On the possible mathematical connections between some equations of various topics concerning the D-Branes and some sectors of Number Theory (Rogers-Ramanujan continued fractions and mock theta functions).

Michele Nardelli[1], Antonio Nardelli

Abstract

In this research thesis, we have described some new mathematical connections between some equations of various topics concerning the D-Branes and some sectors of Number Theory (Rogers-Ramanujan continued fractions and mock theta functions).

[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

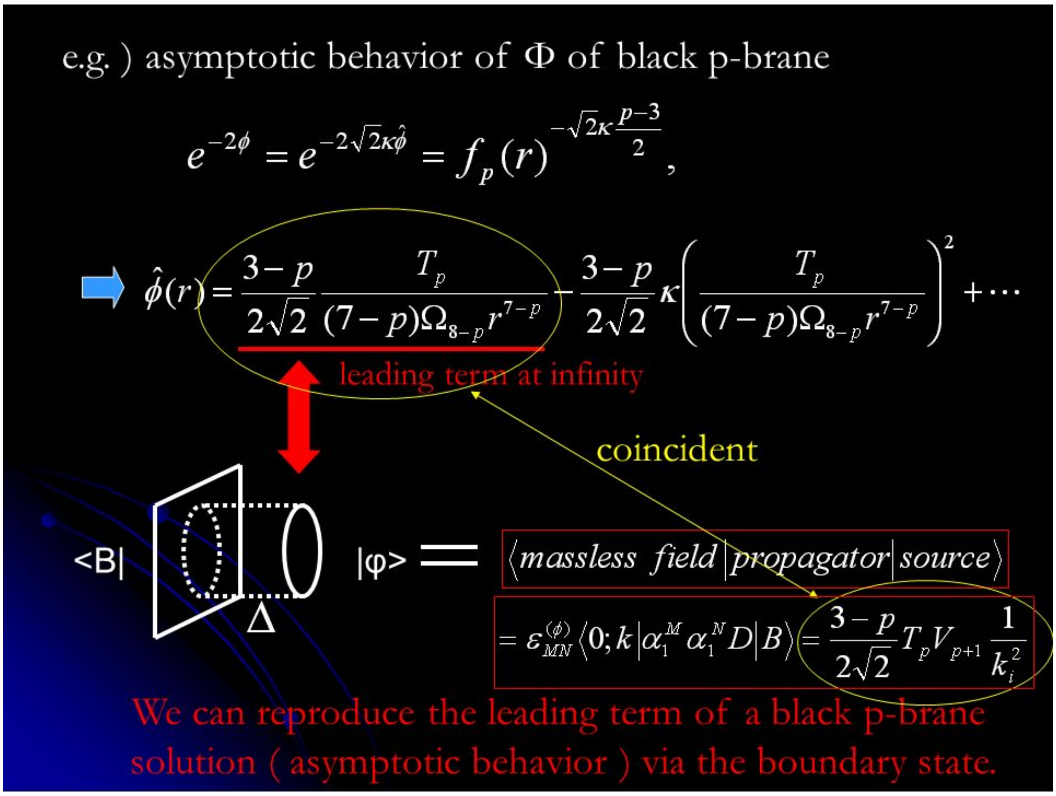
https://www.news.ucsb.edu/2012/013423/ucsb-physicist-receives-international-acclaim-his-work-theoretical-physics

Joseph Polchinski (1954-2018)

From:

Open String Tachyon in Supergravity Solution
Shinpei Kobayashi, Tsuguhiko Asakawa and So Matsuura
arXiv:hep-th/0409044v4 13 Jun 2005

We have, from: "Gaussian Brane and Open String Tachyon Condensation"



From:

J. Polchinski, *String Theory Vol. I: An Introduction to the Bosonic String*

J. Polchinski, *String Theory Vol. II: Superstring Theory and Beyond*

1. The *gravitational* scale $m_{\rm grav} = \kappa^{-1} = 2.4 \times 10^{18}$ GeV, at which quantum gravitational effects become important; this is somewhat more useful than the Planck mass, which is a factor of $(8\pi)^{1/2}$ greater.

$\kappa^{-1} = 2.4e+18$; $\kappa = 4.1666\ldots e-19$

From:

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

Hence

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

so that

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

Hence

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

e^(-Pi*sqrt(22)) = (((2508928 - e^(Pi(sqrt(22)) + 24)))/4372

3.985727908284188 × 10^-7

64((((1+sqrt(2))^12+(1-sqrt(2))^12))) = 2508928

For p = 6 and $\hat{\phi}$ = 1.5 , from

$$e^{-2\phi} = e^{-2\sqrt{2}\kappa\hat{\phi}} = f_p(r)^{-\sqrt{2}\kappa\frac{p-3}{2}},$$

$$e^{-2\phi} = e^{-2\sqrt{2}\kappa\hat{\phi}} = f_p(r)^{-\sqrt{2}\kappa\frac{p-3}{2}}$$

we obtain:

exp((-2*sqrt(2)*1.5* ((((3.64993* (3.98573 × 10^-7)^(2.96)))

where ((((3.64993* (3.98573 × 10^-7)^(2.96))))) = 4.16666 × 10^-19 = κ

Input interpretation:

$\exp\left(-2\sqrt{2} \times 1.5\left(3.64993\left(3.98573 \times 10^{-7}\right)^{2.96}\right)\right)$

Result:

0.99999999999999999823223675635028289664025860664340191461 3...

Or:

exp((-2*sqrt(2)*1.5*4.16666 × 10^-19))

Input interpretation:

$\exp\left(-2\sqrt{2}\times 1.5\times 4.16666\times 10^{-19}\right)$

Result:

0.999999999999999998232235875460755936750481698119325820263...

0.99999999999999999823223587546....

From:

$$\hat{\phi}(r)=\frac{3-p}{2\sqrt{2}}\frac{T_p}{(7-p)\Omega_{8-p}r^{7-p}}-\frac{3-p}{2\sqrt{2}}\kappa\left(\frac{T_p}{(7-p)\Omega_{8-p}r^{7-p}}\right)^2+\cdots$$

3 – 6 / 2√2 = -3/(2*sqrt(2))

Input:

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

Decimal approximation:

−1.060660171779821286601266543157273558927253906532711054 88...

-1.060660171779…. $= \frac{3-p}{2\sqrt{2}}$

3 – 6 / 2√2 * κ = (((-3/(2*sqrt(2))))) * (((4.16666 × 10^-19)))

Input interpretation:

$-\frac{3}{2\sqrt{2}}\times 4.16666\times 10^{-19}$

Result:

$-4.41941...\times 10^{-19}$

-4.41941... * $10^{-19} = \frac{3-p}{2\sqrt{2}}\kappa$

We have indeed:

-1.06066017177 * x – 4.16666e-19 *(x)^2 = 1.5

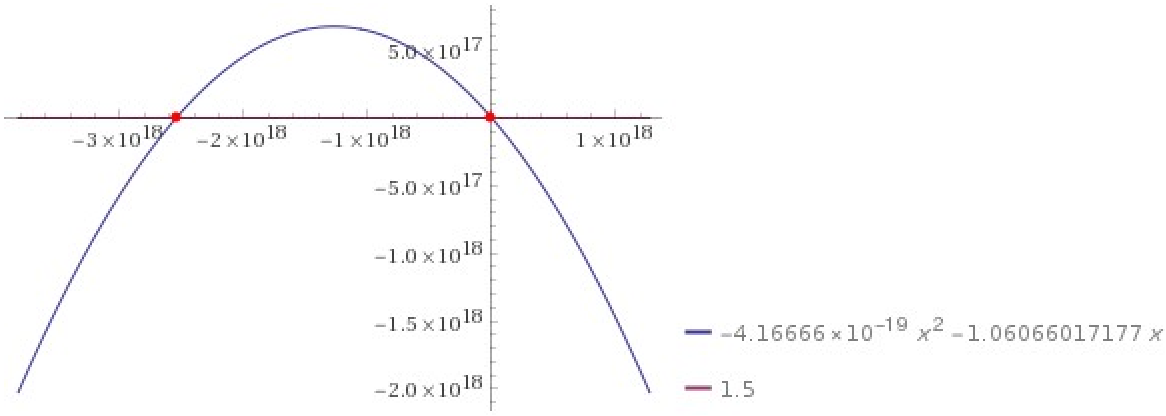
Input interpretation:

$-1.06066017177\,x - 4.16666\times 10^{-19}\,x^2 = 1.5$

Result:

$-4.16666\times 10^{-19}\,x^2 - 1.06066017177\,x = 1.5$

Plot:



- **Alternate forms:**

$-4.16666\times 10^{-19}\,x\,(x + 2.54559\times 10^{18}) = 1.5$

- $(-4.16666\times 10^{-19}\,x - 1.06066)\,x = 1.5$

- $-4.16666\times 10^{-19}\,x^2 - 1.06066017177\,x - 1.5 = 0$

Alternate form assuming x is real:

$-4.16666\times 10^{-19}\,x^2 - 1.06066017177\,x + 0 = 1.5$

- **Solutions:**

$x = -2\,545\,588\,485\,189\,576\,192$

- $x \approx -1.41421$

Integer solution:

$x = -2\,545\,588\,485\,189\,576\,192$

Result:

$-2.545588485189576192\times 10^{18}$

-2.545588485189e+18 = $\frac{T_p}{(7-p)\Omega_{8-p}r^{7-p}}$

Thence, in conclusion:

(((-1.06066017177 * (-2.545588485189e+18)))) – (((-1.06066017177*4.16666e-19 *(-2.545588485189e+18)^2)))

Input interpretation:

$$-1.06066017177(-2.545588485189 \times 10^{18}) - -1.06066017177 \times 4.16666 \times 10^{-19}(-2.545588485189 \times 10^{18})^2$$

Result:

$5.563791365740240467175053467473344657569 22 \times 10^{18}$

$\hat{\phi}(r)$ = 5.56379136574… * 10^{18}

Indeed, from:

$$\hat{\phi}(r) = \frac{3-p}{2\sqrt{2}} \frac{T_p}{(7-p)\Omega_{8-p} r^{7-p}} - \frac{3-p}{2\sqrt{2}} \kappa \left(\frac{T_p}{(7-p)\Omega_{8-p} r^{7-p}} \right)^2 + \cdots$$

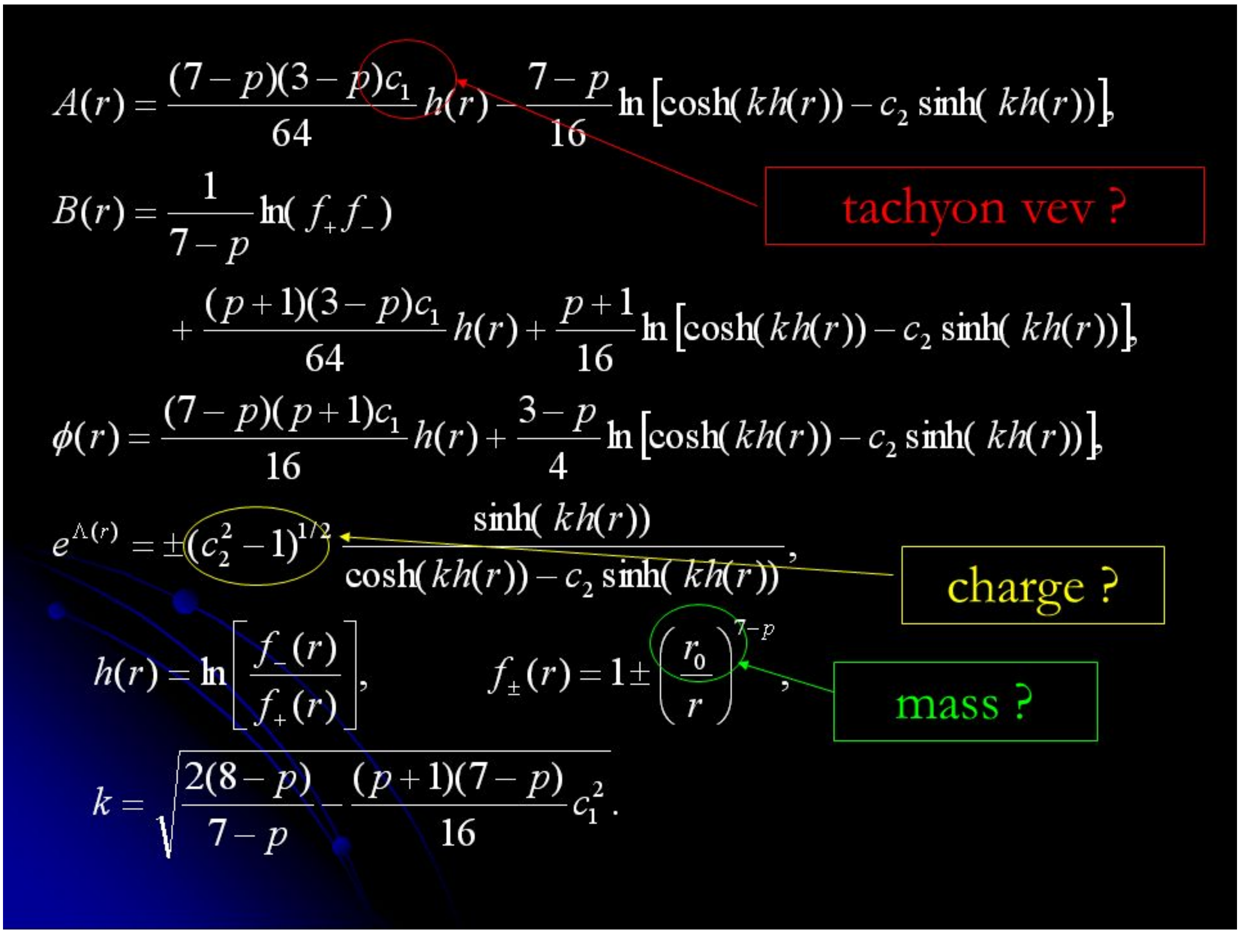
We obtain:

5.56379136574… * 10^{18} = (((-1.06066017177 * (-2.545588485189e+18)))) – (((-1.06066017177*4.16666e-19 *(-2.545588485189e+18)^2)))

Result:

True

Now, we have that:



Now, we calculate *h(r)*, $f_+(r)$, $f_-(r)$ and *k*

$r_0 = 2$ r = 4096 (for r → infinity)

(1-2/4096) = 0.99951171875 = $f_-(r)$

(1-2/4096)

Input:

$$1 - \frac{2}{4096}$$

Exact result:

$$\frac{2047}{2048}$$

Decimal form:

0.99951171875

0.99951171875 result very near to the value of the following Rogers-Ramanujan continued fraction:

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

(1+2/4096) = 1.00048828125 = $f_+(r)$

Input:

$$1+\frac{2}{4096}$$

Exact result:

$$\frac{2049}{2048}$$

Decimal form:

1.00048828125

1.00048828125

h(r) = ln ((((1-2/4096) / (1+2/4096))))

Input:

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)$$

log(x) is the natural logarithm

Exact result:

$$-\log\left(\frac{2049}{2047}\right)$$

Decimal approximation:

−0.00097656257761022565352201325254232083377845541641386422...

-0.00097656257761…

Property:

$-\log\left(\frac{2049}{2047}\right)$ is a transcendental number

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Alternate form:

$-\log(3)+\log(23)+\log(89)-\log(683)$

Alternative representations:

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=\log_e\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)$$

-

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=\log(a)\log_a\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)$$

-

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=-\text{Li}_1\left(1-\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)$$

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

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

Series representations:

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=\sum_{k=1}^{\infty}\frac{\left(-\frac{2}{2047}\right)^k}{k}$$

-

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=-2i\pi\left\lfloor\frac{\arg\left(\frac{2049}{2047}-x\right)}{2\pi}\right\rfloor-\log(x)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{2049}{2047}-x\right)^k x^{-k}}{k}\quad\text{for } x<0$$

-

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)=-\left\lfloor\frac{\arg\left(\frac{2049}{2047}-z_0\right)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-\log(z_0)-\left\lfloor\frac{\arg\left(\frac{2049}{2047}-z_0\right)}{2\pi}\right\rfloor\log(z_0)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{2049}{2047}-z_0\right)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right) = -\int_1^{\frac{2049}{2047}} \frac{1}{t}\, dt$$

- $$\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right) = \frac{i}{2\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\left(\frac{2047}{2}\right)^s \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

We note that:

-1/h(r) = -1/ (((((ln ((((1-2/4096) / (1+2/4096))))))))

Input:

$$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1}{\log\left(\frac{2049}{2047}\right)}$$

Decimal approximation:

1023.999918619786492651717085692952630502050233933264102464...

1024

Property:

$\frac{1}{\log\left(\frac{2049}{2047}\right)}$ is a transcendental number

- **Alternate form:**

$$\frac{1}{\log(3) - \log(23) - \log(89) + \log(683)}$$

Alternative representations:

$$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = -\frac{1}{\log_e\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)}$$

-

$$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = -\frac{1}{\log(a)\log_a\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)}$$

- $$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = \frac{-1}{-\text{Li}_1\left(1-\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)}$$

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

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

Series representations:

$$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = -\frac{1}{\sum_{k=1}^{\infty}\frac{\left(-\frac{2}{2047}\right)^k}{k}}$$

- $$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = \frac{1}{2\,i\,\pi\left\lfloor\frac{\arg\left(\frac{2049}{2047}-x\right)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{2049}{2047}-x\right)^k x^{-k}}{k}} \quad \text{for } x<0$$

- $$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = \frac{1}{\log(z_0)+\left\lfloor\frac{\arg\left(\frac{2049}{2047}-z_0\right)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(\frac{2049}{2047}-z_0\right)^k z_0^{-k}}{k}}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

Integral representations:

$$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = \frac{1}{\int_1^{\frac{2049}{2047}}\frac{1}{t}\,dt}$$

- $$-\frac{1}{\log\left(\frac{1-\frac{2}{4096}}{1+\frac{2}{4096}}\right)} = \frac{2\,i\,\pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(\frac{2047}{2}\right)^s\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds} \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

From the following data:

$c_1 \geq 0$ and $k \geq 0$

$(r_0^{7-p} \geq 0, c_2 \geq 0)$ for $p = 3, \cdots, 6$

p = 6; c_1 = 1/4 = 0.25

sqrt(((2*2 – ((7/16)*0.25^2)))) = k = 1.9931523

Input:

$$\sqrt{2\times 2-\frac{7}{16}\times 0.25^2}$$

Result:

1.9931523...

1.9931523....

The general asymptotically flat solution of the equations of motion of the p-brane is given by (see above slide):

$$A(r) = \frac{(7-p)(3-p)c_1}{64}h(r) - \frac{7-p}{16}\ln\left[\cosh(kh(r)) - c_2\sinh(kh(r))\right],$$

$$B(r) = \frac{1}{7-p}\ln[f_-(r)f_+(r)]$$

$$\frac{(p+1)(3-p)c_1}{64}h(r) + \frac{p+1}{16}\ln\left[\cosh(kh(r)) - c_2\sinh(kh(r))\right],$$

$$\phi(r) = \frac{(p+1)(7-p)c_1}{16}h(r) + \frac{3-p}{4}\ln\left[\cosh(kh(r)) - c_2\sinh(kh(r))\right],$$

$$e^{\Lambda(r)} = -\eta(c_2^2-1)^{1/2}\frac{\sinh(kh(r))}{\cosh(kh(r)) - c_2\sinh(kh(r))},$$

Now, we calculate *A(r)*

p = 6, c_1 = 1/4 = 0.25 k = 1.9931523 c_2 = 1/3 = 0.333333....

h(r) = -0.00097656257761…

(-3*1/4)/64 * (-0.00097656257761) – 1/16 ln ((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761))))

Input interpretation:

$$\left(\frac{1}{64}\left(-3\times\frac{1}{4}\right)\right)\times(-0.00097656257761) - \frac{1}{16}\log\left(\cosh(1.9931523\times(-0.00097656257761)) - \frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)$$

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

Result:

$-0.000029211892\ldots$

-0.000029211892…. = *A(r)*

Alternative representations:

$$-\frac{0.000976562577610000(-3)}{4\times 64} - \frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right) = -\frac{1}{16}\log\left(\frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right) + \frac{1}{2}\left(\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) + \frac{0.00292968773283000}{4\times 64}$$

-

$$-\frac{0.000976562577610000(-3)}{4\times 64} - \frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right) = -\frac{1}{16}\log\left(\cos(-0.00194644\,i) + \frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) + \frac{0.00292968773283000}{4\times 64}$$

-

$$-\frac{0.000976562577610000(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)=$$
$$-\frac{1}{16}\log\left(\cos(0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)+\frac{0.00292968773283000}{4\times 64}$$

i is the imaginary unit

Series representation:

$$-\frac{0.000976562577610000(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)=0.0000114440927063672+0.062500000000000\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)^k}{k}$$

Integral representations:

$$-\frac{0.000976562577610000(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)=0.0000114440927063672-0.062500000000000\int_1^{\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}}\frac{1}{t}\,dt$$

- $$-\frac{0.000976562577610000(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)=$$
$$0.0000114440927063672-0.062500000000000\log\left(1+\int_0^1(0.000648813\cosh(-0.00194644\,t)-0.00194644\sinh(-0.00194644\,t))\,dt\right)$$

- $$-\frac{0.000976562577610000(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)=$$
$$0.0000114440927063672-0.062500000000000\log\left(\frac{\sqrt{\pi}}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{0.5\,e^{9.47155\times 10^{-7}/s+s}(0.000324406+s)}{s^{3/2}}\,ds\right)\text{ for }\gamma>0$$

The reciprocal is:

1/ (((((((-3*1/4)/64 * (-0.00097656257761) – 1/16 ln ((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761)))))))))

Input interpretation:

$$1\Bigg/\left(\left(\frac{1}{64}\left(-3\times\frac{1}{4}\right)\right)\times(-0.00097656257761)-\frac{1}{16}\log\left(\cosh(1.9931523\times(-0.00097656257761))-\frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)\right)$$

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

Result:

−34232.634...

