mass of strange D meson 1968.30

Alternative representations:

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2=$$

$$5+1.19156\times 10^3\left(-\frac{48}{10^3}+\sqrt{-\frac{0.977273\times 2^{0.4}}{-\frac{0.0473736\times 0.659133\times 2^{1.4}}{0.183532}}}\right)$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2=$$

$$5+1.19156\times 10^3\left(-\frac{48}{10^3}+\sqrt{\frac{(-1.05)!\,2^{0.4}}{(-1.45)!\,2^{1.4}}}\right)$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2=$$

$$5+1.19156\times 10^3\left(-\frac{48}{10^3}+\sqrt{\frac{(1)_{-1.05}\,2^{0.4}}{(1)_{-1.45}\,2^{1.4}}}\right)$$

$n!$ is the factorial function

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

Series representations:

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2=$$

$$-52.1951+1191.56\sqrt{-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k}$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2=$$

$$-52.1951+1191.56\sqrt{-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\frac{0.5\,\Gamma(-0.05)}{\Gamma(-0.45)}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2 =$$

$$1191.56\left(-0.0438038+\sqrt{\frac{4.5\sum_{k=0}^{\infty}\frac{(-0.05)^k\,\Gamma^{(k)}(1)}{k!}}{\sum_{k=0}^{\infty}\frac{(-0.45)^k\,\Gamma^{(k)}(1)}{k!}}}\right)$$

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

Integral representations:

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2 =$$

$$1191.56\left(-0.0438038+\sqrt{\frac{0.5\csc(-0.025\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.05}}\,dt}{\csc(-0.225\,\pi)\int_0^{\infty}\frac{\sin(t)}{t^{1.45}}\,dt}}\right)$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2 =$$

$$-52.1951+1191.56\sqrt{\frac{0.5}{\oint_L e^t\,t^{0.05}\,dt}\oint_L e^t\,t^{0.45}\,dt}$$

$$5+\left(10^3\left(-\frac{48}{10^3}+\sqrt{\frac{2^{0.4}\,\Gamma\left(\frac{1}{2}(-1.5+0.4+1)\right)}{2^{1.4}\,\Gamma\left(\frac{1}{2}(-1.5-0.4+1)\right)}}\right)\right)0.595782\times 2 =$$

$$1191.56\left(-0.0438038+\sqrt{\frac{0.5\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.05}}\,dt}{\int_0^{\infty}\frac{e^{-t}-\sum_{k=0}^{n}\frac{(-t)^k}{k!}}{t^{1.45}}\,dt}}\right)\quad \text{for } (n\in\mathbb{Z} \text{ and } 0\le n<0.05)$$

$\csc(x)$ is the cosecant function

$\mathbb{Z}$ is the set of integers

We have that (pag.86)

Thus, *e.g.*,

$$L \log (\cos x - \cos\alpha)^2 \quad (0 < \alpha < \pi)$$

$$= \frac{1}{\pi} \int_0^\pi \log (\cos x - \cos\alpha)^2 \, dx$$

$$= -2 \log 2,$$

$$GP \int_0^\infty \frac{\sin x \, dx}{\cos x - \cos\alpha} = \log (4 \sin^2 \tfrac{1}{2}\alpha),$$

For α = π/2, we obtain:

ln((4 sin^2 (1/2*Pi/2)))

Input:

$$\log\left(4 \sin^2\left(\frac{1}{2} \times \frac{\pi}{2}\right)\right)$$

log(x) is the natural logarithm

Exact result:

$$\log(2)$$

Decimal approximation:

0.6931471805599453094172321214581765680755001343602552541 20...

0.69314718…

Property:

log(2) is a transcendental number

Alternative representations:

$$\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right) = \log\left(4 \cos^2\left(\frac{\pi}{4}\right)\right)$$

$$\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right) = \log\left(4 \left(-\cos\left(\frac{3\pi}{4}\right)\right)^2\right)$$

$$\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right) = \log_e\left(4 \sin^2\left(\frac{\pi}{4}\right)\right)$$

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

Integral representations:

$$\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right) = \int_1^2 \frac{1}{t}\,dt$$

$$\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right) = -\frac{i}{2\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

1.1424432422 * 1/ ln((4 sin^2 (1/2*Pi/2)))

Where **f(q) = 1.1424432422...** is a Ramanujan mock theta function

Input interpretation:

$$1.1424432422 \times \frac{1}{\log\left(4\sin^2\left(\frac{1}{2}\times\frac{\pi}{2}\right)\right)}$$

$\log(x)$ is the natural logarithm

Result:

1.6481972000...