-34232.634…. = 1/*A(r)*

Alternative representations:

$$1\Bigg/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=\frac{1}{-\frac{1}{16}\log_e\left(\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)+\frac{0.00292968773283000}{4\times 64}}$$

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$$1\Bigg/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=\frac{1}{-\frac{1}{16}\log\left(\cos(-0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)+\frac{0.00292968773283000}{4\times 64}}$$

-

$$1\Big/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=\frac{1}{-\frac{1}{16}\log(a)\log_a\left(\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)+\frac{0.00292968773283000}{4\times 64}}$$

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

i is the imaginary unit

Series representation:

$$1\Big/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=-\frac{16.0000000000000}{-0.000183105483301875-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)^k}{k}}$$

Integral representations:

$$1\Big/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=-\frac{16.0000000000000}{-0.000183105483301875+\int_1^{\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}}\frac{1}{t}\,dt}$$

- $$1\Big/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=-\left(16.0000000000000\Big/\left(-0.000183105483301875+\log\left(1+\int_0^1(0.000648813\cosh(-0.00194644\,t)-0.00194644\sinh(-0.00194644\,t))\,dt\right)\right)\right)$$

-

$$1/\left(-\frac{0.000976562577610000\,(-3)}{4\times 64}-\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)\right)=$$

$$-\left(16.0000000000000\Big/\left(-0.000183105483301875+\log\left(\int_0^1\left(0.000648813\cosh(-0.00194644\,t)+(-0.00194644-0.5\,i\,\pi)\sinh\left(0-\frac{1}{2}\,i\,\pi\,(-1+t)-0.00194644\,t\right)\right)dt\right)\right)\right)$$

We note that, from the computations of the following Ramanujan mock theta functions, 4267.24; 2498.27; 2122.1867 and 33021.1 we obtain:

-(((((4267.24 – 2498.27 + 33021.1 - (2122.1867 / 4) - sqrt(729))))))

Input interpretation:

$$-\left(4267.24-2498.27+33021.1-\frac{2122.1867}{4}-\sqrt{729}\right)$$

Result:

−34232.523325

-34232.523325

This result is practically equal to the value of 1/*A(r)* = -34232.634….

$$1/\left(\left(\frac{1}{64}\left(-3\times\frac{1}{4}\right)\right)\times(-0.00097656257761)-\frac{1}{16}\log\left(\cosh(1.9931523\times(-0.00097656257761))-\frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)\right)\Rightarrow$$

$$\Rightarrow -\left(4267.24-2498.27+33021.1-\frac{2122.1867}{4}-\sqrt{729}\right)$$

$$= -34232.523325 \approx -34232.634$$

Now:

ln(1.00048828125*0.99951171875)+((((6+1)*(3-6)*0.25))) / 64 * (-0.00097656257761) + 7/16 * ln((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761))))

Input interpretation:

$$\log(1.00048828125\times 0.99951171875)+\left(\frac{1}{64}((6+1)(3-6)\times 0.25)\right)\times(-0.00097656257761)+\frac{7}{16}\log\left(\cosh(1.9931523\times(-0.00097656257761))-\frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)$$

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

Result:

0.0003644621...

0.0003644621 = *B(r)*

Alternative representations:

$$\log(1.000488281250000\times 0.999511718750000)-\frac{1}{64}\times 0.000976562577610000((6+1)(3-6)0.25)+\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)7=\log(0.99999976158142)+\frac{7}{16}\log\left(\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)+\frac{1}{2}\left(\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)+\frac{0.00512695}{64}$$

-

$$\log(1.000488281250000\times 0.999511718750000)-\frac{1}{64}\times 0.000976562577610000((6+1)(3-6)0.25)+\frac{1}{16}\log\left(\cosh(1.99315(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)7=\log(0.99999976158142)+\frac{7}{16}\log\left(\cos(-0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)+\frac{0.00512695}{64}$$

-

$$\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6+1)(3-6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315 (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315 (-0.000976562577610000))\right) 7 = \log(0.99999976158142) + \frac{7}{16} \log\left(\cos(0.00194644\, i) + \frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) + \frac{0.00512695}{64}$$

i is the imaginary unit

Series representation:

$$\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6+1)(3-6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315 (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315 (-0.000976562577610000))\right) 7 = 0.0000801086 + \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-(-2.3841858 \times 10^{-7})^k - 0.4375 \left(-1 + \cosh(-0.00194644) - \frac{\sinh(-0.00194644)}{3}\right)^k\right)$$

Integral representations:

$$\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6+1)(3-6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315 (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315 (-0.000976562577610000))\right) 7 = 0.0000801086 + \log(0.99999976158142) + 0.4375 \log\left(1 + \int_0^1 (0.000648813 \cosh(-0.00194644\, t) - 0.00194644 \sinh(-0.00194644\, t))\, dt\right)$$

-

$$\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6+1)(3-6) 0.25) + \frac{1}{16} \log\left(\cosh(1.99315 (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315 (-0.000976562577610000))\right) 7 =$$
$$0.0000801086 + \log(0.99999976158142) + 0.4375 \log\left(\frac{\sqrt{\pi}}{i\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{0.5\, e^{9.47155\times10^{-7}/s+s} (0.000324406 + s)}{s^{3/2}} \, ds\right) \text{ for } \gamma > 0$$

- $$\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6+1)(3-6) 0.25) + \frac{1}{16} \log\left(\cosh(1.99315 (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315 (-0.000976562577610000))\right) 7 =$$

$$0.0000801086 + \int_1^{0.99999976158142} \left(\frac{1}{t} + (-0.4375 + 0.4375 \cosh(-0.00194644) - 0.145833 \sinh(-0.00194644)) / (1. - \cosh(-0.00194644) + t(-1 + \cosh(-0.00194644) - 0.333333 \sinh(-0.00194644)) + 0.333333 \sinh(-0.00194644))\right) dt$$

1/(((((ln(1.00048828125*0.99951171875)+((((6+1)*(3-6)*0.25))) / 64 * (-0.00097656257761) + 7/16 * ln((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761)))))

Input interpretation:

$$1 \Big/ \left(\log(1.00048828125 \times 0.99951171875) + \left(\frac{1}{64} ((6+1)(3-6) \times 0.25)\right) \times (-0.00097656257761) + \frac{7}{16} \log\left(\cosh(1.9931523 \times (-0.00097656257761)) - \frac{1}{3} \sinh(1.9931523 \times (-0.00097656257761))\right)\right)$$

log(x) is the natural logarithm

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

Result:

2743.769…

2743.769…. = 1/ *B(r)*

Alternative representations:

$$1 / \left(\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6 + 1)(3 - 6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315\, (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315\, (-0.000976562577610000)) \right) 7 \right) = 1 / \left(\log(0.99999976158142) + \frac{7}{16} \log\left(\cos(-0.00194644\, i) + \frac{1}{6} \left(-\frac{1}{e^{0.00194644}} + e^{0.00194644} \right) \right) + \frac{0.00512695}{64} \right)$$

-

$$1 / \left(\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6 + 1)(3 - 6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315\, (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315\, (-0.000976562577610000)) \right) 7 \right) = 1 / \left(\log(0.99999976158142) + \frac{7}{16} \log\left(\cos(0.00194644\, i) + \frac{1}{6} \left(-\frac{1}{e^{0.00194644}} + e^{0.00194644} \right) \right) + \frac{0.00512695}{64} \right)$$

-

$$1 / \left(\log(1.000488281250000 \times 0.999511718750000) - \frac{1}{64} \times 0.000976562577610000 ((6 + 1)(3 - 6)\, 0.25) + \frac{1}{16} \log\left(\cosh(1.99315\, (-0.000976562577610000)) - \frac{1}{3} \sinh(1.99315\, (-0.000976562577610000)) \right) 7 \right) = 1 / \left(\log_e(0.99999976158142) + \frac{7}{16} \log_e\left(\cosh(-0.00194644) - \frac{\sinh(-0.00194644)}{3} \right) + \frac{0.00512695}{64} \right)$$

i is the imaginary unit

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

Series representation:

$$1/\left(\log(1.000488281250000\times 0.999511718750000)-\frac{1}{64}\times 0.000976562577610000\,((6+1)(3-6)\,0.25)+\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)7\right)=$$

$$1/\left(0.0000801086+\sum_{k=1}^{\infty}\frac{1}{k}(-1)^k\left(-(-2.3841858\times 10^{-7})^k-0.4375\left(-1+\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)^k\right)\right)$$

Integral representations:

$$1/\left(\log(1.000488281250000\times 0.999511718750000)-\frac{1}{64}\times 0.000976562577610000\,((6+1)(3-6)\,0.25)+\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)7\right)=$$

$$1/\left(0.0000801086+\log(0.99999976158142)+0.4375\log\left(1+\int_0^1(0.000648813\cosh(-0.00194644\,t)-0.00194644\sinh(-0.00194644\,t))\,dt\right)\right)$$

•

$$1/\left(\log(1.000488281250000\times 0.999511718750000)-\frac{1}{64}\times 0.000976562577610000\,((6+1)(3-6)\,0.25)+\frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)7\right)=$$

$$1/\left(0.0000801086+\int_1^{0.99999976158142}\left(\frac{1}{t}+(-0.4375+0.4375\cosh(-0.00194644)-0.145833\sinh(-0.00194644))/(1.-\cosh(-0.00194644)+t(-1+\cosh(-0.00194644)-0.333333\sinh(-0.00194644))+0.333333\sinh(-0.00194644))\right)dt\right)$$

•

$$1/\left(\log(1.000488281250000\times 0.999511718750000) - \frac{1}{64}\times 0.000976562577610000\,((6+1)(3-6)\,0.25) + \frac{1}{16}\log\left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)7\right) =$$

$$1/\left(0.0000801086 + \log(0.99999976158142) + 0.4375\log\left(\int_0^1\left(0.000648813\cosh(-0.00194644\,t) + (-0.00194644 - 0.5\,i\,\pi)\sinh\left(0 - \frac{1}{2}\,i\,\pi\,(-1+t) - 0.00194644\,t\right)\right)dt\right)\right)$$

We note that 33021.10 / 12 = 2.751,758333333 is very near to the value of 1/ *B(r)* = 2743.769 where 33021.10 is a Ramanujan mock theta function

Now, we have that:

((((6+1)*0.25))) / 16 * (-0.00097656257761) -3/4 * ln((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761))))

Input interpretation:

$$\left(\frac{1}{16}\,((6+1)\times 0.25)\right)\times(-0.00097656257761) - \frac{3}{4}\log\left(\cosh(1.9931523\times(-0.00097656257761)) - \frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)$$

$\cosh(x)$ is the hyperbolic cosine function

$\sinh(x)$ is the hyperbolic sine function

$\log(x)$ is the natural logarithm

Result:

−0.0005946833...

-0.0005946833…. = $\phi(r)$

Alternative representations:

$$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -\frac{3}{4}\log\left(\frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right) + \frac{1}{2}\left(\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) - \frac{0.00170898}{16}$$

- $$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -\frac{3}{4}\log\left(\cos(-0.00194644\,i) + \frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) - \frac{0.00170898}{16}$$

- $$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -\frac{3}{4}\log\left(\cos(0.00194644\,i) + \frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right) - \frac{0.00170898}{16}$$

i is the imaginary unit

Series representation:

$$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -0.000106812 + 0.75\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\cosh(-0.00194644) - \frac{\sinh(-0.00194644)}{3}\right)^k}{k}$$

Integral representations:

$$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -0.000106812 - 0.75\int_1^{\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}}\frac{1}{t}\,dt$$

- $$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -0.000106812 - 0.75\log\left(1+\int_0^1(0.000648813\cosh(-0.00194644\,t) - 0.00194644\sinh(-0.00194644\,t))\,dt\right)$$

- $$\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3 = -0.000106812 - 0.75\log\left(\frac{\sqrt{\pi}}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{0.5\,e^{9.47155\times10^{-7}/s+s}(0.000324406+s)}{s^{3/2}}\,ds\right) \text{ for } \gamma>0$$

1/((((((((((6+1)*0.25))) / 16 * (-0.00097656257761) -3/4 * ln((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761)))))))))

Input interpretation:

$$1\Big/\left(\left(\frac{1}{16}((6+1)\times0.25)\right)\times(-0.00097656257761) - \frac{3}{4}\log\left(\cosh(1.9931523\times(-0.00097656257761)) - \frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)\right)$$

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

Result:

$-1681.567\ldots$

-1681.567…. = 1/ $\phi(r)$

Alternative representations:

$$1\Big/\left(\frac{1}{16}\,(-0.000976562577610000)\,((6+1)\,0.25)-\frac{1}{4}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)3\right)=\frac{1}{-\frac{3}{4}\log_e\left(\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)-\frac{0.00170898}{16}}$$

-

$$1\Big/\left(\frac{1}{16}\,(-0.000976562577610000)\,((6+1)\,0.25)-\frac{1}{4}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)3\right)=\frac{1}{-\frac{3}{4}\log\left(\cos(-0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)-\frac{0.00170898}{16}}$$

-

$$1\Big/\left(\frac{1}{16}\,(-0.000976562577610000)\,((6+1)\,0.25)-\frac{1}{4}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)3\right)=\frac{1}{-\frac{3}{4}\log(a)\log_a\left(\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)-\frac{0.00170898}{16}}$$

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

i is the imaginary unit

Series representation:

$$1\Big/\left(\frac{1}{16}\,(-0.000976562577610000)\,((6+1)\,0.25)-\frac{1}{4}\log\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)3\right)=-\frac{1.33333}{0.000142415-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}\right)^k}{k}}$$

Integral representations:

$$1/\left(\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3\right) = -\frac{1.33333}{0.000142415 + \int_1^{\cosh(-0.00194644)-\frac{\sinh(-0.00194644)}{3}} \frac{1}{t}\,dt}$$

- $$1/\left(\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3\right) = -\left(1.33333/\left(0.000142415 + \log\left(1 + \int_0^1 (0.000648813\cosh(-0.00194644\,t) - 0.00194644\sinh(-0.00194644\,t))\,dt\right)\right)\right)$$

- $$1/\left(\frac{1}{16}(-0.000976562577610000)((6+1)\,0.25) - \frac{1}{4}\log\left(\cosh(1.99315(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315(-0.000976562577610000))\right)3\right) = -\left(1.33333/\left(0.000142415 + \log\left(\int_0^1 \left(0.000648813\cosh(-0.00194644\,t) + (-0.00194644 - 0.5\,i\pi)\sinh\left(0 - \frac{1}{2}\,i\pi(-1+t) - 0.00194644\,t\right)\right)dt\right)\right)\right)$$

From the calculations of the following Ramanujan mock theta functions, we obtain:
-((-33021.10 /10 + 2122.18 + 2498.27 + 4267.24/12))

Input interpretation:

$$-\left(-\frac{33\,021.10}{10} + 2122.18 + 2498.27 + \frac{4267.24}{12}\right)$$

Result:

$-1673.9433333333333333333333333333333333333333333333333\ldots$

Repeating decimal:

$-1673.94\overline{3}$ (period 1)

-1673.943.... result very near to the value of $1/\phi(r)$ = -1681.567

((((((1/3)^2-1))^1/2))) * ((sinh(1.9931523*-0.00097656257761))) / ((((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761)))))))

Input interpretation:

$$\sqrt{\left(\frac{1}{3}\right)^2-1}\times\sinh(1.9931523\times(-0.00097656257761))\Big/\left(\cosh(1.9931523\times(-0.00097656257761))-\frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))\right)$$

$\sinh(x)$ is the hyperbolic sine function

$\cosh(x)$ is the hyperbolic cosine function

Result:

$-0.0018339271\ldots\, i$

Polar coordinates:

$r = 0.00183393$ (radius), $\theta = -90°$ (angle)

$0.00183393 = e^{\Lambda(r)}$

Alternative representations:

$$\left(\sqrt{\left(\frac{1}{3}\right)^2-1}\,\sinh(1.99315\,(-0.000976562577610000))\right)\Big/\left(\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right)=\frac{\left(\frac{1}{e^{0.00194644}}-e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\cos(-0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)}$$

•

$$\left(\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))\right)\Big/ \left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right) = \frac{\left(\frac{1}{e^{0.00194644}} - e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\cos(0.00194644\,i) + \frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right)}$$

- $$\left(\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))\right)\Big/ \left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right) = \frac{\left(\frac{1}{e^{0.00194644}} - e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\frac{1}{6}\left(-\frac{1}{e^{0.00194644}} + e^{0.00194644}\right) + \frac{1}{2}\left(\frac{1}{e^{0.00194644}} + e^{0.00194644}\right)\right)}$$

i is the imaginary unit

Series representations:

$$\left(\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))\right)\Big/ \left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right) = \frac{2\,i\sqrt{2}\sum_{k=0}^{\infty}\frac{(-0.00194644)^{1+2k}}{(1+2k)!}}{\sum_{k=0}^{\infty}(-0.00194644)^{2k}\left(\frac{3}{(2k)!} + \frac{0.00194644}{(1+2k)!}\right)}$$

-

$$\left(\sqrt{\left(\frac{1}{3}\right)^2 - 1}\ \sinh(1.99315\,(-0.000976562577610000))\right) / \left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right) = -\frac{4\,i\,\sqrt{2}\,\sum_{k=0}^{\infty} I_{1+2k}(-0.00194644)}{\sum_{k=0}^{\infty}\left(2\,I_{1+2k}(-0.00194644) - \frac{3\,(-0.00194644)^{2k}}{(2k)!}\right)}$$

•

$$\left(\sqrt{\left(\frac{1}{3}\right)^2 - 1}\ \sinh(1.99315\,(-0.000976562577610000))\right) / \left(\cosh(1.99315\,(-0.000976562577610000)) - \frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))\right) = -\frac{2\,i\,\sqrt{2}\ i\sum_{k=0}^{\infty}\frac{\left(-0.00194644-\frac{i\pi}{2}\right)^{2k}}{(2k)!}}{\sum_{k=0}^{\infty}\frac{-3\,(-0.00194644)^{2k}+i\left(-0.00194644-\frac{i\pi}{2}\right)^{2k}}{(2k)!}}$$

1/(((((((((((((1/3)^2-1))^1/2))) * ((sinh(1.9931523*-0.00097656257761))) / ((((((cosh(1.9931523*-0.00097656257761)-1/3 sinh(1.9931523*-0.00097656257761)))))))))))

Input interpretation:

$$\frac{1}{\sqrt{\left(\frac{1}{3}\right)^2 - 1} \times \frac{\sinh(1.9931523\times(-0.00097656257761))}{\cosh(1.9931523\times(-0.00097656257761)) - \frac{1}{3}\sinh(1.9931523\times(-0.00097656257761))}}$$

$\sinh(x)$ is the hyperbolic sine function

$\cosh(x)$ is the hyperbolic cosine function

Result:

545.27794... i

Polar coordinates:

$r = 545.278$ (radius), $\theta = 90°$ (angle)

545.278 = $1/e^{\Lambda(r)}$

Alternative representations:

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \frac{1}{\frac{\left(\frac{1}{e^{0.00194644}}-e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\cos(0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)}}$$

•

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \frac{1}{\frac{\left(\frac{1}{e^{0.00194644}}-e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\cos(-0.00194644\,i)+\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)}}$$

•

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \frac{1}{\frac{\left(\frac{1}{e^{0.00194644}}-e^{0.00194644}\right)\sqrt{-1+\left(\frac{1}{3}\right)^2}}{2\left(\frac{1}{6}\left(-\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)+\frac{1}{2}\left(\frac{1}{e^{0.00194644}}+e^{0.00194644}\right)\right)}}$$

i is the imaginary unit

Series representations:

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \frac{i\left(2\sum_{k=0}^{\infty} I_{1+2k}(-0.00194644) - 3\sum_{k=0}^{\infty}\frac{(-0.00194644)^{2k}}{(2k)!}\right)}{4\sqrt{2}\sum_{k=0}^{\infty} I_{1+2k}(-0.00194644)}$$

•

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = -\frac{i\left(3\sum_{k=0}^{\infty}\frac{(-0.00194644)^{2k}}{(2k)!}-\sum_{k=0}^{\infty}\frac{(-0.00194644)^{1+2k}}{(1+2k)!}\right)}{2\sqrt{2}\sum_{k=0}^{\infty}\frac{(-0.00194644)^{1+2k}}{(1+2k)!}}$$

-

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = -\frac{i\left(-\sum_{k=0}^{\infty}\frac{(-0.00194644)^{1+2k}}{(1+2k)!}+3\,i\sum_{k=0}^{\infty}\frac{\left(-0.00194644-\frac{i\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)}{2\sqrt{2}\sum_{k=0}^{\infty}\frac{(-0.00194644)^{1+2k}}{(1+2k)!}}$$

$I_n(z)$ is the modified Bessel function of the first kind

$n!$ is the factorial function

Integral representations:

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \left((0.353553\,i)\left((1541.28+0\,i)+1+0\,i\int_0^1\cosh(-0.00194644\,t)\,dt - 3.+0\,i\int_0^1\sinh(-0.00194644\,t)\,dt\right)\right)\Big/\left(\int_0^1\cosh(-0.00194644\,t)\,dt\right)$$

-

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} = \frac{(0.353553\,i)\left(1+0\,i\int_0^1\cosh(-0.00194644\,t)\,dt+1541.28+0\,i\int_{\frac{i\pi}{2}}^{-0.00194644}\sinh(t)\,dt\right)}{\int_0^1\cosh(-0.00194644\,t)\,dt}$$

-

$$\frac{1}{\frac{\sqrt{\left(\frac{1}{3}\right)^2-1}\ \sinh(1.99315\,(-0.000976562577610000))}{\cosh(1.99315\,(-0.000976562577610000))-\frac{1}{3}\sinh(1.99315\,(-0.000976562577610000))}} =$$

$$\left((0.353553\,i)\left((1+0\,i)\,i\,\pi\int_0^1 \cosh(-0.00194644\,t)\,dt + (770.638+0\,i)\sqrt{\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{9.47155\times10^{-7}/s+s}}{\sqrt{s}}\,ds\right)\right) / \left(i\,\pi\int_0^1 \cosh(-0.00194644\,t)\,dt\right) \text{ for } \gamma > 0$$

From the following Ramanujan mock theta function, we obtain:

12+(4267.24 / 8)

Input interpretation:

$$12 + \frac{4267.24}{8}$$

Result:

545.405

545.405 result practically equal to the solution of $1/e^{\Lambda(r)} = 545.278$

Thence we have the following results:

-0.000029211892…. = $A(r)$ 0.0003644621 = $B(r)$ -0.0005946833…. = $\phi(r)$

$0.00183393 = e^{\Lambda(r)}$

We have the following ratio (A. Nardelli) concerning the general asymptotically flat solution of the equations of motion of the p-brane:

$$A(r) = \frac{(7-p)(3-p)c_1}{64} h(r) - \frac{7-p}{16} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right],$$

$$B(r) - \frac{1}{7-p} \ln[f_-(r) f_+(r)]$$

$$- \frac{(p+1)(3-p)c_1}{64} h(r) + \frac{p+1}{16} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right],$$

$$\phi(r) = \frac{(p+1)(7-p)c_1}{16} h(r) + \frac{3-p}{4} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right],$$

$$e^{\Lambda(r)} = -\eta(c_2^2 - 1)^{1/2} \frac{\sinh(kh(r))}{\cosh(kh(r)) - c_2 \sinh(kh(r))},$$

$$A(r) \times \frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right) \times \frac{1}{e^{\Lambda(r)}}$$

Input interpretation:

$$-0.000029211892 \times \frac{1}{0.0003644621}\left(-\frac{1}{0.0005946833}\right) \times \frac{1}{0.00183393}$$

Result:

73491.78832548118710549159572042220548025195726563413398700...

73491.7883254...

We have the following mathematical connection with the Karatsuba's equation concerning the Dirichlet series:

$$I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \leqslant P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \right|^2 dt \ll$$

$$\ll H\left(\sum_{\lambda \leqslant P^{1-\varepsilon_2}} \frac{|a(\lambda)|^2}{\lambda} \cdot \frac{4^r}{(\log P\lambda^{-1})^{2r}} + |W_2| \right) \ll$$

$$\ll H\left(\left(\frac{4}{\varepsilon_2 \log T}\right)^{2r} \sum_{\lambda \leqslant P} \frac{|a(\lambda)|^2}{\lambda} + |W_2| \right),$$

$$I_{21} \ll H\left\{ \left(\frac{4}{\varepsilon_2 \log T}\right)^{2r} (\log T)(\log X)^{-2\beta} + \right.$$

$$\left. + (\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r}) T^{-\varepsilon_1} \right\}.$$

$= 793139765.05275$

Indeed:

$(793139765.05275/10^4) - 4096 - 2048 + 322$

Where $4096 = 64^2$, $2048 = 64*32$ and 322 is a Lucas number

Input interpretation:

$$\frac{7.9313976505275 \times 10^8}{10^4} - 4096 - 2048 + 322$$

Result:

73491.976505275

73491.976505275

$$\left(\begin{array}{l} I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \leq P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \right|^2 dt \ll \\ \ll H\left(\sum_{\lambda \leq P^{1-\varepsilon_2}} \frac{|a(\lambda)|^2}{\lambda} \cdot \frac{4^r}{(\log P \lambda^{-1})^{2r}} + |W_2| \right) \ll \\ \ll H\left(\left(\frac{4}{\varepsilon_2 \log T} \right)^{2r} \sum_{\lambda \leq P} \frac{|a(\lambda)|^2}{\lambda} + |W_2| \right), \\ I_{21} \ll H\left\{ \left(\frac{4}{\varepsilon_2 \log T} \right)^{2r} (\log T)(\log X)^{-2\beta} + \right. \\ \left. + \left(\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r} \right) T^{-\varepsilon_1} \right\}. \end{array} \right) / 10^4 - 4096 - 2048 + 322$$

$= 73491.976505275$

$$A(r) \times \frac{1}{B(r)} \left(-\frac{1}{\phi(r)} \right) \times \frac{1}{e^{\Lambda(r)}} =$$

$$= -0.000029211892 \times \frac{1}{0.0003644621} \left(-\frac{1}{0.0005946833} \right) \times \frac{1}{0.00183393} =$$

$= 73491.7883254...$

$$\left(\begin{array}{l} I_{21} \ll \int\limits_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \Big| \sum\limits_{\lambda \leq P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \Big|^2 dt \ll \\ \ll H\Big(\sum\limits_{\lambda \leq P^{1-\varepsilon_2}} \frac{|a(\lambda)|^2}{\lambda} \cdot \frac{4^r}{(\log P\lambda^{-1})^{2r}} + |W_2| \Big) \ll \\ \ll H\Big(\Big(\frac{4}{\varepsilon_2 \log T} \Big)^{2r} \sum\limits_{\lambda \leq P} \frac{|a(\lambda)|^2}{\lambda} + |W_2| \Big), \\ I_{21} \ll H\Big\{ \Big(\frac{4}{\varepsilon_2 \log T} \Big)^{2r} (\log T)(\log X)^{-2\beta} + \\ + (\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r}) T^{-\varepsilon_1} \Big\}. \end{array} \right) /10^4 - 4096 - 2048 + 322$$

$$\approx A(r) \times \frac{1}{B(r)} \left(-\frac{1}{\phi(r)} \right) \times \frac{1}{e^{\Lambda(r)}}$$

73491.976505275 ≈ 73491.7883254...

$$\left(\begin{array}{l} A(r) = \frac{(7-p)(3-p)c_1}{64} h(r) - \frac{7-p}{16} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right], \quad / \\ B(r) = \frac{1}{7-p} \ln[f_-(r) f_+(r)] \\ \qquad - \frac{(p+1)(3-p)c_1}{64} h(r) + \frac{p+1}{16} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right], \quad / \\ \phi(r) = \frac{(p+1)(7-p)c_1}{16} h(r) + \frac{3-p}{4} \ln\left[\cosh(kh(r)) - c_2 \sinh(kh(r))\right], \quad / \\ e^{\Lambda(r)} = -\eta(c_2^2 - 1)^{1/2} \frac{\sinh(kh(r))}{\cosh(kh(r)) - c_2 \sinh(kh(r))}, \end{array} \right) \Rightarrow$$

$$\Rightarrow \left(\begin{aligned} & I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right) \left| \sum_{\lambda \le P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda) \lambda^{-i(T+t)} \right|^2 dt \ll \\ & \ll H\left(\sum_{\lambda \le P^{1-\varepsilon_2}} \frac{|a(\lambda)|^2}{\lambda} \cdot \frac{4^r}{(\log P\lambda^{-1})^{2r}} + |W_2| \right) \ll \\ & \ll H\left(\left(\frac{4}{\varepsilon_2 \log T} \right)^{2r} \sum_{\lambda \le P} \frac{|a(\lambda)|^2}{\lambda} + |W_2| \right), \\ & I_{21} \ll H\left\{ \left(\frac{4}{\varepsilon_2 \log T} \right)^{2r} (\log T)(\log X)^{-2\beta} + \right. \\ & \left. + (\varepsilon_2^{-2r} (\log T)^{-2r} + \varepsilon_2^{-r} h_1^r (\log T)^{-r}) T^{-\varepsilon_1} \right\}. \end{aligned} \right) / 10^4 - 4096 - 2048 + 322 =$$

= 73491.7883254... ≈ 73491.976505275

Note that 73491 = 64079 + 9349 + 55 + 8, where 64079 and 9349 are Lucas numbers, while 55 and 8 are Fibonacci numbers

We have that:

7/10^3+(73491.7883254)^1/22

Input interpretation:

$$\frac{7}{10^3} + \sqrt[22]{73491.7883254}$$

Result:

1.671150782077...

1.671150782077...

We note that 1.67115078... is a result practically equal to the value of the formula:

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

that is the holographic proton mass

$$\frac{7}{10^3} + \sqrt[22]{A(r) \times \frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right) \times \frac{1}{e^{\Lambda(r)}}} = 1.671150782077 \ldots$$

From the algebraic sum of the various results, we obtain:

1/ (((-0.000029211892 + 0.0003644621 -0.0005946833 + 0.00183393)))^1/13

Input interpretation:

$$\frac{1}{\sqrt[13]{-0.000029211892 + 0.0003644621 - 0.0005946833 + 0.00183393}}$$

Result:

1.642875...

$1.642875\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

And:

2*sqrt((((6*1/ (((-0.000029211892 + 0.0003644621 -0.0005946833 + 0.00183393)))^1/13))))

Input interpretation:

$$2\sqrt{6 \times \frac{1}{\sqrt[13]{-0.000029211892 + 0.0003644621 - 0.0005946833 + 0.00183393}}}$$

Result:

6.279251...

$6.279251\ldots = 2\pi r$ for r = 0.9993739…, radius that is very near to the value of the following Rogers-Ramanujan continued fraction:

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

From the following data

$$c_1 \geq 0 \text{ and } k \geq 0$$
$$(r_0^{7-p} \geq 0, c_2 \geq 0) \text{ for } p = 3, \cdots, 6$$

p = 6; c_1 = 1/4 = 0.25

p = 6, c_1 = 1/4 = 0.25 k = 1.9931523 c_2 = 1/3 = 0.333333....

h(r) = -0.00097656257761… κ = 4,1666…e-19

$$\omega_d = \frac{2\pi^{(d+1)/2}}{\Gamma((d+1)/2)}$$

2*Pi^1.5 / gamma (1.5) = 12.5664....

Input:

$$2 \times \frac{\pi^{1.5}}{\Gamma(1.5)}$$

$\Gamma(x)$ is the gamma function

Result:

12.5664...

$4\pi \approx 12.56637061$

12.5664….

Alternative representations:

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{\frac{1}{e^{0.120782}}}$$

•

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{\frac{0.947574}{1.06922}}$$

•

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{0.5!}$$

$n!$ is the factorial function

Series representations:

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{\sum_{k=0}^{\infty} \frac{(1.5-z_0)^k \Gamma^{(k)}(z_0)}{k!}} \quad \text{for } (z_0 \notin \mathbb{Z} \text{ or } z_0 > 0)$$

•

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

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

Integral representations:

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{\int_0^\infty e^{-t} t^{0.5} \, dt}$$

•

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = \frac{2\pi^{1.5}}{\int_0^1 \log^{0.5}\left(\frac{1}{t}\right) dt}$$

•

$$\frac{2\pi^{1.5}}{\Gamma(1.5)} = 2\exp\left(-\int_0^1 \frac{0.5 - 1.5x + x^{1.5}}{(-1+x)\log(x)} \, dx\right)\pi^{1.5}$$

$\log(x)$ is the natural logarithm

From:

Open String Tachyon in Supergravity Solution
Shinpei Kobayashi , Tsuguhiko Asakawa and So Matsuura
hep-th/0409044

From the view point of the gravity theory, the three-parameter solution describes a charged dilatonic black object. Thus, the RR-charge Q and the ADM mass M are natural quantities to characterize the solution.[5] For convenience, we consider wrapping the spatial world-volume directions on a torus T^p of volume V_p. The RR-charge is given by an appropriate surface integral over the sphere-at-infinity in the transverse directions [17, 23];

$$Q = 2\eta N_p (c_2^2 - 1)^{1/2} k r_0^{7-p}, \qquad (2.18)$$

where

$$N_p \equiv \frac{(8-p)(7-p)\omega_{8-p} V_p}{16\kappa^2}, \qquad (2.19)$$

and $\omega_d = \frac{2\pi^{(d+1)/2}}{\Gamma((d+1)/2)}$ is the volume of the unit sphere S^d. The ADM mass is defined as [24, 25]

$$g_{00} = -1 + \frac{2\tilde{\kappa}^2 M}{(8-p)\omega_{8-p} r^{7-p}} + \mathcal{O}\left(\frac{1}{r^{2(7-p)}}\right), \qquad (2.20)$$

where the metric is written in Einstein frame and $\tilde{\kappa}^2 \equiv \kappa^2 / V_p$. Using this definition, we see that the ADM mass of the three-parameter solution is [17]

$$M = N_p \left(\frac{3-p}{2} c_1 + 2c_2 k\right) r_0^{7-p}. \qquad (2.21)$$

$$N_p = \frac{(8-p)(7-p)\omega_{8-p} V_p}{16\kappa^2}, \qquad (2.19)$$

$V_p = 2\pi^2$ (admitting a torus of unitary radii)

(2*12.5664 * 2*Pi^2) / (16*4.1666e-19^2) = 1.7860228654147…*10^{38} = N_p

Input interpretation:

$$\frac{2 \times 12.5664 \times 2\pi^2}{16\,(4.1666 \times 10^{-19})^2}$$

Result:

1.786022865414701569431251365161433601419925875793094 0… × 10^{38}

1.7860228654147…*10^{38}

see that the ADM mass of the three-parameter solution is [17]

$$M = N_p \left(\frac{3-p}{2} c_1 + 2c_2 k \right) r_0^{7-p}. \tag{2.21}$$

1.7860228654147 $*10^{38}$ * (-3/2*1/4+2*1/3*1.9931523) * 2 = M

Input interpretation:

$$1.7860228654147 \times 10^{38} \left(-\frac{3}{2} \times \frac{1}{4} + 2 \times \frac{1}{3} \times 1.9931523\right) \times 2$$

Result:

340 690 362 701 084 134 508 000 000 000 000 000 000

Scientific notation:

$3.40690362701084134508 \times 10^{38}$

3.406903627... $*10^{38}$

Inserting the value of the ADM mass 3.406904e+38 in the Hawking radiation calculator, we obtain:

Mass = 3.406904e+38

Radius = 5.058746e+11

Temperature = 3.602107e-16

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.406904e+38)* sqrt[[-((((3.602107e-16 * 4*Pi*(5.058746e+11)^3-(5.058746e+11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1 \Bigg/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{3.406904 \times 10^{38}} \sqrt{-\frac{3.602107 \times 10^{-16} \times 4\pi (5.058746 \times 10^{11})^3 - (5.058746 \times 10^{11})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618249336012945517815305624597541789224923815339885247692...

1.618249336…

And:

1/sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.406904e+38)*
sqrt[[-((((3.602107e-16 * 4*Pi*(5.058746e+11)^3-(5.058746e+11)^2))))) /
((6.67*10^-11))]]]]]]

Input interpretation:

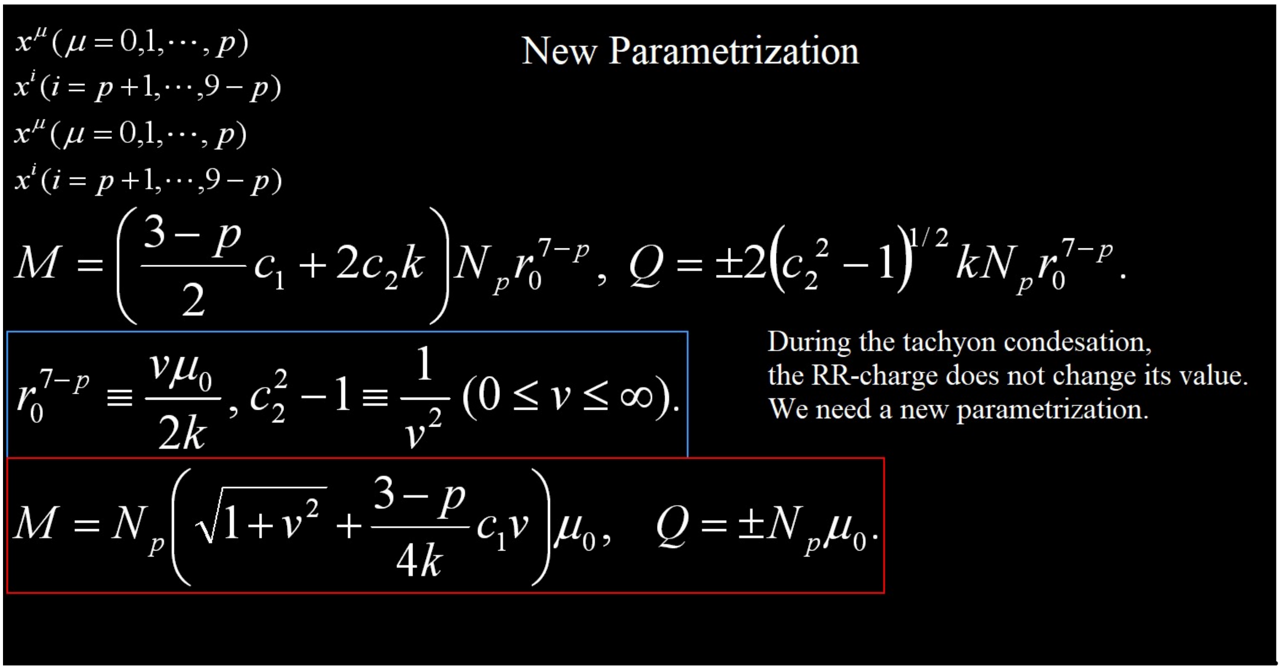
$$1\Bigg/\left(\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.406904\times 10^{38}}\sqrt{-\frac{3.602107\times 10^{-16}\times 4\pi\,(5.058746\times 10^{11})^3-(5.058746\times 10^{11})^2}{6.67\times 10^{-11}}}\right)\right)}\right)$$

Result:

0.617951744360858056724317620844565903058624888618379241810...

0.617951744…

Now:



We have:

2(1/3^2-1)^1/2*1.9931523*1.7860228654147e+38*2 = **Q**

Input interpretation:

$$2\sqrt{\frac{1}{3^2}-1}\times 1.9931523\times 1.7860228654147\times 10^{38}\times 2$$

Result:

$1.3424905...\times 10^{39}\, i$

Polar coordinates:

$r = 1.34249\times 10^{39}$ (radius), $\theta = 90°$ (angle)

$1.34249 * 10^{39}$

47+((((2(1/3^2-1)^1/2*1.9931523*1.7860228654147e+38*2))))^1/12

Where 47 is a Lucas number

Input interpretation:

$$47+\sqrt[12]{2\sqrt{\frac{1}{3^2}-1}\times 1.9931523\times 1.7860228654147\times 10^{38}\times 2}$$

Result:

1853.87386... +
237.879457... i

Polar coordinates:

$r = 1869.07$ (radius), $\theta = 7.31194°$ (angle)

1869.07 result very near to the rest mass of D meson 1869.62

We note that:

$M = 3.406903627...*10^{38}$

$Q = 1.34249 * 10^{39}$

((((3.406903627e+38 / 1.34249e+39)^1/3)))

Input interpretation:

$$\sqrt[3]{\frac{3.406903627\times10^{38}}{1.34249\times10^{39}}}$$

Result:

0.633115476157163040355265609915937185840018535076327708420...

0.633115476157163...

And:

(1.34249e+39 / 3.406903627e+38)^1/e

Input interpretation:

$$\sqrt[e]{\frac{1.34249\times10^{39}}{3.406903627\times10^{38}}}$$

Result:

1.656117119728742727591993303619667194597807076633853589694...

1.656117119728.... We note that, the result 1,6561171... is practically equal to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 =$ 1164,2696 i.e. 1,65578...

Indeed:

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1,65578\ldots$$

And:

(11/10^3+4/10^3)+(1.34249e+39 / 3.406903627e+38)^1/e

Where 4 and 11 are Lucas numbers

Input interpretation:

$$\left(\frac{11}{10^3}+\frac{4}{10^3}\right)+\sqrt[e]{\frac{1.34249\times10^{39}}{3.406903627\times10^{38}}}$$

Result:

1.6711171197287427275919933036196671945978070766338535896941...

1.671117119....

We note that 1.671117... is 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

Further:

(-55/10^3+2/10^3+11/10^3+4/10^3)+(1.34249e+39 / 3.406903627e+38)^1/e

Where 2 and 55 are Fibonacci numbers, 4 and 11 are Lucas numbers

Input interpretation:

$$\left(-\frac{55}{10^3}+\frac{2}{10^3}+\frac{11}{10^3}+\frac{4}{10^3}\right)+\sqrt[e]{\frac{1.34249\times 10^{39}}{3.406903627\times 10^{38}}}$$

Result:

1.6181171197287427275919933036196671945978070766338535896941...

1.6181171197....

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

Via the boundary state

$$h^{(1)}_{MN}(r) = -\frac{1}{8}(A+B)CN_p\big((7-p)\eta_{\mu\nu}, -(p+1)\delta_{ij}\big)\frac{1}{r^{7-p}}$$

$$\phi^{(1)}(r) = -\frac{1}{4}CN_p[(p+1)A-(7-p)B]\frac{1}{r^{7-p}}$$

From the 3-parameter solution

$$h^{(1)}_{MN}(r) = -\frac{\mu_0}{8}\left(\sqrt{1+v^2}+\frac{3-p}{4}\frac{c_1}{k}v\right)\big((7-p)\eta_{\mu\nu}, -(p+1)\delta_{ij}\big)\frac{1}{r^{7-p}}$$

$$\phi^{(1)}(r) = -\frac{\mu_0}{4}\left[\frac{3-p}{4}\sqrt{1+v^2}+\frac{(p+1)(7-p)}{16}\frac{c_1}{k}v\right]\frac{1}{r^{7-p}}$$

-3/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) * (1-7)*1/4096 = $\boldsymbol{h^{(1)}_{MN}(r)}$

Input interpretation:

$$-\frac{3}{8}\left(\sqrt{26}-\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)(1-7)\times\frac{1}{4096}$$

Result:

0.002542598...

0.002542598…

We have also that:

exp(((((-3/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) * (1-7)*1/4096)))))

Input interpretation:

$$\exp\left(-\frac{3}{8}\left(\sqrt{26}-\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)(1-7)\times\frac{1}{4096}\right)$$

Result:

1.002545834...

1.002545834...

And:

-7/10^4 + exp(((((-3/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) * (1-7)*1/4096)))))

Input interpretation:

$$-\frac{7}{10^4}+\exp\left(-\frac{3}{8}\left(\sqrt{26}-\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)(1-7)\times\frac{1}{4096}\right)$$

Result:

1.001845834...

1.001845834... result practically equal to the value of the following Rogers-Ramanujan continued fraction:

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

Series representations:

$$-\frac{7}{10^4}+\exp\left(\frac{\left(\sqrt{26}-\frac{3(0.25\times 5)}{4\times 1.99315}\right)(-3)(1-7)}{8\times 4096}\right)=$$
$$-\frac{7}{10000}+\exp\left(-0.000258377+0.000549316\sqrt{25}\sum_{k=0}^{\infty}25^{-k}\binom{\frac{1}{2}}{k}\right)$$

- $$-\frac{7}{10^4}+\exp\left(\frac{\left(\sqrt{26}-\frac{3(0.25\times 5)}{4\times 1.99315}\right)(-3)(1-7)}{8\times 4096}\right)=$$
$$-\frac{7}{10000}+\exp\left(-0.000258377+0.000549316\sqrt{25}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{25}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

- $$-\frac{7}{10^4}+\exp\left(\frac{\left(\sqrt{26}-\frac{3(0.25\times 5)}{4\times 1.99315}\right)(-3)(1-7)}{8\times 4096}\right)=$$
$$-\frac{7}{10000}+\exp\left(-0.000258377+\frac{0.000274658\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}25^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}\right)$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

-3/4((((-3/4*sqrt(1+5^2)+7/16*(0.25*5)/ 1.9931523))))*1/4096 = $\boldsymbol{\phi}^{(1)}(\boldsymbol{r})$

Input interpretation:

$$-\frac{3}{4}\left(-\frac{3}{4}\sqrt{1+5^2}+\frac{7}{16}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096}$$

Result:

0.0006500039...

0.0006500039…

And the inverse:

1/((((-3/4((((-3/4*sqrt(1+5^2)+7/16*(0.25*5)/ 1.9931523))))*1/4096))))

Input interpretation:

$$\frac{1}{-\frac{3}{4}\left(-\frac{3}{4}\sqrt{1+5^2}+\frac{7}{16}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096}}$$

Result:

1538.452...

1538.452… result very near to the rest mass of Xi baryon 1535

And:

-13/10^3+ [1/((((-3/4((((-3/4*sqrt(1+5^2)+7/16*(0.25*5)/ 1.9931523))))*1/4096))))]^1/15

Input interpretation:

$$-\frac{13}{10^3}+\sqrt[15]{\frac{1}{-\frac{3}{4}\left(-\frac{3}{4}\sqrt{1+5^2}+\frac{7}{16}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096}}}$$

Result:

1.6180688...

1.6180688...

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

From the two results, we have also:

1+(0.002542598 - 0.0006500039)

Input interpretation:

1 + (0.002542598 − 0.0006500039)

Result:

1.0018925941

1.0018925941 result practically equal to the value of the following Rogers-Ramanujan continued fraction:

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

We have also, from 3-parameter solution, that:

(4267.24+11+3+2)+1/Pi*1/(0.002542598 * 0.0006500039)

Where 4267.24 are a result of a Ramanujan mock theta function and 2, 3 and 11 are Lucas numbers

Input interpretation:

$$(4267.24+11+3+2)+\frac{1}{\pi}\times\frac{1}{0.002542598\times 0.0006500039}$$

Result:

196883.3...