1.6481972…. ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

Alternative representations:

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log\left(4\cos^2\left(\frac{\pi}{4}\right)\right)}$$

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log\left(4\left(-\cos\left(\frac{3\pi}{4}\right)\right)^2\right)}$$

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log_e\left(4\sin^2\left(\frac{\pi}{4}\right)\right)}$$

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

Series representations:

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log\left(16\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{\pi}{4}\right)\right)^2\right)}$$

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log\left(4\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k(-\pi)^{2k}}{(2k)!}\right)^2\right)}$$

$$\frac{1.14244324220000}{\log\left(4\sin^2\left(\frac{\pi}{2\times 2}\right)\right)} = \frac{1.14244324220000}{\log\left(4\left(\sum_{k=0}^{\infty}\frac{(-1)^k 4^{-1-2k}\pi^{1+2k}}{(1+2k)!}\right)^2\right)}$$

$J_n(z)$ is the Bessel function of the first kind

$n!$ is the factorial function

24 + 1.1424432422*10^3 * 1/ ln((4 sin^2 (1/2*Pi/2)))

Input interpretation:

$$24 + 1.1424432422\times 10^3\times\frac{1}{\log\left(4\sin^2\left(\frac{1}{2}\times\frac{\pi}{2}\right)\right)}$$

$\log(x)$ is the natural logarithm

Result:

1672.1972000...

1672.1972.... result practically equal to the rest mass of Omega baryon 1672.45

And:

2*0.5957823226*1.1424432422 * 1/ ln((4 sin^2 (1/2*Pi/2)))

Where 0.5957823226 is a Ramanujan mock theta function

Input interpretation:

$$2\times 0.5957823226\times 1.1424432422\times\frac{1}{\log\left(4\sin^2\left(\frac{1}{2}\times\frac{\pi}{2}\right)\right)}$$

$\log(x)$ is the natural logarithm

Result:

1.963933512...

1.963933…. result very near to the mean value $1.962 * 10^{19}$ of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

Alternative representations:

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log\left(4 \cos^2\left(\frac{\pi}{4}\right)\right)}$$

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log\left(4 \left(-\cos\left(\frac{3\pi}{4}\right)\right)^2\right)}$$

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log_e\left(4 \sin^2\left(\frac{\pi}{4}\right)\right)}$$

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

Series representations:

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log\left(16 \left(\sum_{k=0}^{\infty} (-1)^k J_{1+2k}\left(\frac{\pi}{4}\right)\right)^2\right)}$$

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log\left(4 \left(\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{16}\right)^k (-\pi)^{2k}}{(2k)!}\right)^2\right)}$$

$$\frac{2 \times 0.595782 \times 1.14244324220000}{\log\left(4 \sin^2\left(\frac{\pi}{2 \times 2}\right)\right)} = \frac{1.36129}{\log\left(4 \left(\sum_{k=0}^{\infty} \frac{(-1)^k 4^{-1-2k} \pi^{1+2k}}{(1+2k)!}\right)^2\right)}$$

$J_n(z)$ is the Bessel function of the first kind

$n!$ is the factorial function

Now, we have that (pag.241):

Thus the equations

$$G\int_0^\infty x^{\alpha-1} f(x)\,dx = \sum_1^\infty a_n G\int_0^\infty x^{\alpha-1} e^{-2n\pi ix}\,dx$$

$$= \Gamma(\alpha)\,(2\pi)^{-\alpha}\, e^{-\frac{1}{2}\alpha\pi i} \sum_1^\infty \frac{a_n}{n^\alpha},$$

$$G\int_0^\infty x^{\alpha-1} \sum_1^\infty a_n \frac{\cos}{\sin} 2n\pi x\,dx = \Gamma(\alpha)\,(2\pi)^{-\alpha} \frac{\cos}{\sin} \tfrac{1}{2}\alpha\pi \sum_1^\infty \frac{a_n}{n^\alpha} \quad \text{..............(18)}$$

are certainly valid if $\alpha > 1$. On the other hand they are not necessarily valid if $0 < \alpha < 1$. Thus if $\alpha = \frac{1}{2}$ and $a_n = 1/\sqrt{n}$ we are led to the series

$$G\int_0^\infty x^{\alpha-1} f(x)\,dx = \sum_1^\infty a_n G\int_0^\infty x^{\alpha-1} e^{-2n\pi ix}\,dx$$

$$= \Gamma(\alpha)\,(2\pi)^{-\alpha}\, e^{-\frac{1}{2}\alpha\pi i} \sum_1^\infty \frac{a_n}{n^\alpha},$$