196883.3... result practically equal to the value of the following partition function, concerning the j-invariants:

$$Z_{24}(\tau) = j(\tau) - 744$$
$$= q^{-1} + 196884\,q + 21493760\,q^2 + 864299970\,q^3 + 20245856256\,q^4 + \ldots$$

Alternative representations:

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\,\pi} = 4283.24+\frac{1}{1.6527\times 10^{-6}\,(180\,°)}$$

-

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\,\pi} = 4283.24+\frac{1}{1.6527\times 10^{-6}\,(-i\log(-1))}$$

-

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\,\pi} = 4283.24+\frac{1}{1.6527\times 10^{-6}\cos^{-1}(-1)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\,\pi} = 4283.24+\frac{151268.}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

-

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\pi}=4283.24+\frac{302535.}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

- $$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\pi}=4283.24+\frac{605071.}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

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

Integral representations:

$$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\pi}=4283.24+\frac{302535.}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

- $$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\pi}=4283.24+\frac{151268.}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

- $$(4267.24+11+3+2)+\frac{1}{(0.0025426\times 0.000650004)\pi}=4283.24+\frac{302535.}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

Note

From:

Rotating strings confronting PDG mesons

Jacob Sonnenschein and Dorin Weissman

The Raymond and Beverly Sackler School of Physics and Astronomy,
Tel Aviv University, Ramat Aviv 69978, Israel
arXiv:1402.5603v1 [hep-ph] 23 Feb 2014

The slopes that were found, on the other hand, are quite uniform for the light quark trajectories. The (J, M^2) trajectories have a slope in the range $0.80 - 0.90$ GeV^{-2}, and this slightly decreases to $0.78 - 0.84$ GeV^{-2} in the (n, M^2) plane fits. The slope for the strange meson is also in this range, while for the $s\bar{s}$ states the optimum is found with a higher slope of around 1.1 GeV^{-2}, in both planes. The charmed and $c\bar{c}$ mesons are best fitted in the (J, M^2) plane with a similar value of approximately 1 GeV^{-2} for the slope - and only when adding the appropriate mass for the c quark. This is what allows the universal slope fit in section 4.1.5, which had an optimum for the slope $\alpha' = 0.884$ GeV^{-2}.

4.4 Summary of results for the mesons

Table (1) summarizes the results of the fits for the mesons in the (J, M^2) plane. Tables (2) and (3) likewise summarize the results of the two types of fits for the (n, M^2) trajectories, that of the rotating string and of the WKB approximation.

The higher values of α' and a always correspond to higher values of the endpoint masses, and the ranges listed are those where χ^2 is within 10% of its optimal value.

Traj.	N	m	α'	a
π/b	4	$m_{u/d} = 90 - 185$	$0.808 - 0.863$	$(-0.23) - 0.00$
ρ/a	6	$m_{u/d} = 0 - 180$	$0.883 - 0.933$	$0.47 - 0.66$
η/h	5	$m_{u/d} = 0 - 70$	$0.839 - 0.854$	$(-0.25) - (-0.21)$
ω	6	$m_{u/d} = 0 - 60$	$0.910 - 0.918$	$0.45 - 0.50$
K^*	5	$m_{u/d} = 0 - 240 \quad m_s = 0 - 390$	$0.848 - 0.927$	$0.32 - 0.62$
ϕ	3	$m_s = 400$	1.078	0.82
D	3	$m_{u/d} = 80 \quad m_c = 1640$	1.073	-0.07
D_s^*	3	$m_s = 400 \quad m_c = 1580$	1.093	0.89
Ψ	3	$m_c = 1500$	0.979	-0.09
Υ	3	$m_b = 4730$	0.635	1.00

Table 1. The results of the meson fits in the (J, M^2) plane. For the uneven K^* fit the higher values of m_s require $m_{u/d}$ to take a correspondingly low value. $m_{u/d} + m_s$ never exceeds 480 MeV, and the highest masses quoted for the s are obtained when $m_{u/d} = 0$. The ranges listed are those where χ^2 is within 10% of its optimal value. N is the number of data points in the trajectory.

Traj.	N	m	α'	a
π/π_2	$4+3$	$m_{u/d} = 110 - 250$	$0.788 - 0.852$	$a_0 = (-0.22) - (-0.00) \quad a_2 = (-0.00) - 0.26$
a_1	4	$m_{u/d} = 0 - 390$	$0.783 - 0.849$	$(-0.18) - 0.21$
h_1	4	$m_{u/d} = 0 - 235$	$0.833 - 0.850$	$(-0.14) - (-0.02)$
ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$	$a_1 = 0.81 - 1.00 \quad a_3 = 0.95 - 1.15$
ϕ	3	$m_s = 510 - 520$	$1.072 - 1.112$	1.00
Ψ	4	$m_c = 1380 - 1460$	$0.494 - 0.547$	$0.71 - 0.88$
Υ	6	$m_b = 4725 - 4740$	$0.455 - 0.471$	1.00
χ_b	3	$m_b = 4800$	0.499	0.58

Table 2. The results of the meson fits in the (n, M^2) plane. The ranges listed are those where χ^2 is within 10% of its optimal value. N is the number of data points in the trajectory.

The tensor structure of the closed string amplitude (6.6.19) is just two copies of that in the open string amplitude (6.5.15), if one sets $\alpha' = 2$ in the closed string and $\alpha' = 1/2$ in the open.

This is what allows the universal slope fit in section 4.1.5, which had an optimum for the slope α’ = 0.884 GeV^{-2} . Other values are 0.90904; 0.979

(1,07 + 0,98 + 0,884 + 0,90904) ÷ 4 = 0,96076

0,884 + 0,97 = 1,854 ÷ 2 = 0,927

(0,979 + 0,96076 + 0,927) / 2 = 0,95558666....

We take an average value for α’ that is 0.95686 that correspond also with the result of the following Rogers-Ramanujan continued fraction:

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

$$T^8, T^9 \to \infty \; (u^8, u^9 \to \infty)$$

$$S = 2T_{D9}\int d^{10}x \exp\left(-\frac{\pi}{2}(u^8x^8)^2 + (u^9x^9)^2\right) F(\pi\,\alpha' u^8) F(\pi\,\alpha' u^9)$$

$$= 2T_{D9}\int d^8x \sqrt{\frac{2}{u^8}} F(\pi\,\alpha' u^8) \sqrt{\frac{2}{u^9}} F(\pi\,\alpha' u^9)$$

$$\xrightarrow[u^8, u^9 \to \infty]{} 4\pi^2 \alpha'^2 T_{D9} \int d^8x$$

$$(2\pi\sqrt{\alpha'})^2 T_{D9} = T_{D7}$$

$$D9\overline{D9}\ action \to BPS\ D7\ action$$

((2Pi*sqrt(0.95686)))^2

Input:

$$\left(2\pi\sqrt{0.95686}\right)^2$$

Result:

37.7753...

37.7753…. = 37.7753 $T_{D9} = T_{D7}$

$$T^9 \to \infty \; (u^9 \to \infty)$$

$$S = 2T_{D9}\int d^{10}x \exp\left(-\frac{\pi}{2}(u^9 x^9)^2\right) F\left(\pi\alpha' u^9\right)$$

$$= 2T_{D9}\int d^9x \sqrt{\frac{2}{u^9}} F\left(\pi\alpha' u^9\right)$$

$$\xrightarrow[u^9\to\infty]{} 2\pi\sqrt{2\alpha'}T_{D9}\int d^9x$$

$$\sqrt{2}(2\pi\alpha')T_{D9} = T_{D8}$$

$$D9\overline{D9}\ action \to non-BPS\ \ D8\ action$$

sqrt(2)*((2Pi*(0.95686)))

Input:

$$\sqrt{2}\,(2\pi\times 0.95686)$$

Result:

8.502433936412428654239231768298950744912773819392045893722...

8.5024339364… $T_{D9} = T_{D8}$

-

Series representations:

$$\sqrt{2}\;2\,(\pi\,0.95686) = 1.91372\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}$$

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

- $$\sqrt{2}\ 2(\pi\, 0.95686) = 1.91372\,\pi \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

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

- $$\sqrt{2}\ 2(\pi\, 0.95686) = 1.91372\,\pi \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi) \rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi) \rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}$$

$n!$ is the factorial function

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

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

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

We note that:

37.7753 $T_{D9} = T_{D7}$

8.5024339364… $T_{D9} = T_{D8}$

37.7753 / 8.5024339364

Input interpretation:

$$\frac{37.7753}{8.5024339364}$$

Result:

4.442880742451775011712280359353689879262182608071384485118...

4.442880742451775…. = $T_{D7} = T_{D8}$

And:

(((((37.7753) / (8.5024339364)))))^1/3

Input interpretation:

$$\sqrt[3]{\frac{37.7753}{8.5024339364}}$$

Result:

1.643948539232212161595302367284254048192904618961750283923...

$1.64394853923\ldots. \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Asymptotic Behavior of the Solution

$$e^{2A(r)} = 1 - \frac{7-p}{8}\left(\sqrt{1+v^2} + \frac{3-p}{4}\frac{c_1}{k}v\right)\frac{\mu_0}{r^{7-p}} + O\left(\frac{1}{r^{2(7-p)}}\right),$$

$$e^{2B(r)} = 1 + \frac{p+1}{8}\left(\sqrt{1+v^2} + \frac{3-p}{4}\frac{c_1}{k}v\right)\frac{\mu_0}{r^{7-p}} + O\left(\frac{1}{r^{2(7-p)}}\right),$$

$$\phi(r) = \left(\frac{3-p}{4}\sqrt{1+v^2} - \frac{(p+1)(7-p)}{16}\frac{c_1}{k}v\right)\frac{\mu_0}{r^{7-p}} + O\left(\frac{1}{r^{2(7-p)}}\right),$$

$$C(r) = \pm\frac{\mu_0}{r^{7-p}} + O\left(\frac{1}{r^{2(7-p)}}\right).$$

We have the following results:
1-1/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) *1/4096 + 1/(4096)^2 = $\mathbf{e^{2A(r)}}$

Input interpretation:

$$1 - \frac{1}{8}\left(\sqrt{26} - \frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096} + \frac{1}{4096^2}$$

Result:

0.99985880414...

0.99985880414.... result very near to the following Rogers-Ramanujan continued fraction:

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

1+7/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) *1/4096 + 1/(4096)^2 = $\mathbf{e^{2B(r)}}$

Input interpretation:

$$1+\frac{7}{8}\left(\sqrt{26}-\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096}+\frac{1}{4096^2}$$

Result:

1.000988847858121204799682038926411964230504955860488061233...

1.0009888478581212....

The inverse is:

1/((((1+7/8(((sqrt(26)-3/4*(0.25*5)/ 1.9931523))) *1/4096 + 1/(4096)^2))))

Input interpretation:

$$\frac{1}{1+\frac{7}{8}\left(\sqrt{26}-\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}\right)\times\frac{1}{4096}+\frac{1}{4096^2}}$$

Result:

0.9990121290...

0.9990121290.... result very near to the following Rogers-Ramanujan continued fraction:

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

((((-3/4*sqrt(1+5^2)-7/16*(0.25*5)/ 1.9931523))))*1/4096+ 1/(4096)^2 = $\boldsymbol{\phi(r)}$

Input interpretation:

$$\left(-\frac{3}{4}\sqrt{1+5^2}-\frac{7}{16}\times\frac{0.25\times5}{1.9931523}\right)\times\frac{1}{4096}+\frac{1}{4096^2}$$

Result:

$-0.001000585\ldots$

-0.001000585....

The inverse is:

1/ ((((((((-3/4*sqrt(1+5^2)-7/16*(0.25*5)/ 1.9931523))))*1/4096+ 1/(4096)^2))))

Input interpretation:

$$\frac{1}{\left(-\frac{3}{4}\sqrt{1+5^2}-\frac{7}{16}\times\frac{0.25\times5}{1.9931523}\right)\times\frac{1}{4096}+\frac{1}{4096^2}}$$

Result:

$-999.4150\ldots$

-999.4150....

We can to obtain:

-(47+18-4) -1/ ((((((((-3/4*sqrt(1+5^2)-7/16*(0.25*5)/ 1.9931523))))*1/4096+ 1/(4096)^2))))

where 4, 18 and 47 are Lucas numbers

Input interpretation:

$$-(47+18-4)-\frac{1}{\left(-\frac{3}{4}\sqrt{1+5^2}-\frac{7}{16}\times\frac{0.25\times5}{1.9931523}\right)\times\frac{1}{4096}+\frac{1}{4096^2}}$$

Result:

$938.4150\ldots$

938.4150.... result practically equal to the proton rest mass in MeV 938.272

1/4096 + 1/4096^2 = **C(r)**

Input:

$$\frac{1}{4096} + \frac{1}{4096^2}$$

Exact result:

$$\frac{4097}{16\,777\,216}$$

Decimal form:

0.000244200229644775390625

0.00024420022964….

The inverse is:

1/(((1/4096+ 1/(4096)^2)))

Input:

$$\frac{1}{\frac{1}{4096} + \frac{1}{4096^2}}$$

Exact result:

$$\frac{16\,777\,216}{4097}$$

Decimal approximation:

4095.000244081034903587991213082743470832316329021235050036...

4095.00024408….

And:

-4+1/4*1/(((1/4096+ 1/(4096)^2)))

Input:

$$-4 + \frac{1}{4} \times \frac{1}{\frac{1}{4096} + \frac{1}{4096^2}}$$

Exact result:

$$\frac{4177916}{4097}$$

Decimal approximation:

1019.750061020258725896997803270685867708079082255308762509...

1019.75006102…. result practically equal to the rest mass of Phi meson 1019.445

The algebraic sum of the results is:

0.99985880414 + 1.0009888478581212 - 0.001000585 + 0.00024420022964

(0.99985880414 + 1.0009888478581212 -0.001000585 + 0.00024420022964)

Input interpretation:

0.99985880414 + 1.0009888478581212 − 0.001000585 + 0.00024420022964

Result:

2.0000912672277612

2.0000912672277612

The inverse is:

1/(0.99985880414 + 1.0009888478581212 -0.001000585 + 0.00024420022964)

Input interpretation:

$$\frac{1}{0.99985880414 + 1.0009888478581212 - 0.001000585 + 0.00024420022964}$$

Result:

0.499977184234225545741654252536279854401881080172529088355...

0.49997718423422.... ≈ 0.5 = 1/2

Note:

From Wikipedia

Apart from the trivial zeros, the Riemann zeta function has no zeros to the right of $\sigma = 1$ and to the left of $\sigma = 0$ (neither can the zeros lie too close to those lines). Furthermore, the non-trivial zeros are symmetric about the real axis and the line $\sigma = 1/2$ and, according to the Riemann hypothesis, they all lie on the line $\sigma = 1/2$

From the multiplication of the results, we obtain:

-(0.99985880414 * 1.0009888478581212 * -0.001000585 * 0.00024420022964)

Input interpretation:

$-(0.99985880414 \times 1.0009888478581212 \times (-0.001000585) \times 0.00024420022964)$

Result:

$2.445501705645899835428343404735872067240592 \times 10^{-7}$

Repeating decimal:

$2.44550170564589983542834340473587206724059200000000 \times 10^{-7}$

2.44550170564589....* 10^{-7}

From the inverse, we obtain:

1/ -(0.99985880414 * 1.0009888478581212 * -0.001000585 * 0.00024420022964)

Input interpretation:

$$-\frac{1}{0.99985880414 \times 1.0009888478581212 \times (-0.001000585) \times 0.00024420022964}$$

Result:

$4.089140472449118509938530570815181399402555979156791\,17... \times 10^{6}$

4.0891404724491185….*10^6

From the ratio, we obtain:

(0.99985880414 * 1/ 1.0009888478581212 * 1/ -0.001000585 * 1/ 0.00024420022964)

Input interpretation:

$$0.99985880414 \times \frac{1}{1.0009888478581212}\left(-\frac{1}{0.001000585}\right) \times \frac{1}{0.00024420022964}$$

Result:

$-4.087985814559994120526813305832549381383494917729247\,6... \times 10^{6}$

-4.087985814559….*10^6

We have that:

11/10^3+(4.087985814559*10^6)^1/31

Where 11 is a Lucas number:

Input interpretation:

$$\frac{11}{10^3} + \sqrt[31]{4.087985814559 \times 10^6}$$

Result:

1.6450844457876...

1.6450844457876.... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

The ratio between the two results, is:

-(4.0891404724491185e+6 / -4.08798581455999412 × 10^6)

Input interpretation:

$$-\left(-\frac{4.0891404724491185 \times 10^6}{4.08798581455999412 \times 10^6}\right)$$

Result:

1.000282451540074304376823712036953868202129874390888064579...

1.00028245154…..

-11/10^3+(((((-(4.0891404724491185e+6 / -4.08798581455999412 × 10^6))))))^1728

Input interpretation:

$$-\frac{11}{10^3} + \left(-\left(-\frac{4.0891404724491185 \times 10^6}{4.08798581455999412 \times 10^6}\right)\right)^{1728}$$

Result:

1.618066815879239949269228345354389673035579356651229485707...

1.618066815879….

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

From:

Open String Tachyon in Supergravity Solution
Shinpei Kobayashi, Tsuguhiko Asakawa and So Matsuura
arXiv:hep-th/0409044v4 13 Jun 2005

We have also that:

Next, from the graviton and the dilaton, we see that the parameters must satisfy the following relations simultaneously;

$$1+\frac{2}{N-\bar{N}}\mathrm{tr}\, e^{-|T|^2}=\sqrt{1+v^2}+\frac{3-p}{4}\frac{c_1 v}{k}=\sqrt{1+v^2}-\frac{(p+1)(7-p)}{4(3-p)}\frac{c_1 v}{k}, \qquad (3.31)$$

sqrt(1+5^2)+[((((7/(12)*(0.25*5)/1.9931523))))]

Input interpretation:

$$\sqrt{1+5^2}+\frac{7}{12}\times\frac{0.25\times 5}{1.9931523}$$

Result:

5.464855...

5.464855....

And:

sqrt(1+5^2)+(((3/(4)*(0.25*5)/1.9931523)))

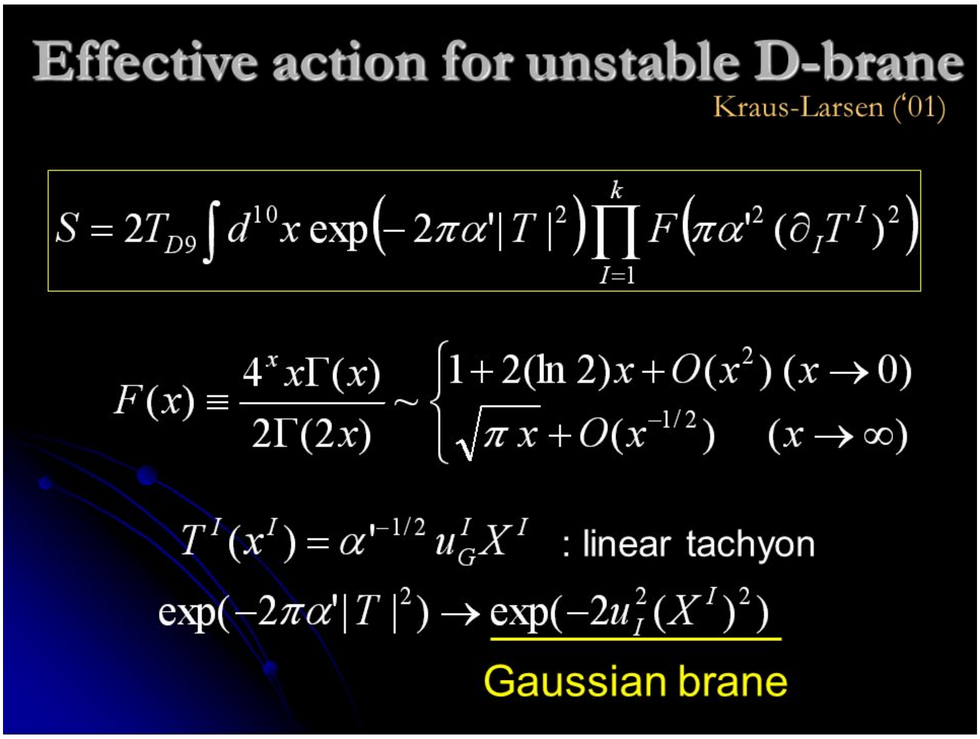
Input interpretation:

$$\sqrt{1+5^2}+\frac{3}{4}\times\frac{0.25\times 5}{1.9931523}$$

Result:

5.569380...

5.569380



Thus, when $T = 0$ (i.e. $\mathrm{tr}\, e^{-|T|^2} = \bar{N}$), the factor is the tension of the sum of N D-branes and $\bar{N}$ $\bar{\text{D}}$-branes, while, when $|T| \sim \infty$, the tension becomes that of $(N - \bar{N})$ D-branes.

We have the following equation concerning the Gaussian brane:

$$exp(-2\pi\alpha'|T|^2) \rightarrow exp(-2u_I^2(X^I)^2)$$

From:

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

But we know that

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

We have that:

1-24*exp(-Pi*sqrt(5))+276*exp(-2Pi*sqrt(5))

Input:

$$1 - 24 \exp\left(-\pi \sqrt{5}\right) + 276 \exp\left(-2 \pi \sqrt{5}\right)$$

Exact result:

$$1 + 276 e^{-2 \sqrt{5} \pi} - 24 e^{-\sqrt{5} \pi}$$

Decimal approximation:

0.9788696145226380546278857378122128905554396772402688360 37...