For $\alpha = 2$, and $a_n = 1/n$, we obtain:

gamma (2) * 1/(2Pi)^2 * exp(-2pi/2 * i) * sum ((1/(n)))/(n^2),n = 1..infinity

Input interpretation:

$$\Gamma(2)\times\frac{1}{(2\pi)^2}\exp\left(-2\times\frac{\pi}{2}\,i\right)\sum_{n=1}^{\infty}\frac{\frac{1}{n}}{n^2}$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

Result:

$$-\frac{\zeta(3)}{4\pi^2} \approx -0.0304485$$

Input:

$$-\frac{\zeta(3)}{4\pi^2}$$

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

Decimal approximation:

−0.030448457058393270780251530471154776647000483544973936 25...

Alternative representations:

$$-\frac{\zeta(3)}{4\pi^2} = \frac{\mathrm{Li}_3(-1)}{\frac{3}{4}(4\pi^2)}$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{\zeta(3, 1)}{4\pi^2}$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{S_{2,1}(1)}{4\pi^2}$$

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

$\zeta(s, a)$ is the generalized Riemann zeta function

$S_{n,p}(x)$ is the Nielsen generalized polylogarithm function

Series representations:

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{\sum_{k=1}^{\infty} \frac{1}{k^3}}{4\pi^2}$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{2\sum_{k=0}^{\infty} \frac{1}{(1+2k)^3}}{7\pi^2}$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{e^{\sum_{k=1}^{\infty} P(3k)/k}}{4\pi^2}$$

$P(z)$ gives the prime zeta function

Integral representations:

$$-\frac{\zeta(3)}{4\pi^2} = \frac{1}{12\pi^2}\int_0^1 \frac{\log^3(1-t^2)}{t^3}\,dt$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{1}{8\pi^2}\int_0^{\infty} \frac{t^2}{-1+e^t}\,dt$$

$$-\frac{\zeta(3)}{4\pi^2} = -\frac{1}{6\pi^2}\int_0^{\infty} \frac{t^2}{1+e^t}\,dt$$

log(x) is the natural logarithm

-27*2 * 1/ ((-zeta(3)/(4Pi^2)))

Input:

$$-27\times 2\left(-\frac{1}{\frac{\zeta(3)}{4\pi^2}}\right)$$

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

Exact result:

$$\frac{216\pi^2}{\zeta(3)}$$

Decimal approximation:

1773.488879795786814954848546764290355705534833389528443012...

1773.488…. result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV).

Alternative representations:

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{-54}{-\frac{\zeta(3,1)}{4\pi^2}}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{-54}{-\frac{S_{2,1}(1)}{4\pi^2}}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = -\frac{54}{\frac{\text{Li}_3(-1)}{\frac{3}{4}(4\pi^2)}}$$

$\zeta(s, a)$ is the generalized Riemann zeta function

$S_{n,p}(x)$ is the Nielsen generalized polylogarithm function

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

Series representations:

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{216\pi^2}{\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{189\pi^2}{\sum_{k=0}^{\infty}\frac{1}{(1+2k)^3}}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = 216\, e^{-\sum_{k=1}^{\infty} P(3k)/k}\, \pi^2$$

$P(z)$ gives the prime zeta function

Integral representations:

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{756\pi^2}{\int_0^{\infty} t^2 \operatorname{csch}(t)\, dt}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = -\frac{648\pi^2}{\int_0^1 \frac{\log^3(1-t^2)}{t^3}\, dt}$$

$$\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}} = \frac{432\pi^2}{\int_0^{\infty} \frac{t^2}{-1+e^t}\, dt}$$

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

$\log(x)$ is the natural logarithm

(- 1.2273432177/43)+ ((((-27*2 * 1/ ((-zeta(3)/(4Pi^2))))))^1/15

Where **f(q) = 1.22734321771259...** is a Ramanujan mock theta function

Input interpretation:

$$-\frac{1.2273432177}{43} + \sqrt[15]{-27\times 2\left(-\frac{1}{\frac{\zeta(3)}{4\pi^2}}\right)}$$

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

Result:

1.618058854156...