0.978869614522638…

Alternate forms:

$$1 + e^{-2 \sqrt{5} \pi} \left(276 - 24 e^{\sqrt{5} \pi}\right)$$

- $$e^{-2 \sqrt{5} \pi} \left(276 - 24 e^{\sqrt{5} \pi} + e^{2 \sqrt{5} \pi}\right)$$

Series representations:

$$1 - 24 \exp\left(-\pi \sqrt{5}\right) + 276 \exp\left(-2 \pi \sqrt{5}\right) = 1 + 276 \exp\left(-2 \pi \sqrt{4} \sum_{k=0}^{\infty} 4^{-k} \binom{\frac{1}{2}}{k}\right) - 24 \exp\left(-\pi \sqrt{4} \sum_{k=0}^{\infty} 4^{-k} \binom{\frac{1}{2}}{k}\right)$$

- $$1 - 24 \exp\left(-\pi \sqrt{5}\right) + 276 \exp\left(-2 \pi \sqrt{5}\right) = 1 + 276 \exp\left(-2 \pi \sqrt{4} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right) - 24 \exp\left(-\pi \sqrt{4} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

- $$1 - 24 \exp\left(-\pi \sqrt{5}\right) + 276 \exp\left(-2 \pi \sqrt{5}\right) = 1 + 276 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{\sqrt{\pi}}\right) - 24 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2 \sqrt{\pi}}\right)$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\text{Res}_{z=z_0} f$ is a complex residue

We have that:

exp(-2Pi*sqrt(5))

Input:

$$\exp\left(-2\pi\sqrt{5}\right)$$

Exact result:

$$e^{-2\sqrt{5}\,\pi}$$

Decimal approximation:

$$7.912677253114856461797619504797230454769325552209323 1\ldots \times 10^{-7}$$

7.9126772531….*10^{-7}

Property:

$e^{-2\sqrt{5}\,\pi}$ is a transcendental number

Series representations:

$$e^{-2\pi\sqrt{5}} = e^{-2\pi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{1/2}{k}}$$

- $$e^{-2\pi\sqrt{5}} = \exp\left(-2\pi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

- $$e^{-2\pi\sqrt{5}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}\right)$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

and we observe that obtain:

1/276*(((0.978869614522638-1+24*exp(-Pi*sqrt(5)))))

Input interpretation:

$$\frac{1}{276}\left(0.978869614522638 - 1 + 24 \exp\left(-\pi \sqrt{5}\right)\right)$$

Result:

$7.9126772531... \times 10^{-7}$

7.9126772531....*10^{-7}

Thence, we set $-2\pi\alpha'|T|^2 = -2u_I^2(X^I)^2 = -2\pi\sqrt{5}$ and obtain:

$exp(-2\pi\alpha'|T|^2) \rightarrow exp(-2u_I^2(X^I)^2) = exp\left(-2\pi\sqrt{5}\right) = 7.9126772531....*10^{-7}$

In conclusion, we have for S:

2*4.442880742451775 * integrate [exp(-2Pi*sqrt(5)) * (((3*4^3 gamma (3)))) / (((2* gamma (6))))]x

Input interpretation:

$$2 \times 4.442880742451775 \int \left(\exp\left(-2\pi\sqrt{5}\right) \times \frac{3 \times 4^3\, \Gamma(3)}{2\, \Gamma(6)}\right) x\, dx$$

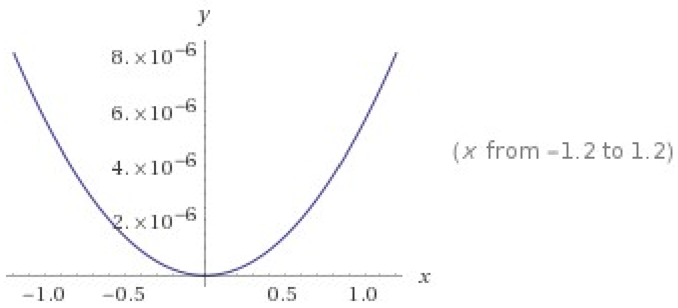
$\Gamma(x)$ is the gamma function

Result:

$5.624813022256033 \times 10^{-6} x^2$

5.624813022256033 * 10^{-6} x^2

Plot:



And for x = 0.9502566373

(5.624813022256033×10^-6 * 0.9502566373^2)

Input interpretation:

$5.624813022256033 \times 10^{-6} \times 0.9502566373^2$

Result:

$5.0791368430228331173611456379340325 7 \times 10^{-6}$

5.07913684302283….*10^{-6}

And:

1/(5.624813022256033×10^-6 * 0.9502566373^2)

Input interpretation:

$$\frac{1}{5.624813022256033 \times 10^{-6} \times 0.9502566373^2}$$

Result:

196883.8467846542578415527390192438982632066243000478961182...

196883.84678465…. result practically equal to the value of the following partition function, concerning the j-invariants:

$$\begin{aligned} Z_{24}(\tau) &= j(\tau) - 744 \\ &= q^{-1} + 196884\, q + 21493760\, q^2 + 864299970\, q^3 + 20245856256\, q^4 + \ldots \end{aligned}$$

With regard the value 0.9502566373 is very near to the result of the following Rogers-Ramanujan continued fraction:

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

We have indeed:

0.9568666373-0.00661 = 0.9502566373; 0.00661 = $661/10^5$ and

661 = 610 + 47 + 4 where 610 is a Fibonacci number, 4 and 47 are Lucas numbers

From:

On certain trigonometrical sums and their applications in the theory of numbers
Srinivasa Ramanujan - Transactions of the Cambridge Philosophical Society, XXII, No.13, 1918, 259 – 276

In all these equations the series on the right hand are finite Dirichlet's series and therefore absolutely convergent.

$$\{1^{-s}+(-3)^{-s}+5^{-s}+(-7)^{-s}+\cdots\}\delta_{2s}(n)=\frac{\pi^s n^{s-1}}{(s-1)!}\left\{1^{-s}\left(\frac{\sin n\pi}{\sin n\pi}\right)\right.$$
$$\left.+2^{-s}\left(\frac{\sin n\pi}{\sin(\frac{1}{2}n\pi+\frac{1}{2}s\pi)}\right)+3^{-s}\left(\frac{\sin n\pi}{\sin(\frac{1}{3}n\pi+s\pi)}\right)+4^{-s}\left(\frac{\sin n\pi}{\sin(\frac{1}{4}n\pi+\frac{3}{2}s\pi)}\right)+\cdots\right\}$$

s > 1; s = 2, n = 5 (14.4)

Pi^2*5 / 1! ((((((1^-2*(sin5Pi/sin5Pi)+2^-2(((sin5Pi))/(sin(5Pi/2+2Pi/2)))+3^-2(((sin5Pi))/(sin(5Pi/3+2Pi)))+4^-2(((sin5Pi))/(sin(5Pi/4+6Pi/2)))))))

Pi^2*5 / 1!

Input:

$$\pi^2\times\frac{5}{1!}$$

$n!$ is the factorial function

Exact result:

$5\pi^2$

Decimal approximation:

49.348022005446793094172454999380755676568497036203953132066...

49.348022005446793…

Property:

$5\pi^2$ is a transcendental number

Alternative representations:

$$\frac{\pi^2 5}{1!} = \frac{5\pi^2}{\Gamma(2)}$$

-

$$\frac{\pi^2 5}{1!} = \frac{5\pi^2}{\Gamma(2, 0)}$$

-

$$\frac{\pi^2 5}{1!} = \frac{5\pi^2}{(1)_1}$$

$\Gamma(x)$ is the gamma function

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

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

Series representations:

$$\frac{\pi^2 5}{1!} = 30 \sum_{k=1}^{\infty} \frac{1}{k^2}$$

-

$$\frac{\pi^2 5}{1!} = -60 \sum_{k=1}^{\infty} \frac{(-1)^k}{k^2}$$

-

$$\frac{\pi^2 5}{1!} = 40 \sum_{k=0}^{\infty} \frac{1}{(1+2k)^2}$$

Integral representations:

$$\frac{\pi^2 5}{1!} = 80 \left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2$$

-

$$\frac{\pi^2 5}{1!} = 20 \left(\int_0^\infty \frac{1}{1+t^2} \, dt \right)^2$$

- $$\frac{\pi^2 5}{1!} = 20 \left(\int_0^1 \frac{1}{\sqrt{1-t^2}} \, dt \right)^2$$

1^-2*((sin5Pi)/(sin5Pi))+2^-2(((sin5Pi))/(sin(5Pi/2+2Pi/2)))

Input:

$$\frac{\frac{\sin(5)\pi}{\sin(5)\pi}}{1^2} + \frac{\frac{\sin(5)\pi}{\sin\left(5\times\frac{\pi}{2}+2\times\frac{\pi}{2}\right)}}{2^2}$$

Exact result:

$$1 - \frac{1}{4}\pi\sin(5)$$

Decimal approximation:

1.7531373641576592292976041729810255297445692146175373715 34...

1.7531373641576592…

Alternate forms:

$$\frac{1}{4}(4 - \pi\sin(5))$$

- $$1 - \frac{1}{8} i e^{-5i} \pi + \frac{1}{8} i e^{5i} \pi$$

Alternative representations:

$$\frac{\sin(5)\pi}{1^2(\sin(5)\pi)} + \frac{\sin(5)\pi}{2^2\sin\left(\frac{5\pi}{2}+\frac{2\pi}{2}\right)} = \frac{\pi}{\frac{\csc(5)\pi}{\csc(5)}} + \frac{\pi}{\frac{4\csc(5)}{\csc\left(\frac{7\pi}{2}\right)}}$$

- $$\frac{\sin(5)\pi}{1^2(\sin(5)\pi)} + \frac{\sin(5)\pi}{2^2\sin\left(\frac{5\pi}{2}+\frac{2\pi}{2}\right)} = \frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\pi\cos\left(-5+\frac{\pi}{2}\right)} + \frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{4\cos(-3\pi)}$$

- $$\frac{\sin(5)\pi}{1^2(\sin(5)\pi)} + \frac{\sin(5)\pi}{2^2\sin\left(\frac{5\pi}{2}+\frac{2\pi}{2}\right)} = \frac{-\pi\cos\left(5+\frac{\pi}{2}\right)}{-\pi\cos\left(5+\frac{\pi}{2}\right)} - \frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{4(-\cos(4\pi))}$$

$\csc(x)$ is the cosecant function

Series representations:

$$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 - \frac{1}{4}\,\pi \sum_{k=0}^{\infty} \frac{(-1)^k\,5^{1+2k}}{(1+2k)!}$$

- $$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 - \frac{1}{2}\,\pi \sum_{k=0}^{\infty} (-1)^k\,J_{1+2k}(5)$$

- $$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 - \frac{1}{4}\,\pi \sum_{k=0}^{\infty} \frac{(-1)^k\left(5 - \frac{\pi}{2}\right)^{2k}}{(2k)!}$$

$n!$ is the factorial function

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

Integral representations:

$$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 - \frac{5\pi}{4} \int_0^1 \cos(5\,t)\,dt$$

- $$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 + \frac{5\,i\sqrt{\pi}}{16} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-25/(4s)+s}}{s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

- $$\frac{\sin(5)\,\pi}{1^2\,(\sin(5)\,\pi)} + \frac{\sin(5)\,\pi}{2^2\,\sin\left(\frac{5\pi}{2} + \frac{2\pi}{2}\right)} = 1 + \frac{i\sqrt{\pi}}{8} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\left(\frac{5}{2}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)}\,ds \quad \text{for } 0 < \gamma < 1$$

$\Gamma(x)$ is the gamma function

3^-2(((sin5Pi))/(sin(5Pi/3+2Pi)))+4^-2(((sin5Pi))/(sin(5Pi/4+6Pi/2)))

Input:

$$\frac{\frac{\sin(5)\,\pi}{\sin\left(5\times\frac{\pi}{3} + 2\pi\right)}}{3^2} + \frac{\frac{\sin(5)\,\pi}{\sin\left(5\times\frac{\pi}{4} + 6\times\frac{\pi}{2}\right)}}{4^2}$$

Exact result:

$$\frac{\pi\sin(5)}{8\sqrt{2}} - \frac{2\pi\sin(5)}{9\sqrt{3}}$$

Decimal approximation:

0.120236006815747125666503745990367693844778481112933310261...

0.120236006815747125666….

Alternate forms:

$$\frac{1}{432}\left(27\sqrt{2}-32\sqrt{3}\right)\pi\sin(5)$$

- $$\left(\frac{1}{8\sqrt{2}}-\frac{2}{9\sqrt{3}}\right)\pi\sin(5)$$

$$\frac{1}{432}\left(27\sqrt{2}\,\pi\sin(5)-32\sqrt{3}\,\pi\sin(5)\right)$$

Alternative representations:

$$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{9\cos\left(-\frac{19\pi}{6}\right)}+\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{4^2\cos\left(-\frac{5\pi}{2}-\frac{5\pi}{4}\right)}$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\frac{\pi}{\frac{9\csc(5)}{\csc\left(\frac{11\pi}{3}\right)}}+\frac{\pi}{\frac{4^2\csc(5)}{\csc\left(3\pi+\frac{5\pi}{4}\right)}}$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{9\left(-\cos\left(\frac{25\pi}{6}\right)\right)}-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{4^2\left(-\cos\left(\frac{7\pi}{2}+\frac{5\pi}{4}\right)\right)}$$

$\csc(x)$ is the cosecant function

Series representations:

$$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\frac{1}{432}\left(27\sqrt{2}-32\sqrt{3}\right)\pi\sum_{k=0}^{\infty}\frac{(-1)^k\,5^{1+2k}}{(1+2k)!}$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\sum_{k=0}^{\infty}\frac{1}{216}(-1)^k\left(27\sqrt{2}-32\sqrt{3}\right)\pi J_{1+2k}(5)$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\frac{1}{432}\left(27\sqrt{2}-32\sqrt{3}\right)\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(5-\frac{\pi}{2}\right)^{2k}}{(2k)!}$$

$n!$ is the factorial function

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

Integral representations:

$$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=\int_0^1\frac{5}{432}\left(27\sqrt{2}-32\sqrt{3}\right)\pi\cos(5t)\,dt$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=-\frac{5i\left(27\sqrt{2}-32\sqrt{3}\right)\sqrt{\pi}}{1728}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-25/(4s)+s}}{s^{3/2}}\,ds \quad \text{for } \gamma>0$$

- $$\frac{\sin(5)\pi}{3^2\sin\left(\frac{5\pi}{3}+2\pi\right)}+\frac{\sin(5)\pi}{4^2\sin\left(\frac{5\pi}{4}+\frac{6\pi}{2}\right)}=-\frac{1}{864}i\left(27\sqrt{2}-32\sqrt{3}\right)\sqrt{\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(\frac{5}{2}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<1$$

$\Gamma(x)$ is the gamma function

49.348022005446793 (1.7531373641576592 + 0.12023600681574712566665)

Input interpretation:

49.348022005446793 (1.7531373641576592 + 0.12023600681574712566665)

Result:

92.4472703352136937373339594237960125345

Repeating decimal:

92.4472703352136937373339594237960125345

92.447270335213693….

We note that:

(((49.3480220054 (1.7531373641 + 0.1202360068))))^1/9

Input interpretation:

$\sqrt[9]{49.3480220054\,(1.7531373641+0.1202360068)}$

Result:

1.65360842733...

1.65360842733….

And:

18/10^3+(((49.3480220054 (1.7531373641 + 0.1202360068))))^1/9

Input interpretation:

$$\frac{18}{10^3} + \sqrt[9]{49.3480220054\,(1.7531373641 + 0.1202360068)}$$

Result:

1.67160842733...

1.67160842733….

We note that 1.67160842733... is a result practically equal to the value of the formula:

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

that is the holographic proton mass

$$r_2(n) = \delta_2(n) = 4\left\{\left(\frac{\sin n\pi}{\sin n\pi}\right) - \tfrac{1}{3}\left(\frac{\sin n\pi}{\sin \frac{1}{3}n\pi}\right) + \tfrac{1}{5}\left(\frac{\sin n\pi}{\sin \frac{1}{5}n\pi}\right) - \cdots\right\}$$
$$= 4\left\{\tfrac{1}{2}\left(\frac{\sin n\pi}{\cos \frac{1}{2}n\pi}\right) - \tfrac{1}{4}\left(\frac{\sin n\pi}{\cos \frac{1}{4}n\pi}\right) + \tfrac{1}{6}\left(\frac{\sin n\pi}{\cos \frac{1}{6}n\pi}\right) - \cdots\right\};$$

(14.5)

s = 8, n = 5

4((((1/2(sin5Pi)/((cos5Pi)/2) – 1/4(sin5Pi)/((cos5Pi)/4)+1/6(sin5Pi)/((cos5Pi)/6))))

Input:

$$4\left(\frac{1}{2} \times \frac{\sin(5)\,\pi}{\frac{1}{2}\,(\cos(5)\,\pi)} - \frac{1}{4} \times \frac{\sin(5)\,\pi}{\frac{1}{4}\,(\cos(5)\,\pi)} + \frac{1}{6} \times \frac{\sin(5)\,\pi}{\frac{1}{6}\,(\cos(5)\,\pi)}\right)$$

Exact result:

$4\tan(5)$

Decimal approximation:

-13.522060024986342547930823517789375634838276833141839508 7...

-13.5220600249863…

Property:

$4\tan(5)$ is a transcendental number

-

Alternate forms:

$$\frac{4\sin(10)}{1+\cos(10)}$$

-

$$\frac{4\,i\left(e^{-5i}-e^{5i}\right)}{e^{-5i}+e^{5i}}$$

-

$$\frac{4\,(1+2\cos(2)+2\cos(4))\tan(1)}{1-2\cos(2)+2\cos(4)}$$

Alternative representations:

$$4\left(\frac{\sin(5)\,\pi}{\frac{1}{2}(\cos(5)\,\pi)\,2}-\frac{\sin(5)\,\pi}{\frac{1}{4}(\cos(5)\,\pi)\,4}+\frac{\sin(5)\,\pi}{\frac{1}{6}(\cos(5)\,\pi)\,6}\right)=4\left(\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(-5\,i))}-\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(-5\,i))}+\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(-5\,i))}\right)$$

-

$$4\left(\frac{\sin(5)\,\pi}{\frac{1}{2}(\cos(5)\,\pi)\,2}-\frac{\sin(5)\,\pi}{\frac{1}{4}(\cos(5)\,\pi)\,4}+\frac{\sin(5)\,\pi}{\frac{1}{6}(\cos(5)\,\pi)\,6}\right)=4\left(-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(-5\,i))}+\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(-5\,i))}-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(-5\,i))}\right)$$

-

$$4\left(\frac{\sin(5)\,\pi}{\frac{1}{2}(\cos(5)\,\pi)\,2}-\frac{\sin(5)\,\pi}{\frac{1}{4}(\cos(5)\,\pi)\,4}+\frac{\sin(5)\,\pi}{\frac{1}{6}(\cos(5)\,\pi)\,6}\right)=4\left(\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(5\,i))}-\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(5\,i))}+\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(5\,i))}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations:

$$4\left(\frac{\sin(5)\,\pi}{\frac{1}{2}(\cos(5)\,\pi)\,2}-\frac{\sin(5)\,\pi}{\frac{1}{4}(\cos(5)\,\pi)\,4}+\frac{\sin(5)\,\pi}{\frac{1}{6}(\cos(5)\,\pi)\,6}\right)=4\,i+8\,i\sum_{k=1}^{\infty}(-1)^k\,q^{2k}\quad\text{for } q=e^{5i}$$

-

$$4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)=4i\sum_{k=-\infty}^{\infty}(-1)^k e^{10ik}\operatorname{sgn}(k)$$

- $$4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)=160\sum_{k=1}^{\infty}\frac{1}{-100+(1-2k)^2\pi^2}$$

sgn(x) is the sign of x

Integral representation:

$$4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)=4\int_0^5\sec^2(t)\,dt$$

sec(x) is the secant function

We have:

1+1/ ((((-4(((((1/2(sin5Pi)/((cos5Pi)/2) – 1/4(sin5Pi)/((cos5Pi)/4)+1/6(sin5Pi)/((cos5Pi)/6))))))))^1/6

Input:

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{1}{2}\times\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)}-\frac{1}{4}\times\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)}+\frac{1}{6}\times\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)}\right)}}$$

Exact result:

$$1+\frac{1}{\sqrt[3]{2}\sqrt[6]{-\tan(5)}}$$

Decimal approximation:

1.647877438942306115157004352575917521352272713123485853653...

$1.6478774389…. \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Property:

$1+\frac{1}{\sqrt[3]{2}\sqrt[6]{-\tan(5)}}$ is a transcendental number

- **Alternate forms:**

$$1+\frac{\sqrt[6]{-\cot(5)}}{\sqrt[3]{2}}$$

- $$1-\frac{(-\tan(5))^{5/6}\cot(5)}{\sqrt[3]{2}}$$
- $$1+\frac{\sqrt[6]{-(1+\cos(10))\csc(10)}}{\sqrt[3]{2}}$$

cot(x) is the cotangent function

csc(x) is the cosecant function

Alternative representations:

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}}=$$
$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(-5i))}-\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(-5i))}+\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(-5i))}\right)}}$$

- $$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}}=$$
$$1+\frac{1}{\sqrt[6]{-4\left(-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(-5i))}+\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(-5i))}-\frac{\pi\cos\left(5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(-5i))}\right)}}$$

- $$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}}=$$
$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{2}{2}(\pi\cosh(5i))}-\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{4}{4}(\pi\cosh(5i))}+\frac{\pi\cos\left(-5+\frac{\pi}{2}\right)}{\frac{6}{6}(\pi\cosh(5i))}\right)}}$$

cosh(x) is the hyperbolic cosine function

i is the imaginary unit

Series representations:

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}} = 1+\frac{1}{\sqrt[3]{2}\sqrt[6]{-i\left(1+2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)}} \quad \text{for } q=e^{5i}$$

•

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}} = 1+\frac{1}{\sqrt[3]{2}\sqrt[6]{-i\sum_{k=-\infty}^{\infty}(-1)^k e^{10ik}\operatorname{sgn}(k)}}$$

•

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}} = 1+\frac{1}{2^{5/6}\sqrt[6]{5}\sqrt[6]{-\sum_{k=1}^{\infty}\frac{1}{-100+(-1+2k)^2\pi^2}}}$$

sgn(x) is the sign of x

Integral representation:

$$1+\frac{1}{\sqrt[6]{-4\left(\frac{\sin(5)\pi}{\frac{1}{2}(\cos(5)\pi)2}-\frac{\sin(5)\pi}{\frac{1}{4}(\cos(5)\pi)4}+\frac{\sin(5)\pi}{\frac{1}{6}(\cos(5)\pi)6}\right)}} = -\frac{2^{2/3}\left(-\int_0^5\sec^2(t)\,dt\right)^{5/6}-2\int_0^5\sec^2(t)\,dt}{2\int_0^5\sec^2(t)\,dt}$$

sec(x) is the secant function

$$(1^{-s}-3^{-s}+5^{-s}-\cdots)\delta'_{2s}(n) = \frac{(\frac{1}{2}\pi)^s}{(s-1)!}(n+\tfrac{1}{4}s)^{s-1} \left\{1^{-s}\left(\frac{\sin(4n+s)\pi}{\sin(4n+s)\pi}\right) - 3^{-s}\left(\frac{\sin(4n+s)\pi}{\sin\frac{1}{3}(4n+s)\pi}\right) + 5^{-s}\left(\frac{\sin(4n+s)\pi}{\sin\frac{1}{5}(4n+s)\pi}\right) - \cdots\right\}$$

s = 3, n = 5 (14.8)

((((Pi/2)^3 * (5+3/4)^2))) / 2! * ((((1^-3(sin23Pi)/(sin23Pi) – 3^-3(sin23Pi)/((sin23Pi)/3)+5^-3(sin23Pi)/((sin23Pi)/5)))))

Input:

$$\frac{\left(\frac{\pi}{2}\right)^3\left(5+\frac{3}{4}\right)^2}{2!}\left(\frac{\frac{\sin(23)\pi}{\sin(23)\pi}}{1^3}-\frac{\frac{\sin(23)\pi}{\frac{1}{3}(\sin(23)\pi)}}{3^3}+\frac{\frac{\sin(23)\pi}{\frac{1}{5}(\sin(23)\pi)}}{5^3}\right)$$

$n!$ is the factorial function

Exact result:

$$\frac{110561\,\pi^3}{57600}$$

Decimal approximation:

59.515363820323410042028417884267315190160245297444850551 60...

59.51536382032341…

Property:

$\frac{110561\,\pi^3}{57600}$ is a transcendental number

Alternative representations:

$$\frac{\left(\frac{\sin(23)\pi}{1^3(\sin(23)\pi)}-\frac{\sin(23)\pi}{\frac{1}{3}\times 3^3(\sin(23)\pi)}+\frac{\sin(23)\pi}{\frac{1}{5}\times 5^3(\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3\left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{\left(\frac{\pi}{2}\right)^3\left(5+\frac{3}{4}\right)^2\left(-\frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\frac{27}{3}\left(\pi\cos\left(-23+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\pi\cos\left(-23+\frac{\pi}{2}\right)}+\frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^3\left(\pi\cos\left(-23+\frac{\pi}{2}\right)\right)}\right)}{(1)_2}$$

•

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2 \left(-\frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\frac{27}{3}\left(\pi\cos\left(-23+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\pi\cos\left(-23+\frac{\pi}{2}\right)} + \frac{\pi\cos\left(-23+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^3\left(\pi\cos\left(-23+\frac{\pi}{2}\right)\right)}\right)}{1!!\times 2!!}$$

-

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2 \left(\frac{-\pi\cos\left(23+\frac{\pi}{2}\right)}{-\pi\cos\left(23+\frac{\pi}{2}\right)} + \frac{\pi\cos\left(23+\frac{\pi}{2}\right)}{\frac{27}{3}\left(-\pi\cos\left(23+\frac{\pi}{2}\right)\right)} - \frac{\pi\cos\left(23+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^3\left(-\pi\cos\left(23+\frac{\pi}{2}\right)\right)}\right)}{1!!\times 2!!}$$

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

$n!!$ is the double factorial function

Series representations:

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = -\frac{110561 \sum_{k=1}^{\infty} \frac{(-1)^k}{(-1+2k)^3}}{1800}$$

-

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{110561}{900}\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^3$$

-

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{110561}{900}\left(\sum_{k=0}^{\infty} \frac{(-1)^{1+k}\, 1195^{-1-2k}\left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}\right)^3$$

Integral representations:

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{110561}{900}\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^3$$

-

$$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{110561 \left(\int_0^\infty \frac{1}{1+t^2}\, dt\right)^3}{7200}$$

- $$\frac{\left(\frac{\sin(23)\pi}{1^3 (\sin(23)\pi)} - \frac{\sin(23)\pi}{\frac{1}{3}\times 3^3 (\sin(23)\pi)} + \frac{\sin(23)\pi}{\frac{1}{5}\times 5^3 (\sin(23)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^3 \left(5+\frac{3}{4}\right)^2\right)}{2!} = \frac{110561 \left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^3}{7200}$$

$$(1^{-s} + 3^{-s} + 5^{-s} + \cdots)\delta'_{2s}(n) = \frac{(\frac{1}{2}\pi)^s}{(s-1)!}(n + \tfrac{1}{4}s)^{s-1}$$
$$\left\{1^{-s}\left(\frac{\sin(n+\frac{1}{4}s)\pi}{\sin(n+\frac{1}{4}s)\pi}\right) + 3^{-s}\left(\frac{\sin(n+\frac{1}{4}s)\pi}{\sin\frac{1}{3}(n+\frac{1}{4}s)\pi}\right)\right.$$
$$\left. +5^{-s}\left(\frac{\sin(n+\frac{1}{4}s)\pi}{\sin\frac{1}{5}(n+\frac{1}{4}s)\pi}\right) + \cdots\right\}$$

s = 8, n = 5 (14.6)

((((Pi/2)^8 * (5+8/4)^7))) / 7! * ((((1^-8(sin7Pi)/(sin7Pi) + 3^-8(sin7Pi)/((sin7Pi)/3)+5^-8(sin7Pi)/((sin7Pi)/5)))))

Input:

$$\frac{\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7}{7!}\left(\frac{\frac{\sin(7)\pi}{\sin(7)\pi}}{1^8} + \frac{\frac{\sin(7)\pi}{\frac{1}{3}(\sin(7)\pi)}}{3^8} + \frac{\frac{\sin(7)\pi}{\frac{1}{5}(\sin(7)\pi)}}{5^8}\right)$$

$n!$ is the factorial function

Exact result:

$$\frac{20110883235863\,\pi^8}{31492800000000}$$

Decimal approximation:

6059.249712444108642091454077093882218276566830849034501029...

6059.2497124441

Property:

$\frac{20\,110\,883\,235\,863\,\pi^8}{31\,492\,800\,000\,000}$ is a transcendental number

Alternative representations:

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7 \left(\frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{1^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)}\right)}{(1)_7}$$

-

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7 \left(\frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{1^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)}\right)}{6!!\times 7!!}$$

-

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7 \left(\frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{1^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)} + \frac{\pi\cos\left(-7+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^8 \left(\pi\cos\left(-7+\frac{\pi}{2}\right)\right)}\right)}{e^{\log\Gamma(8)}}$$

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

$n!!$ is the double factorial function

$\log\Gamma(x)$ is the logarithm of the gamma function

Series representations:

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{321\,774\,131\,773\,808 \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^8}{7\,688\,671\,875}$$

-

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{321\,774\,131\,773\,808 \left(\sum_{k=0}^{\infty} \frac{(-1)^k\, 1195^{-1-2k} \left(5^{1+2k} - 4\times 239^{1+2k}\right)}{1+2k}\right)^8}{7\,688\,671\,875}$$

- $$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{20\,110\,883\,235\,863 \left(\sum_{k=0}^{\infty} \left(-\frac{1}{4}\right)^k \left(\frac{1}{1+2k} + \frac{2}{1+4k} + \frac{1}{3+4k}\right)\right)^8}{31\,492\,800\,000\,000}$$

Integral representations:

$$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{321\,774\,131\,773\,808 \left(\int_0^1 \sqrt{1-t^2}\, dt\right)^8}{7\,688\,671\,875}$$

- $$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{20\,110\,883\,235\,863 \left(\int_0^{\infty} \frac{1}{1+t^2}\, dt\right)^8}{123\,018\,750\,000}$$

- $$\frac{\left(\frac{\sin(7)\pi}{1^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{3}\times 3^8 (\sin(7)\pi)} + \frac{\sin(7)\pi}{\frac{1}{5}\times 5^8 (\sin(7)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^8 \left(5+\frac{8}{4}\right)^7\right)}{7!} = \frac{20\,110\,883\,235\,863 \left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\, dt\right)^8}{123\,018\,750\,000}$$

$$(1^{-s}+3^{-s}+5^{-s}+\cdots)\delta'_{2s}(n)=\frac{(\frac{1}{2}\pi)^s}{(s-1)!}(n+\tfrac{1}{4}s)^{s-1}$$

$$\left\{1^{-s}\left(\frac{\sin(2n+\frac{1}{2}s)\pi}{\sin(2n+\frac{1}{2}s)\pi}\right)+3^{-s}\left(\frac{\sin(2n+\frac{1}{2}s)\pi}{\sin\frac{1}{3}(2n+\frac{1}{2}s)\pi}\right)\right.$$

$$\left.+5^{-s}\left(\frac{\sin(2n+\frac{1}{2}s)\pi}{\sin\frac{1}{5}(2n+\frac{1}{2}s)\pi}\right)+\cdots\right\}$$

s = 6, n = 5 (14.7)

((((Pi/2)^6 * (5+6/4)^5))) / 5! * ((((1^-6(sin13Pi)/(sin13Pi) + 3^-6(sin13Pi)/((sin13Pi)/3)+5^-6(sin13Pi)/((sin13Pi)/5)))))

Input:

$$\frac{\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5}{5!}\left(\frac{\frac{\sin(13)\pi}{\sin(13)\pi}}{1^6}+\frac{\frac{\sin(13)\pi}{\frac{1}{3}(\sin(13)\pi)}}{3^6}+\frac{\frac{\sin(13)\pi}{\frac{1}{5}(\sin(13)\pi)}}{5^6}\right)$$

$n!$ is the factorial function

Exact result:

$$\frac{283\,201\,136\,699\,\pi^6}{186\,624\,000\,000}$$

Decimal approximation:

1458.904066093649072048270395317733494198187941635852590407...

1458.90406609…

Property:

$\frac{283\,201\,136\,699\,\pi^6}{186\,624\,000\,000}$ is a transcendental number

Alternative representations:

$$\frac{\left(\frac{\sin(13)\pi}{1^6(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=$$

$$\frac{\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\left(\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{1^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}\right)}{(1)_5}$$

•

$$\frac{\left(\frac{\sin(13)\pi}{1^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6\,(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=\frac{\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\left(\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{1^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}\right)}{4!!\times 5!!}$$

- $$\frac{\left(\frac{\sin(13)\pi}{1^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6\,(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=\frac{\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\left(\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{3}\times 3^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{1^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}+\frac{\pi\cos\left(-13+\frac{\pi}{2}\right)}{\frac{1}{5}\times 5^6\left(\pi\cos\left(-13+\frac{\pi}{2}\right)\right)}\right)}{e^{\log\Gamma(6)}}$$

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

$n!!$ is the double factorial function

$\log\Gamma(x)$ is the logarithm of the gamma function

Series representations:

$$\frac{\left(\frac{\sin(13)\pi}{1^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6\,(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=\frac{1\,982\,407\,956\,893\sum_{k=1}^{\infty}\frac{1}{k^6}}{1\,382\,400\,000}$$

- $$\frac{\left(\frac{\sin(13)\pi}{1^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6\,(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=\frac{283\,201\,136\,699\sum_{k=0}^{\infty}\frac{1}{(1+2k)^6}}{194\,400\,000}$$

- $$\frac{\left(\frac{\sin(13)\pi}{1^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{3}\times 3^6\,(\sin(13)\pi)}+\frac{\sin(13)\pi}{\frac{1}{5}\times 5^6\,(\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6\left(5+\frac{6}{4}\right)^5\right)}{5!}=\frac{283\,201\,136\,699\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^6}{45\,562\,500}$$

Integral representations:

$$\frac{\left(\frac{\sin(13)\pi}{1^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{3}\times 3^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{5}\times 5^6 (\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6 \left(5+\frac{6}{4}\right)^5\right)}{5!} = \frac{283201136699\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^6}{45562500}$$

- $$\frac{\left(\frac{\sin(13)\pi}{1^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{3}\times 3^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{5}\times 5^6 (\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6 \left(5+\frac{6}{4}\right)^5\right)}{5!} = \frac{283201136699\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^6}{2916000000}$$

- $$\frac{\left(\frac{\sin(13)\pi}{1^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{3}\times 3^6 (\sin(13)\pi)} + \frac{\sin(13)\pi}{\frac{1}{5}\times 5^6 (\sin(13)\pi)}\right)\left(\left(\frac{\pi}{2}\right)^6 \left(5+\frac{6}{4}\right)^5\right)}{5!} = \frac{283201136699\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^6}{2916000000}$$

92.447270335213693

-13.5220600249863…

6059.2497124441

1458.90406609…

59.51536382032341…

-(843+29+4) + 0.64 * -(-6059.2497124441 *1/1458.90406609) * (92.447270335213693 *- 59.51536382032341 * -13.5220600249863)

Where 843, 29 and 4 are Lucas numbers

Input interpretation:

$$-(843+29+4)+0.64\times(-1)\left(-6059.2497124441\times\frac{1}{1458.90406609}\right)(92.447270335213693\times(-59.51536382032341)\times(-13.5220600249863))$$

Result:

196883.854938876052449617050846067968521192562874846193848 6...

196883.854938…

-(32^2+47+4)+196884*(47-2) / -(-6059.2497124441 *1458.90406609) * (92.447270335213693 *- 59.51536382032341 * -13.5220600249863)

Where 47 and 4 are Lucas numbers

Input interpretation:

$$-(32^2+47+4)+196\,884\left(-\frac{47-2}{-6059.2497124441\times 1458.90406609}\right.$$
$$\left.(92.447270335213693\times(-59.51536382032341)\times(-13.5220600249863))\right)$$

Result:

73491.437895028744913620490180348799243702854247299605757 59...

73491.437895…

We note that:

196883,854938 ÷ 73491,437895 = 2,6790039843

We have:

$$\left(\frac{1}{1-0.449329}+\frac{0.449329}{(1-0.449329^2)(1-0.449329^3)}\right)+\frac{0.449329^2}{(1-0.449329^3)(1-0.449329^4)(1-0.449329^5)} =$$

= $\chi(q)$ **= 2.6709253774829**

73491.437895 * 2.6709253774829 = 196290.1465;

521 + 76 – 3 = 594; where 521, 76 and 3 are Lucas numbers

196290.1465 + 594 = 196884.1465

Results concerning and linked to the finite Dirichlet's series absolutely convergent of Ramanujan above analyzed.

With regard the previous results, i.e.:

$$\left(\begin{array}{l} I_{21} \ll \int_{-\infty}^{+\infty} \exp\left(-\left(\frac{t}{H}\right)^2\right)\left|\sum_{\lambda\le P^{1-\varepsilon_2}} \frac{a(\lambda)}{\sqrt{\lambda}} B(\lambda)\lambda^{-i(T+t)}\right|^2 dt \ll \\ \ll H\left(\sum_{\lambda \le P^{1-\varepsilon_2}} \frac{|a(\lambda)|^2}{\lambda}\cdot\frac{4^r}{(\log P\lambda^{-1})^{2r}} + |W_2|\right) \ll \\ \ll H\left(\left(\frac{4}{\varepsilon_2\log T}\right)^{2r}\sum_{\lambda\le P}\frac{|a(\lambda)|^2}{\lambda} + |W_2|\right), \\ I_{21} \ll H\left\{\left(\frac{4}{\varepsilon_2 \log T}\right)^{2r}(\log T)(\log X)^{-2\beta} + \right. \\ \left. + (\varepsilon_2^{-2r}(\log T)^{-2r} + \varepsilon_2^{-r}h_1^r(\log T)^{-r})T^{-\varepsilon_1}\right\}. \end{array}\right) / 10^4 - 4096 - 2048 + 322$$

$$\approx A(r) \times \frac{1}{B(r)}\left(-\frac{1}{\phi(r)}\right) \times \frac{1}{e^{\Lambda(r)}}$$

73491.976505275 ≈ 73491.7883254...

We have that:

73491,976505275 × 2,67092537 = 196291,58453938293632675

196291,58453938293632675 + 594 = 196885,58453938293632675

73491,7883254 × 2,67092537 = 196291,081924980675398

196291,081924980675398 + 594 = 196885,081924980675398

We have the following data:

0.99951171875 = $f_{-}(r)$

1.00048828125 = $f_{+}(r)$

p = 6; c_1 = 1/4 = 0.25

sqrt(((2*2 – ((7/16)*0.25^2)))) = k = 1.9931523

From:

Supergravity Description of Non-BPS Branes
Philippe Brax, Gautam Mandal, and Yaron Oz - arXiv:hep-th/0005242v2 13 Jul 2000

Figure 2: The two-parameter space of solutions for $Q = 0$, as parameterised by M, c_1. Path II represents decay of the brane-antibrane configuration to flat space.

Now (26) implies $c_2 = \pm 1$. As remarked in Section 3 below, the physically relevant choice for $p > 3$ is $c_2 = 1$, while for $p < 3$ it is $c_2 = -1$ (for $p = 3$ the two choices are physically equivalent). To simplify the discussion we will present the formulae in the rest of this section for $p > 3$; it is straightforward to write down the formulae in the other cases.

The solution now reads

$$\begin{aligned} e^{2A} &= \left(\frac{f_-}{f_+}\right)^{\alpha} , \\ e^{2B} &= f_-^{\beta_-} f_+^{\beta_+} , \\ e^{\phi} &= (f_-/f_+)^{\gamma} , \\ e^{\Lambda} &= 0 , \end{aligned} \tag{27}$$

where

$$\begin{aligned} \alpha &= (7-p)\left(\frac{(3-p)c_1 + 4k}{32}\right) , \\ \beta_\pm &= \frac{2}{7-p} \mp \left(\frac{(p+1)((p-3)c_1 - 4k}{32}\right) , \\ \gamma &= \frac{1}{16}\left((7-p)(p+1)c_1 - 4(3-p)k\right) . \end{aligned} \tag{28}$$

These represent the most general 2-parameter (r_0, c_1) solution of Type II supergravity with no gauge field and SO(p,1) × SO(9-p) symmetry.

$$e^{2A} = \left(\frac{f_-}{f_+}\right)^{\alpha}$$

$$\alpha = (7-p)\left(\frac{(3-p)c_1+4k}{32}\right)$$

For p = 6

(7-6) (((((3-6)*1/4+4*1.9931523))/32))

Input interpretation:

$$(7-6)\left(\frac{1}{32}\left((3-6)\times\frac{1}{4}+4\times1.9931523\right)\right)$$

Result:

0.2257065375

0.2257065375 = α

For:

0.99951171875 = $f_-(r)$

1.00048828125 = $f_+(r)$

And:

$$e^{2A} = \left(\frac{f_-}{f_+}\right)^\alpha$$

We obtain:

(0.99951171875 / 1.00048828125)^0.2257065375

Input interpretation:

$$\left(\frac{0.99951171875}{1.00048828125}\right)^{0.2257065375}$$

Result:

0.999779607732...

0.999779607732…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

And:

$$e^{2B} = f_-^{\beta_-} f_+^{\beta_+}$$

$$\beta_\pm = \frac{2}{7-p} \mp \left(\frac{(p+1)((p-3)c_1 - 4k}{32}\right)$$

p = 6; c_1 = 1/4 = 0.25

k = 1.9931523

2+((((((((6+1)*((6-3)*0.25-4*1.9931523))/32))))))

Input interpretation:

$$2+\frac{1}{32}((6+1)((6-3)\times 0.25+4\times(-1.9931523)))$$

Result:

0.4200542375

0.4200542375

2-((((((((6+1)*((6-3)*0.25-4*1.9931523))/32))))))

Input interpretation:

$$2-\frac{1}{32}((6+1)((6-3)\times 0.25+4\times(-1.9931523)))$$

Result:

3.5799457625

3.5799457625

$$c^{2B} = f_-^{\beta_-} f_+^{\beta_+}$$

For:

0.99951171875 = $f_-(r)$

1.00048828125 = $f_+(r)$

(0.99951171875^3.5799457625 * 1.00048828125^0.4200542375)

Input interpretation:

$0.99951171875^{3.5799457625} \times 1.00048828125^{0.4200542375}$

Result:

0.9984577977...

0.9984577977….

$$e^{\phi} = (f_-/f_+)^{\gamma}$$

$$\gamma = \frac{1}{16}((7-p)(p+1)c_1 - 4(3-p)k)$$

1/16(((7-6)(6+1)*0.25-4(3-6)*1.9931523))

Input interpretation:

$\frac{1}{16}((7-6)(6+1)\times 0.25 + 4(3-6)\times(-1.9931523))$

Result:

1.604239225

1.604239225

For:

0.99951171875 = $f_-(r)$

1.00048828125 = $f_+(r)$

(0.99951171875/1.00048828125)^1.604239225

Input interpretation:

$$\left(\frac{0.99951171875}{1.00048828125}\right)^{1.604239225}$$

Result:

0.99843458655...

0.99843458655…

From:

"**Boundary States and Black p-branes**" Shinpei Kobayashi（RESCEU） in collaboration with Tsuguhiko Asakawa (RIKEN) So Matsuura (RIKEN)" 2004/05/19

dilaton (10-dim.)

$$\hat{\phi}^{(2)} = \frac{3-p}{2\sqrt{2}}\kappa T_p^2 G(r)^2$$

$$= \kappa \frac{(p-3)\Gamma\left(\frac{9-p}{2}\right)^2 T_p^2}{8\sqrt{2}\pi^{9-p}(7-p)^2}\frac{1}{r^{14-2p}}$$

$$= \kappa \frac{T_p^2}{2^{7-p}\sqrt{2}\pi^{\frac{9-p}{2}}(7-p)^2}\frac{p-3}{(7-p)(p-5)}\frac{\Gamma\left(\frac{9-p}{2}\right)^2\Gamma\left(\frac{p-3}{2}\right)}{\Gamma(8-p)}\int\frac{d^{9-p}k_i}{(2\pi)^{9-p}}\frac{e^{ik_i\cdot x}}{|k_i|^{p-5}}$$

(a)

From:

D–Brane Primer

Clifford V. Johnson

arXiv:hep-th/0007170v3 24 Aug 2000

This agrees with the recursion relation (183). The actual D–brane tension includes a factor of the string coupling from the action (179),

$$\tau_p = \frac{\sqrt{\pi}}{16\kappa}(4\pi^2\alpha')^{(11-p)/2} \quad (192)$$

$\kappa^{-1} = 2.4e+18$; $\kappa = 4.1666\ldots e-19$

α' that is 0.95686 $\approx 1\ (GeV)^{-2}$

(((sqrt(Pi)(4Pi^2*0.95686)^2.5))) / ((16*4.1666e-19))

Input interpretation:

$$\frac{\sqrt{\pi}\,(4\pi^2 \times 0.95686)^{2.5}}{16 \times 4.1666 \times 10^{-19}}$$

Result:

$2.33181... \times 10^{21}$

$2.33181\ldots * 10^{21} = T_P$

(((4.1666e-19*((((3(gamma 3/2)^2 * (2.33181e+21)^2))) / (((8sqrt(2)*Pi^3))))) * ((1 / 4096^2))

Input interpretation:

$$\left(4.1666 \times 10^{-19} \times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.33181 \times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right) \times \frac{1}{4096^2}$$

$\Gamma(x)$ is the gamma function

Result:

$9.06995... \times 10^{14}$

$9.06995\ldots * 10^{14}$

For r = 5,

Input interpretation:

we obtain:

(((4.1666e-19*((((3(gamma 3/2)^2 * (2.33181e+21)^2))) / (((8sqrt(2)*Pi^3))))) * ((1 / 5^2))

$$\left(4.1666 \times 10^{-19} \times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.33181 \times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right) \times \frac{1}{5^2}$$

$\Gamma(x)$ is the gamma function

Result:

$6.08674... \times 10^{20}$

$6.08674... * 10^{20}$

The mass of the dilaton is of the order of one hundred MeV, or about two hundred times (we take 181 = 199-18) the mass of an electron, which weighs about 10^{-27} grams (or 10^{-31} kg)

electron mass =$9,1093837015(28)\times10^{-31}$ kg

181 $*0.91093837015\times10^{-27}$ grams

Where 181 = 199-18 that are Lucas numbers

Input interpretation:

$181 \times 0.91093837015 \times 10^{-27}$ grams

Unit conversion:

$1.64879845 \times 10^{-28}$ kg (kilograms)

$1.64879845*10^{-28}$ kg

Now, we have that:

13*sqrt(1/1.64879845*10^-28)

Where 13 is a Fibonacci number

Input interpretation:

$$13\sqrt{\frac{1}{1.64879845 \times 10^{-28}}}$$

Result:

$1.01241732... \times 10^{15}$

$1.01241732... * 10^{15}$

With regard the Regge slope, we have that:

Table (1) summarizes the results of the fits for the mesons in the (J, M^2) plane. Tables (2) and (3) likewise summarize the results of the two types of fits for the (n, M^2) trajectories, that of the rotating string and of the WKB approximation.