1.618058….

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

Alternative representations:

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-54}{-\frac{\zeta(3,1)}{4\pi^2}}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-54}{-\frac{S_{2,1}(1)}{4\pi^2}}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=-\frac{1.22734321770000}{43}+\sqrt[15]{-\frac{54}{\frac{\text{Li}_3(-1)}{\frac{3}{4}(4\pi^2)}}}$$

$\zeta(s, a)$ is the generalized Riemann zeta function

$S_{n,p}(x)$ is the Nielsen generalized polylogarithm function

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

Series representations:

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.43096908110526\sqrt[15]{\frac{\pi^2}{\sum_{k=1}^{\infty}\frac{1}{k^3}}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.40378630417471\sqrt[15]{-\frac{\pi^2}{\sum_{k=1}^{\infty}\frac{(-1)^k}{k^3}}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.41828699380265\sqrt[15]{\frac{\pi^2}{\sum_{k=0}^{\infty}\frac{1}{(1+2k)^3}}}$$

Integral representations:

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.48536363308245\sqrt[15]{\frac{\pi^2\,\Gamma(3)}{\int_0^{\infty}t^2\operatorname{csch}(t)\,dt}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.30464669167515\sqrt[15]{\frac{\pi^2\,\Gamma(4)}{\int_0^{\infty}t^3\operatorname{csch}^2(t)\,dt}}$$

$$-\frac{1.22734321770000}{43}+\sqrt[15]{\frac{-27\times 2}{-\frac{\zeta(3)}{4\pi^2}}}=$$

$$-0.0285428655279070+1.43096908110526\sqrt[15]{\frac{\pi^2\,\Gamma(3)}{\int_0^{\infty}\frac{t^2}{-1+e^t}\,dt}}$$

$\Gamma(x)$ is the gamma function

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

We have also:

((((-(1.716864664 + 1.962364415 + 0.509707374) * 1/ ((-zeta(3)/(4Pi^2))))

Input interpretation:

$$-(1.716864664 + 1.962364415 + 0.509707374)\left(-\frac{1}{\frac{\zeta(3)}{4\pi^2}}\right)$$

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

Result:

137.5746707...

137.57467…. result very near to the mean of the rest masses of two Pion mesons 134.9766 and 139.57 that is 137.2733 and very near to the inverse of fine-structure constant 137,035

Alternative representations:

$$\frac{-(1.71686 + 1.96236 + 0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{-4.18894}{-\frac{\zeta(3,1)}{4\pi^2}}$$

$$\frac{-(1.71686 + 1.96236 + 0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{-4.18894}{-\frac{S_{2,1}(1)}{4\pi^2}}$$

$$\frac{-(1.71686 + 1.96236 + 0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = -\frac{4.18894}{\frac{\text{Li}_3(-1)}{\frac{3}{4}(4\pi^2)}}$$

$\zeta(s, a)$ is the generalized Riemann zeta function

$S_{n,p}(x)$ is the Nielsen generalized polylogarithm function

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

Series representations:

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{16.7557\,\pi^2}{\sum_{k=1}^{\infty}\frac{1}{k^3}}$$

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = -\frac{12.5668\,\pi^2}{\sum_{k=1}^{\infty}\frac{(-1)^k}{k^3}}$$

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{14.6613\,\pi^2}{\sum_{k=0}^{\infty}\frac{1}{(1+2k)^3}}$$

Integral representations:

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{29.3226\,\pi^2\,\Gamma(3)}{\int_0^{\infty} t^2\,\mathrm{csch}(t)\,dt}$$

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{16.7557\,\pi^2\,\Gamma(3)}{\int_0^{\infty}\frac{t^2}{-1+e^t}\,dt}$$

$$\frac{-(1.71686+1.96236+0.509707)}{-\frac{\zeta(3)}{4\pi^2}} = \frac{12.5668\,\pi^2\,\Gamma(3)}{\int_0^{\infty}\frac{t^2}{1+e^t}\,dt}$$

$\Gamma(x)$ is the gamma function

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

References

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