The higher values of α' and a always correspond to higher values of the endpoint masses, and the ranges listed are those where χ^2 is within 10% of its optimal value.

Traj.	N	m	α'	a
π/π_2	$4+3$	$m_{u/d} = 110 - 250$	$0.788 - 0.852$	$a_0 = (-0.22) - (-0.00)$ $a_2 = (-0.00) - 0.26$
a_1	4	$m_{u/d} = 0 - 390$	$0.783 - 0.849$	$(-0.18) - 0.21$
h_1	4	$m_{u/d} = 0 - 235$	$0.833 - 0.850$	$(-0.14) - (-0.02)$
ω/ω_3	$5+3$	$m_{u/d} = 255 - 390$	$0.988 - 1.18$	$a_1 = 0.81 - 1.00$ $a_3 = 0.95 - 1.15$
ϕ	3	$m_s = 510 - 520$	$1.072 - 1.112$	1.00
Ψ	4	$m_c = 1380 - 1460$	$0.494 - 0.547$	$0.71 - 0.88$
Υ	6	$m_b = 4725 - 4740$	$0.455 - 0.471$	1.00
χ_b	3	$m_b = 4800$	0.499	0.58

Table 2. The results of the meson fits in the (n, M^2) plane. The ranges listed are those where χ^2 is within 10% of its optimal value. N is the number of data points in the trajectory.

Now, we take the following values: 0.988 and the result of the following Rogers-Ramanujan continued fraction:

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

We obtain:

(0.988 + 0.9991104684)/2 = 0,9935552342. Thence, in conclusion.

(((sqrt(Pi)(4Pi^2*0.9935552342)^2.5))) / ((16*4.1666e-19))

Input interpretation:

$$\frac{\sqrt{\pi}\,(4\pi^2 \times 0.9935552342)^{2.5}}{16 \times 4.1666 \times 10^{-19}}$$

Result:

$2.56184... \times 10^{21}$

2.56184…. * 10^{21}

(((4.1666e-19*((((3(gamma 3/2)^2 * (2.56184e+21)^2))) / (((8sqrt(2)*Pi^3))))) * ((1 / 4096^2))

Input interpretation:

$$\left(4.1666 \times 10^{-19} \times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.56184 \times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right) \times \frac{1}{4096^2}$$

$\Gamma(x)$ is the gamma function

Result:

$1.09477... \times 10^{15}$

1.09477... * 10^{15} $= \hat{\phi}^{(2)}$

Thence the following possible mathematical connection:

$$\left(13\sqrt{\frac{1}{1.64879845 \times 10^{-28}}}\right) = 1.01241732 \times 10^{15} \cong$$

$$\cong \left(\left(4.1666 \times 10^{-19} \times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.56184 \times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right) \times \frac{1}{4096^2}\right) = 1.09477 \times 10^{15}$$

1.01241732... * 10^{15} ≈ 1.09477... * 10^{15}

For r = 961*10^{22}

(((4.1666e-19*((((3(gamma 3/2)^2 * (2.33181e+21)^2))) / (((8sqrt(2)*Pi^3)))))*1/(961*10^22)^2)))

Where 961 = 987-21-5 that are Fibonacci numbers

Input interpretation:

$$\left(4.1666\times 10^{-19}\times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.33181\times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right)\times \frac{1}{(961\times 10^{22})^2}$$

$\Gamma(x)$ is the gamma function

Result:

$1.64770... \times 10^{-28}$

1.64770… * 10^{-28} result very near to the value of dilaton mass 1.64879845*10^{-28} kg

With r = 4096, after the following calculation, we obtain the following expression:

(199-2)*1/(((((4.1666e-19*((((3(gamma 3/2)^2 * (2.56184e+21)^2))) / (((8sqrt(2)*Pi^3))))) * ((1 / 4096^2))))))^2

Where 2 and 199 are Lucas numbers

Input interpretation:

$$(199-2)\times \frac{1}{\left(\left(4.1666\times 10^{-19}\times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.56184\times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right)\times \frac{1}{4096^2}\right)^2}$$

$\Gamma(x)$ is the gamma function

Result:

$1.64370... \times 10^{-28}$

1.64370…. * 10^{-28} result that is very near to the value of dilaton mass like those obtained previously.

Thence, we have this further mathematical connection:

$$\left(\left(4.1666\times 10^{-19}\times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.33181\times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right)\times \frac{1}{(961\times 10^{22})^2}\right) = 1.64770\times 10^{-28} \cong$$

$$\cong \left((199-2) \times \frac{1}{\left(\left(4.1666 \times 10^{-19} \times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.56184 \times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right) \times \frac{1}{4096^2}\right)^2} \right) = 1.64370 \times 10^{-28}$$

$1.64770\ldots * 10^{-28} \approx 1.64370\ldots * 10^{-28}$

Note that, the result of the hypothetical dilaton mass is a sub-multiple very near to ζ(2) = 1.64493...

From:

Excited D-branes and Supergravity Solutions
Tsuguhiko Asakawa, Shinpei Kobayashi and So Matsuura
hep-th/0506221 - June 2005

The boundary state corresponding to the NSNS-sector of *N* D*p*-branes in the limit of u → ∞

Now, we have:

$1.7860228654147\ldots*10^{38} = N_p$ $\quad 2.33181\ldots * 10^{21} = T_P$

α' that is $0.9935552342 \approx 1\ (\text{GeV})^{-2}$ $\quad$ r = 4096; n = 843 (Lucas number)

$y = 4\pi\alpha' u^2$ is a dimensionless parameter $\quad 0 < u < \infty \quad u = 9$

(4*Pi*0.9935552342*9^2)

Input interpretation:

$4\pi \times 0.9935552342 \times 9^2$

Result:

1011.316047...

1011.316047…

Now, we have:

$$|\,Bp';u\,\rangle_{\rm NS} = N\exp\left[\int d\hat{\sigma}\left(-\frac{1}{4u^2}{\rm P}_i D{\rm P}_i\right)\right]|\,Bp\,\rangle_{\rm NS}\,, \qquad (A.7)$$

where we determine the constant factor of (A.1) so that $|\,Bp';u\,\rangle_{\rm NS}$ becomes the boundary state corresponding to the NSNS-sector of N Dp-branes in the limit of $u \to \infty$.

Using the explicit expression of ${\rm P}_i(\hat{\sigma})$ by the string oscillators and the zeta-function regularization,

$$\prod_{m=1}^{\infty}\frac{b}{m+a} = \frac{\Gamma(a+1)}{\sqrt{2\pi b}}, \qquad \prod_{r=1/2}^{\infty}\frac{b}{r+a} = \frac{\Gamma(a+1/2)}{\sqrt{2\pi}}, \qquad (A.8)$$

we obtain

$$|\,Bp';u\,\rangle_{\rm NS} = N\frac{T_p}{2}\left[\frac{4^y y^{1/2}\Gamma^2(y)}{\sqrt{4\pi}\Gamma(2y)}\right]^{9-p}\exp\left[-\sum_{n=1}^{\infty}\frac{1}{n}\alpha_{-n}^M S_{MN}^{(n)}\tilde{\alpha}_{-n}^N + i\sum_{r=1/2}^{\infty} b_{-r}^M S_{MN}^{(r)}\tilde{b}_{-r}^N\right]\times$$
$$\times\int\frac{\prod_{i=p+1}^{9}dp_i}{(2\pi)^{9-p}}\exp\left(-\frac{p_i^2}{8\pi u^2}\right)|\,p_\mu = 0,\,p_i\,\rangle_{\rm NS}\,, \qquad (y = 4\pi\alpha' u^2) \qquad (A.9)$$

with

$$S_{MN}^{(n)} = \left(\eta_{\mu\nu},\,-\frac{y-n}{y+n}\delta_{ij}\right), \quad S_{MN}^{(r)} = \left(\eta_{\mu\nu},\,-\frac{y-r}{y+r}\delta_{ij}\right). \qquad (A.10)$$

-(1011.316047-843)/(1011.316047+843) = $\boldsymbol{S_{MN}^{(n)}}$

Input interpretation:

$$-\frac{1011.316047 - 843}{1011.316047 + 843}$$

Result:

−0.09076988104175102357834473294616319523227423162131541430...

-0.090769881041751….

-(1011.316047-4096)/(1011.316047+4096) = $\boldsymbol{S_{MN}^{(r)}}$

Input interpretation:

$$-\frac{1011.316047 - 4096}{1011.316047 + 4096}$$

Result:

0.603973579197614124074589504251214003635753462115832911172...

0.6039735791976…

We have:

1.7860228654147…*10^{38} = N_p 2.33181… * 10^{21} = T_P

α' that is 0.9935552342 ≈ 1 $(GeV)^{-2}$ r = 4096; n = 843 (Lucas number)

y = 1011.316047; u = 9; p_i = 8

$$|\,Bp';u\,\rangle_{NS} = N\frac{T_p}{2}\left[\frac{4^y y^{1/2}\Gamma^2(y)}{\sqrt{4\pi}\Gamma(2y)}\right]^{9-p} \exp\left[-\sum_{n=1}^{\infty}\frac{1}{n}\alpha_{-n}^M S_{MN}^{(n)}\tilde{\alpha}_{-n}^N + i\sum_{r=1/2}^{\infty} b_{-r}^M S_{MN}^{(r)}\tilde{b}_{-r}^N\right] \times$$

$$\times \int \frac{\prod_{i=p+1}^{9} dp_i}{(2\pi)^{9-p}} \exp\left(-\frac{p_i^2}{8\pi u^2}\right)|\,p_\mu = 0,\, p_i\,\rangle_{NS}\,, \qquad (y = 4\pi\alpha' u^2) \qquad \text{(A.9)}$$

with

$$S_{MN}^{(n)} = \left(\eta_{\mu\nu},\, -\frac{y-n}{y+n}\delta_{ij}\right), \quad S_{MN}^{(r)} = \left(\eta_{\mu\nu},\, -\frac{y-r}{y+r}\delta_{ij}\right). \qquad \text{(A.10)}$$

Now:

$$N\frac{T_p}{2}\left[\frac{4^y y^{1/2}\Gamma^2(y)}{\sqrt{4\pi}\Gamma(2y)}\right]^{9-p}$$

(1.78602286e+38 * 2.33181e+21)/2 * ((((((4^1011.316047*1011.316047^(1/2)* gamma^2(1011.316047))) / (((sqrt(4Pi)*gamma (2*1011.316047))))))^3

Input interpretation:

$$\left(\frac{1}{2}\left(1.78602286\times 10^{38}\times 2.33181\times 10^{21}\right)\right)\left(\frac{4^{1011.316047}\sqrt{1011.316047}\;\Gamma(1011.316047)^2}{\sqrt{4\pi}\;\Gamma(2\times 1011.316047)}\right)^3$$

Γ(x) is the gamma function

Result:

2.08311... × 10^{59}

2.08311…*10^59

Now, we have:

where T_p is the tension for a single Dp-brane, $\mu = 0, 1, \cdots, p$ are the directions longitudinal to the worldvolume, $i = p+1, \cdots, 9$ are the directions transverse to the Dp-branes, and α^M_{-n} and b^M_{-r} ($\tilde{\alpha}^M_{-n}$ and $\tilde{b}^M_{-r}$) are the creation operators of the modes of the left-moving (right-moving) worldsheet bosons and fermions, respectively. $S_{MN} = \mathrm{diag}\,(\eta_{\mu\nu}, -\delta_{ij})$ gives Neumann (Dirichlet) boundary conditions on the string worldsheet in $\mu(i)$ directions, respectively. Here the number

Thence:

-0.090769881041751….   0.6039735791976…

We take: 26 left-movers and 10 right-movers (see Polchinski book Vol. II pag.73)

$$\exp\left[-\sum_{n=1}^{\infty}\frac{1}{n}\alpha^M_{-n}S^{(n)}_{MN}\tilde{\alpha}^N_{-n} + i\sum_{r=1/2}^{\infty} b^M_{-r}S^{(r)}_{MN}\tilde{b}^N_{-r}\right]$$

exp(-1/843*26*-0.090769881041751*26 + i * 10*0.6039735791976*10)

Input interpretation:

$$\exp\left(-\frac{1}{843}\times 26\times(-0.090769881041751)\times 26 + i\times 10\times 0.6039735791976\times 10\right)$$

i is the imaginary unit

Result:

$-0.81765160391\ldots - 0.69867869758\ldots\, i$

Polar coordinates:

$r = 1.07550270471$ (radius), $\theta = -139.486297457°$ (angle)

1.07550270471

And:

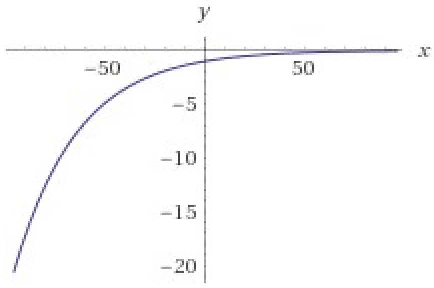
$$\int \frac{\prod_{i=p+1}^{9} dp_i}{(2\pi)^{9-p}} \exp\left(-\frac{p_i^2}{8\pi u^2}\right) |\, p_\mu = 0,\, p_i\,\rangle_{\rm NS}$$

integrate [8/(2Pi)^3*exp(-64/(81*8*Pi)]x

Indefinite integral:

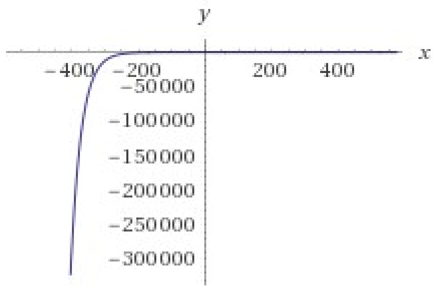
$$\int \frac{8 \exp\left(-\frac{64 x}{81 \times 8 \pi}\right)}{(2 \pi)^3} dx \approx \text{constant} + -1.02588 \times 2.71828^{-0.031438 x}$$

Plots of the integral:



(x from -95.4 to 95.4)

•



(x from -572.6 to 572.6)

•

Alternate form assuming x is real:

$$-\frac{81}{8 \pi^2 \left(e^{x/\pi}\right)^{8/81}} + \text{constant}$$

•

Series expansion of the integral at x = 0:

$$-\frac{81}{8 \pi^2} + \frac{x}{\pi^3} - \frac{4 x^2}{81 \pi^4} + \frac{32 x^3}{19683 \pi^5} - \frac{64 x^4}{1594323 \pi^6} + O(x^5)$$

(Taylor series)

•

Definite integral:

- More digits

$$\int_0^\infty \frac{e^{-(8 x)/(81 \pi)}}{\pi^3} dx = \frac{81}{8 \pi^2} \approx 1.02588$$

1.02588

-

Definite integral over a half-period:

- More digits

$$\int_0^{-\frac{81 i \pi^2}{8}} \frac{e^{-(8x)/(81\pi)}}{\pi^3} \, dx = \frac{81}{4\pi^2} \approx 2.05175$$

Thence:

(2.08311*10^59 * 1.07550270471 * 1.02588)

Input interpretation:

$2.08311 \times 10^{59} \times 1.07550270471 \times 1.02588$

Result:

229 837 174 377 516 273 682 800 000 000 000 000 000 000 000 000 000 000 000 000

Scientific notation:

$2.298371743775162736828 \times 10^{59}$

$2.2983717437\ldots*10^{59}$

And:

Γ^μ. In the last line $\mathbf{x}^\mu$ is identified with the superfield $\mathbf{X}^\mu$ on the string worldsheet. Then the state corresponding to this solution is

$$|\,Bp';v\,\rangle_{\rm NS} \equiv \int [d\mathbf{X}^\mu] \exp\left\{\int d\widehat{\sigma}\left(-i\mathbf{X}^\mu \mathbf{P}_\mu - \frac{1}{4v^2} D\mathbf{X}^\mu D^2 \mathbf{X}^\mu\right)\right\} |\,\mathbf{X}^M = 0\,\rangle_{\rm NS}$$
$$= \int [d\mathbf{X}^\mu] \exp\left\{\int d\widehat{\sigma}\left(-\frac{1}{4v^2} D\mathbf{X}^\mu D^2 \mathbf{X}^\mu\right)\right\} |\,\mathbf{X}^\mu, \mathbf{X}^i = 0\,\rangle_{\rm NS}\,, \qquad \text{(A.18)}$$

where the measure has been fixed so that this state expresses the boundary state of N Dp-branes in the $v \to \infty$ limit. This expression can again be evaluated using the zeta-function regularization as

$$|\,Bp';v\,\rangle_{\rm NS} = \frac{NT_p}{2}\left(\frac{4^y y^{1/2}\Gamma^2(y)}{\sqrt{4\pi}\,\Gamma(2y)}\right)^{p+1}$$
$$\times \exp\left[-\sum_{n=1}^{\infty} \frac{1}{n} \alpha^M_{-n} S^{(n)}_{MN} \widetilde{\alpha}^N_{-n} + i \sum_{r=1/2}^{\infty} b^M_{-r} S^{(r)}_{MN} \widetilde{b}^N_{-r}\right] |\,p_\mu = 0, x^i = 0\,\rangle_{\rm NS}\,, \quad \text{(A.19)}$$

where $y = v^2/\pi\alpha'$ and

$$S^{(n)}_{MN} = \left(\frac{y-n}{y+n}\eta_{\mu\nu}, -\delta_{ij}\right), \qquad S^{(r)}_{MN} = \left(\frac{y-r}{y+r}\eta_{\mu\nu}, -\delta_{ij}\right), \qquad \text{(A.20)}$$

In the limit of $y \to \infty$,

$$\frac{4^y y^{1/2}\Gamma^2(y)}{\sqrt{4\pi}\,\Gamma(2y)} \to 1 \qquad \text{(A.21)}$$

For $y \to \infty$, we obtain:

(1.78602286e+38 * 2.33181e+21)/2

Input interpretation:

$\frac{1}{2}(1.78602286 \times 10^{38} \times 2.33181 \times 10^{21})$

Result:

208 233 298 258 830 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000

Scientific notation:

$2.0823329825883 \times 10^{59}$

$2.0823329825883 * 10^{59}$

We have:

$$|\,Bp';u\,\rangle_{\rm NS} = N \exp\left[\int d\widehat{\sigma}\left(-\frac{1}{4u^2}\mathbf{P}_i D\mathbf{P}_i\right)\right] |\,Bp\,\rangle_{\rm NS}$$

$= 2.2983717437\ldots * 10^{59}$

$$| Bp'; v \rangle_{NS} = \int [d\mathbf{X}^\mu] \exp\left\{ \int d\hat{\sigma} \left(-\frac{1}{4v^2} D\mathbf{X}^\mu D^2 \mathbf{X}^\mu \right) \right\} | \mathbf{X}^\mu, \mathbf{X}^i = 0 \rangle_{NS}$$

$= 2.0823329825883 * 10^{59}$

We have the following expressions:

(2.2983717437 *10^59) / (2.0823329825883 * 10^59)

Input interpretation:

$$\frac{2.2983717437 \times 10^{59}}{2.0823329825883 \times 10^{59}}$$

Result:

1.103748422043033655081434665916266021109135320693631356426...

1.103748422043…. result that is very near to the sum of the following two Ramanujan continued fraction:

0.5683000031 + 0.5269391135 = 1.0952391166

$$4\int_0^{\infty}\frac{tdt}{e^{\sqrt{5}t}\cosh t}=\cfrac{1}{1+\cfrac{1^2}{1+\cfrac{1^2}{1+\cfrac{2^2}{1+\cfrac{2^2}{1+\cfrac{3^2}{1+\cfrac{3^2}{1+\ldots}}}}}}}\approx 0.5683000031$$

$$2\int_0^{\infty}\frac{t^2dt}{e^{\sqrt{3}t}\sinh t}=\cfrac{1}{1+\cfrac{1^3}{1+\cfrac{1^3}{3+\cfrac{2^3}{1+\cfrac{2^3}{5+\cfrac{3^3}{1+\cfrac{3^3}{7+\ldots}}}}}}}\approx 0.5269391135$$

(10178)+2*((((2.2983717437 *10^59) + (2.0823329825883 * 10^59))))^1/12

We have 10178 = 6765+2584+610+199+18+2, where 6765, 2584, 610 are Fibonacci numbers, while 199, 18 and 2 are Lucas numbers

Input interpretation:

$$10178 + 2\sqrt[12]{2.2983717437\times 10^{59} + 2.0823329825883\times 10^{59}}$$

Result:

196884.165976...

196884.165976.... … result practically equal to the value of the following partition function:

$$Z_{24}(\tau) = j(\tau) - 744$$
$$= q^{-1} + 196884\,q + 21493760\,q^2 + 864299970\,q^3 + 20245856256\,q^4 + \ldots$$

From:

$$| Bp'; u \rangle_{NS} = N \exp \left[\int d\hat{\sigma} \left(-\frac{1}{4u^2} \mathbf{P}_i D \mathbf{P}_i \right) \right] | Bp \rangle_{NS}$$

= 2.2983717437…*10^59

$$| Bp'; v \rangle_{NS} = \int [d\mathbf{X}^\mu] \exp \left\{ \int d\hat{\sigma} \left(-\frac{1}{4v^2} D\mathbf{X}^\mu D^2 \mathbf{X}^\mu \right) \right\} | \mathbf{X}^\mu, \mathbf{X}^i = 0 \rangle_{NS}$$

= 2.0823329825883 * 10^59

-(4181 - 233 - 21)+2*((((2.2983717437 *10^59) + (2.0823329825883 * 10^59))))^1/13

Where 4181, 233 and 21 are Fibonacci numbers

Input interpretation:

$$-(4181 - 233 - 21) + 2 \sqrt[13]{2.2983717437 \times 10^{59} + 2.0823329825883 \times 10^{59}}$$

Result:

73490.8437525...

73490.8437525... result very near to the following ratio (A. Nardelli) concerning the general asymptotically flat solution of the equations of motion of the p-brane:

$$A(r) \times \frac{1}{B(r)} \left(-\frac{1}{\phi(r)} \right) \times \frac{1}{e^{\Lambda(r)}}$$

$$-0.000029211892 \times \frac{1}{0.0003644621} \left(-\frac{1}{0.0005946833} \right) \times \frac{1}{0.00183393}$$

= 73491.78832548118710549159572042220548025195726563413398700... =

= 73491.7883254...

We note that:

((((2.2983717437 *10^59) + (2.0823329825883 * 10^59))))^1/276

Where 276 = 233 + 47 – 4 (233 is a Fibonacci number, 47 and 4 are Lucas numbers)

Input interpretation:

$$\sqrt[276]{2.2983717437 \times 10^{59} + 2.0823329825883 \times 10^{59}}$$

Result:

1.6447221856470...

1.6447221856470.... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934 \ldots$

In conclusion, we have also:

ln((((2.2983717437 *10^59) + (2.0823329825883 * 10^59))))

Input interpretation:

$\log(2.2983717437 \times 10^{59} + 2.0823329825883 \times 10^{59})$

$\log(x)$ is the natural logarithm

Result:

137.3297300945...

137.32973…. result very near to the rest mass of Pion mesons 139.570 and 134.976 and practically equal to the average is 137.273

Alternative representations:

$$\log(2.29837174370000 \times 10^{59} + 2.08233298258830000 \times 10^{59}) = \log_e(4.38070472628830 \times 10^{59})$$

•

$$\log(2.29837174370000 \times 10^{59} + 2.08233298258830000 \times 10^{59}) = \log(a) \log_a(4.38070472628830 \times 10^{59})$$

•

$$\log(2.29837174370000 \times 10^{59} + 2.08233298258830000 \times 10^{59}) = -\text{Li}_1(1 - 4.38070472628830 \times 10^{59})$$

$\log_b(x)$ is the base− b logarithm

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

•

Series representations:

$$\log(2.29837174370000\times 10^{59}+2.08233298258830000\times 10^{59}) = \log(4.38070472628830\times 10^{59})-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-137.329730094507464\,k}}{k}$$

- $$\log(2.29837174370000\times 10^{59}+2.08233298258830000\times 10^{59}) = 2\,i\,\pi\left\lfloor\frac{\arg(4.38070472628830\times 10^{59}-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(4.38070472628830\times 10^{59}-x)^k\,x^{-k}}{k}\quad\text{for } x<0$$

- $$\log(2.29837174370000\times 10^{59}+2.08233298258830000\times 10^{59}) = \left\lfloor\frac{\arg(4.38070472628830\times 10^{59}-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(4.38070472628830\times 10^{59}-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(4.38070472628830\times 10^{59}-z_0)^k\,z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

- ## Integral representations:

$$\log(2.29837174370000\times 10^{59}+2.08233298258830000\times 10^{59}) = \int_{1}^{4.38070472628830\times 10^{59}}\frac{1}{t}\,dt$$

- $$\log(2.29837174370000\times 10^{59}+2.08233298258830000\times 10^{59}) = \frac{1}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-137.329730094507464\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

From:

"**Boundary States and Black p-branes**" Shinpei Kobayashi（RESCEU）in collaboration with Tsuguhiko Asakawa (RIKEN) So Matsuura (RIKEN)" 2004/05/19

$$\hat{\phi}(r) = -\frac{p-3}{2\sqrt{2}} T_p G(r) + \frac{p-3}{2\sqrt{2}} \kappa T_p^2 G(r)^2 + \cdots$$

From the following data:

$1.09477... * 10^{15} = \hat{\phi}^{(2)}$

$\Omega_2 = 1$, is a gauge transformation parameter, $\kappa = 4.1666…e-19$

$1.7860228654147…*10^{38} = \boldsymbol{N_p}$ $2.33181… * 10^{21} = T_P$

α' that is 0.9935552342 ≈ 1 $(GeV)^{-2}$ r = 4096; n = 843 (Lucas number)

y = 1011.316047; u = 9; $p_i = 8$, p = 6

$$e^{-2\phi} = e^{-2\sqrt{2}\kappa\hat{\phi}} = H(r)^{-\sqrt{2}\kappa\cdot\frac{p-3}{2}},$$
$$H(r) = 1 + \frac{2\kappa T_p}{(7-p)\Omega_{8-p} r^{7-p}} \equiv 1 + 2\kappa T_p G(r)$$

1+(2*4.1666e-19*2.33181e+21)/(4096)

Input interpretation:

$$1 + \frac{2 \times 4.1666 \times 10^{-19} \times 2.33181 \times 10^{21}}{4096}$$

Result:

1.47440036845703125

1.4744003684.... = ***H(r)***

(1.4744003684 – 1) / (2*4.1666e-19*2.33181e+21)

Input interpretation:

$$\frac{1.4744003684 - 1}{2 \times 4.1666 \times 10^{-19} \times 2.33181 \times 10^{21}}$$

Result:

0.000244140624970650012214751510489926198205227608985575384...

- **Repeating decimal:**

0.000244140624970650012214751510489926198205227608985575384...

(period 2041800)

0.00024414062497065.... = ***G(r)***

We observe that:

1/ ((((1.4744003684 – 1) / (2*4.1666e-19*2.33181e+21))))

Input interpretation:

$$\frac{1}{\frac{1.4744003684-1}{2 \times 4.1666 \times 10^{-19} \times 2.33181 \times 10^{21}}}$$

Result:

4096.000000492411084729671976367714810568852838184263096369...

4096.0000004924…. result practically equal to the value of r, that is 4096.

Note that √4096 = 64 = 8^2, where 8 is a Fibonacci numbers and are the "modes" corresponding to the physical vibrations of a superstring.

Thence:

G(r) = 1 / r = **1 / 4096**

Thence:

$$\hat{\phi}(r) = -\frac{p-3}{2\sqrt{2}} T_p G(r) + \frac{p-3}{2\sqrt{2}} \kappa T_p^2 G(r)^2 + \cdots$$

-(((((3/(2*sqrt(2)))*(2.33181e+21)*((1/(4096)))))+(((((3/(2*sqrt(2)))* (4.1666e-19)*(2.33181e+21)^2)*((1/(4096)))^2)))

Input interpretation:

$$-\left(\frac{3}{2\sqrt{2}} \times 2.33181 \times 10^{21} \times \frac{1}{4096} + \left(\frac{3}{2\sqrt{2}} \times 4.1666 \times 10^{-19} (2.33181 \times 10^{21})^2\right)\left(\frac{1}{4096}\right)^2\right)$$

Result:

$$-7.47050... \times 10^{17}$$

-7.47050…*10^{17}

We observe that from the result of this expression, we can to obtain:

(3571+233+11)+1/4[(((-((((-(3/(2*sqrt(2)))*(2.33181e+21)*((1/(4096)))))+(((((3/(2*sqrt(2)))* (4.1666e-19)*(2.33181e+21)^2)*((1/(4096)))^2))))))))]^1/3

Where 11 and 3571 are Lucas numbers and 233 is a Fibonacci number

Input interpretation:

$$(3571 + 233 + 11) + \frac{1}{4}\left(-\left(-\frac{3}{2\sqrt{2}}\left(2.33181 \times 10^{21} \times \frac{1}{4096}\right) + \left(\frac{3}{2\sqrt{2}} \times 4.1666 \times 10^{-19} (2.33181 \times 10^{21})^2\right)\left(\frac{1}{4096}\right)^2\right)\right)^{\wedge}(1/3)$$

Result:

196884.3612355790262930818210234562962529826220937890171828...

196884.36…

And:

(2207+843+233)+1/11[(((-((((-(3/(2*sqrt(2)))*(2.33181e+21)*((1/(4096)))))+(((((3/(2*sqrt(2)))* (4.1666e-19)*(2.33181e+21)^2)*((1/(4096)))^2))))))))]^1/3

Where 2207 and 843 are Lucas numbers and 233 is a Fibonacci number

Input interpretation:

$$(2207+843+233)+\frac{1}{11}\left(-\left(-\frac{3}{2\sqrt{2}}\left(2.33181\times 10^{21}\times\frac{1}{4096}\right)+\left(\frac{3}{2\sqrt{2}}\times 4.1666\times 10^{-19}\left(2.33181\times 10^{21}\right)^2\right)\left(\frac{1}{4096}\right)^2\right)\right)\text{^}(1/3)$$

Result:

73490.04044930146410657520764489319863744822621592327897559...

73490.0404….

With regard the inverse of this expression, we obtain:

1/ ((((((((-(((((3/(2*sqrt(2)))*(2.33181e+21)*((1/(4096)))))+(((((3/(2*sqrt(2)))* (4.1666e-19)*(2.33181e+21)^2)*((1/(4096)))^2))))))))))

Input interpretation:

$$-\frac{1}{\frac{3}{2\sqrt{2}}\times 2.33181\times 10^{21}\times\frac{1}{4096}+\left(\frac{3}{2\sqrt{2}}\times 4.1666\times 10^{-19}\left(2.33181\times 10^{21}\right)^2\right)\left(\frac{1}{4096}\right)^2}$$

Result:

$-1.33860...\times 10^{-18}$

$-1.33860...*10^{-18}$

Result:

$-1.338599166652011286129329335178616807048245060521807...\times 10^{-18}$

$-1.338599166652....*10^{-18}$

And:

1/(1.897512108+1.8236681145196)* (-1.338599166652011 × 10^-18)^2 * 1729 * 196884

Where 1.897512108 and 1.8236681145196 are two results of Ramanujan mock theta functions, 1729 is the Hardy-Ramanujan number and 196884 is a fundamental number of the following ***j*-invariant**

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

(In mathematics, Felix Klein's ***j*-invariant** or ***j* function**, regarded as a function of a complex variable τ, is a modular function of weight zero for SL(2, **Z**) defined on the upper half plane of complex numbers. Several remarkable properties of j have to do with its q expansion (Fourier series expansion), written as a Laurent series in terms of $q = e^{2\pi i\tau}$ (the square of the nome), which begins:

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

Note that j has a simple pole at the cusp, so its q-expansion has no terms below q^{-1}.

All the Fourier coefficients are integers, which results in several almost integers, notably Ramanujan's constant:

$$e^{\pi\sqrt{163}} \approx 640320^3 + 744.$$

The asymptotic formula for the coefficient of q^n is given by

$$\frac{e^{4\pi\sqrt{n}}}{\sqrt{2}\,n^{3/4}},$$

as can be proved by the Hardy–Littlewood circle method)

Input interpretation:

$$\frac{1}{1.897512108 + 1.8236681145196}(-1.338599166652011\times10^{-18})^2\times1729\times196\,884$$

-

Result:

$$1.6391768575611497127000918854364778314913891635633535...\times10^{-28}$$

$1.6391768575611497...*10^{-28}$ result very near to the value of dilaton mass $1.64879845*10^{-28}$ kg

We now, analyze this other equation:

$$= \kappa\frac{T_p^2}{2^{7-p}\sqrt{2}\pi^{\frac{9-p}{2}}}\frac{p-3}{(7-p)(p-5)}\frac{\Gamma\left(\frac{9-p}{2}\right)^2\Gamma\left(\frac{p-3}{2}\right)}{\Gamma(8-p)}\int\frac{d^{9-p}k_i}{(2\pi)^{9-p}}\frac{e^{ik_i\cdot x}}{|k_i|^{p-5}}$$

For r = 5, from:

$$\kappa \frac{(p-3)\Gamma\left(\frac{9-p}{2}\right)^2 T_p^2}{8\sqrt{2}\pi^{9-p}(7-p)^2} \frac{1}{r^{14-2p}}$$

we obtain:

(((4.1666e-19*((((3(gamma 3/2)^2 * (2.33181e+21)^2))) / (((8sqrt(2)*Pi^3))))) * ((1 / 5^2))

$$\left(4.1666\times 10^{-19}\times \frac{3\,\Gamma\left(\frac{3}{2}\right)^2 (2.33181\times 10^{21})^2}{8\sqrt{2}\,\pi^3}\right)\times \frac{1}{5^2}$$

$6.08674... \times 10^{20}$

6.08674... * 10^{20}

For:

κ = 4.1666…e-19; k = 1.9931523; 2.33181… * 10^{21} = T_P ; r = 4096; n = 843 (Lucas number); y = 1011.316047; u = 9; p_i = 8, p = 6; x = 0.9502566373,

we obtain:

(((4.1666e-19*(2.33181e+21)^2*3*gamma (3/2)^2 * gamma (3/2)))) / ((((2sqrt(2)*Pi^1.5 * gamma (2))))

Input interpretation:

$$\frac{4.1666\times 10^{-19}\,(2.33181\times 10^{21})^2\times 3\,\Gamma\left(\frac{3}{2}\right)^2\,\Gamma\left(\frac{3}{2}\right)}{2\sqrt{2}\,\pi^{1.5}\,\Gamma(2)}$$

$\Gamma(x)$ is the gamma function

Result:

$3.0036851307320539608604160394482007026163460017212449... \times 10^{23}$

3.003685130732…*10^{23}

3.003685130732 × 10^23 * integrate [(1.9931523)/(2Pi)^3 * ((exp(i*1.9931523*0.9502566373))) / (1.9931523)]x

Input interpretation:

$$3.003685130732\times 10^{23}\int\left(\frac{1.9931523}{(2\pi)^3}\times\frac{\exp(i\times 1.9931523\times 0.9502566373)}{1.9931523}\right)x\,dx$$

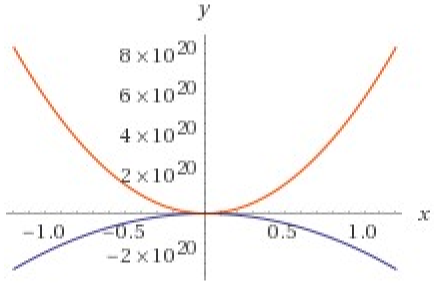
i is the imaginary unit

Result:

$(-1.92301\times10^{20}+5.74109\times10^{20}\,i)\,x^2$

(-1.92301*10^{20} + 5.74109*10^{20} i) x^2

Plot:



-

For x = ζ(2*e*/0.63165)

(-1.92301×10^20 + 5.74109×10^20 i) (((zeta (2e/0.63165))))^2

Input interpretation:

$$(-1.92301\times10^{20}+5.74109\times10^{20}\,i)\,\zeta\left(2\times\frac{e}{0.63165}\right)^2$$

ζ(s) is the Riemann zeta function

i is the imaginary unit

Result:

$-1.93322\ldots\times10^{20}+$
$5.77157\ldots\times10^{20}\,i$

Polar coordinates:

$r=6.08673\times10^{20}$ (radius), $\theta=108.519°$ (angle)

6.08673*10^{20} result practically equal to the previous expression

We have also that:

-5778-18+76+1/2(((((-1.92301×10^20 + 5.74109×10^20 i) (((zeta (2e/0.63165))))^2))))^1/4

Input interpretation:

$$-5778-18+76+\frac{1}{2}\sqrt[4]{(-1.92301\times10^{20}+5.74109\times10^{20}\,i)\,\zeta\left(2\times\frac{e}{0.63165}\right)^2}$$

ζ(s) is the Riemann zeta function

i is the imaginary unit

Result:

64174.8... +
35812.6... i

Polar coordinates:

$r = 73491.1$ (radius), $\theta = 29.1636°$ (angle)

73491.1

From:

D-branes, Matrix Theory and K-homology

Tsuguhiko Asakawa, Shigeki Sugimoto and Seiji Terashima

arXiv:hep-th/0108085v3 8 Apr 2002

It is important to note that unlike the non-BPS D-instanton state without boundary interaction (5.1), the RR-sector may not be projected out, since the boundary interaction carries the fermion zero modes. Let us check that the boundary state (5.52) becomes (5.1) when the boundary interaction is turned off, i.e. $T = \Phi_\mu = 0$. In this case, the boundary interaction for RR-sector vanishes since the zero mode of η is not saturated in the η integral. The boundary interaction for NS-sector becomes

$$e^{-S_b(P,\text{II})}/(\text{Tr}_{\mathcal{H}}1) = \int [d\eta]\, e^{\oint d\sigma\left(\frac{1}{4}\dot{\eta}\eta\right)} = \int \prod_{r>0} d\eta_r d\eta_{-r}\, e^{(\pi r\eta_r\eta_{-r})} \quad (5.53)$$

$$= \prod_{r=1/2,1/3,\ldots} \pi r \quad (5.54)$$

$$= \sqrt{2}. \quad (5.55)$$

In (5.68), we used a ζ-function regularization trick

$$\prod_{r=1/2,3/2,\ldots} u^2 = 1, \tag{5.70}$$

and took a naive limit. Let us justify (5.68) using oscillator expansion and ζ-function regularization. First, we consider the bosonic part. We adopt the $p = 0$ case for simplicity.

$$\int [dx] \exp\left(-\oint d\sigma \frac{\dot{x}^2}{4u^2}\right) |\, x\,\rangle \tag{5.71}$$

$$= \int dx_0 \prod_{n=1}^{\infty} \left(\int dx_{-n} dx_n \, e^{-\frac{n}{2u^2}x_{-n}x_n - \frac{1}{2}x_{-n}x_n - u_n^\dagger \tilde{a}_n^\dagger + u_n^\dagger x_n + x_{-n}\tilde{a}_n^\dagger}\right) |\, x_0\,\rangle \tag{5.72}$$

$$= \frac{u\Gamma(u^2)}{\sqrt{2\pi}} e^{-\sum_{n=1}^{\infty}\left(1-\frac{2}{1+n/u^2}\right)a_n^\dagger \tilde{a}_n^\dagger} |\, 0\,\rangle \,. \tag{5.73}$$

We used the ζ-function regularization to obtain (5.73) (see Appendix B).

Similarly the fermionic part can also be calculated.

$$\int [ud\theta] \exp\left(-\oint d\sigma \frac{\theta\dot{\theta}}{4u^2}\right) |\, \theta; \pm\,\rangle_{\rm NS} \tag{5.74}$$

$$- \prod_{r>0}^{\infty} \left(\int u^2 d\theta_{-r} d\theta_r \, e^{-\frac{r}{2u^2}\theta_{-r}\theta_r - \frac{1}{2}\theta_{-r}\theta_r \pm i\psi_r^\dagger \tilde{\psi}_r^\dagger + \psi_r^\dagger \theta_r \mp i\theta_{-r}\tilde{\psi}_r^\dagger}\right) |\, 0\,\rangle_{\rm NS} \tag{5.75}$$

$$= \frac{\sqrt{2\pi}}{\Gamma\left(u^2 + \frac{1}{2}\right)} e^{\pm\sum_{r>0}^{\infty}\left(1-\frac{2}{1-r/u^2}\right)i\psi_r^\dagger \tilde{\psi}_r^\dagger} |\, 0\,\rangle_{\rm NS} \,. \tag{5.76}$$

Combining (5.73) and (5.76) together, we obtain

$$e^{-S_t(\Gamma,\Pi_\pm)} |\, D; \pm\,\rangle_{\rm NS} \tag{5.77}$$

$$= \frac{u\Gamma(u^2)}{\Gamma(u^2 + \frac{1}{2})} e^{-\sum_{n=1}^{\infty}\left(1-\frac{2}{1+n/u^2}\right)a_n^\dagger \tilde{a}_n^\dagger \pm \sum_{r>0}^{\infty}\left(1-\frac{2}{1+r/u^2}\right)i\psi_r^\dagger \tilde{\psi}_r^\dagger} |\, 0\,\rangle_{\rm NS} \tag{5.78}$$

$$\to \ |\, B0; \pm\,\rangle_{\rm NS} \quad (\text{as } u \to \infty), \tag{5.79}$$

which actually agrees with the previous estimation (5.69). This calculation is precisely analogous to that given in [15, 50, 51]. In fact the coefficient $\frac{u\Gamma(u^2)}{\Gamma(u^2+1/2)} = \frac{4^{u^2}\Gamma(u^2)^2}{2\sqrt{\pi}\Gamma(2u^2)}$ in (5.78) is exactly the same as the factor which plays a crucial role to obtain the exact D-brane tension in BSFT [13, 15, 16].

Now, we have that:

$$e^{-S_b(P,\Pi)}/(\mathrm{Tr}_{\mathcal{H}} 1) = \int [d\eta]\, e^{\oint d\sigma\left(\frac{1}{4}\dot{\eta}\eta\right)} = \int \prod_{r>0} d\eta_r d\eta_{-r}\, e^{(\ldots \eta_{-r})}$$
$$= \prod_{r=1/2,1/3,\ldots} \pi r$$
$$= \sqrt{2}. \qquad (5.53\text{-}5.55)$$

$$\int dx_0 \prod_{n-1}^{\infty} \left(\int dx_{-n} dx_n\, e^{-\frac{n}{2u^2} x_{-n} x_n - \frac{1}{2} x_{-n} x_n - a_n^\dagger \tilde{a}_n^\dagger + a_n^\dagger x_n + x_{-n} \tilde{a}_n^\dagger} \right) | x_0 \rangle =$$

$$= \frac{u\Gamma(u^2)}{\sqrt{2\pi}} e^{-\sum_{n=1}^{\infty} \left(1 - \frac{2}{1+n/u^2}\right) a_n^\dagger \tilde{a}_n^\dagger} | 0 \rangle \qquad (5.72\text{-}5.73)$$

For u = -1, u^2 =1 and n = 76, that is a Lucas number. we obtain:

(((-1* gamma (1) * exp-((1-2/(1+76)))))) / (sqrt(2*Pi))

Input:

$$-\frac{\Gamma(1) \exp\left(-\left(1 - \frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$-\frac{1}{e^{75/77}\sqrt{2\pi}}$$

Decimal approximation:

−0.150624618543660251190009663966133164269780579536784586 26...

-0.15062461854366…

Alternative representations:

$$-\frac{\Gamma(1) \exp\left(-\left(1 - \frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-1 + \frac{2}{77}\right)}{\sqrt{2\pi}}$$

•

$$-\frac{\Gamma(1) \exp\left(-\left(1 - \frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-1 + \frac{2}{77}\right) e^0}{\sqrt{2\pi}}$$

•

$$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-1+\frac{2}{77}\right)(1)_0}{\sqrt{2\pi}}$$

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

Series representations:

$$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-\frac{75}{77}\right)\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\exp\left(i\pi\left\lfloor\frac{\arg(2\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k\,(2\pi-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

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

- $$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-\frac{75}{77}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} z_0^{-1/2-1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2\pi-z_0)^k\,z_0^{-k}}{k!}}$$

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

i is the imaginary unit

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

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

Integral representations:

$$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-\frac{75}{77}\right)}{\sqrt{2\pi}}\int_0^1 1\,dt$$

- $$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{e^{\int_0^1 0\,dx}\exp\left(-\frac{75}{77}\right)}{\sqrt{2\pi}}$$

•

$$-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}} = -\frac{\exp\left(-\frac{75}{77}\right)}{\sqrt{2\pi}} \int_0^\infty e^{-t}\,dt$$

From the ratio between the two results, we obtain:

-sqrt(2) / ((((((-1* gamma (1) * exp-((1-2/(1+76)))))) / (sqrt(2*Pi)))))

Input:

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$2\,e^{75/77}\sqrt{\pi}$$

Decimal approximation:

9.388993486235248023358766237557825779873676817334217629463...

9.388993486…. result very near to the value of black hole entropy 9.3664

Alternative representations:

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{-\sqrt{2}}{-\frac{\exp\left(-1+\frac{2}{77}\right)}{\sqrt{2\pi}}}$$

•

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{-\sqrt{2}}{-\frac{\exp\left(-1+\frac{2}{77}\right)e^{0}}{\sqrt{2\pi}}}$$

•

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{-\sqrt{2}}{-\frac{\exp\left(-1+\frac{2}{77}\right)(1)_0}{\sqrt{2\pi}}}$$

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

Series representations:

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(2\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}^2 \sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(2-x)^{k_1}(2\pi-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right) \Bigg/ \left(\exp\left(-\frac{75}{77}\right)\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } (z_0\notin\mathbb{Z} \text{ or } z_0>0) \text{ and } x<0)$$

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \left(\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} z_0^{1+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} \sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(2-z_0)^{k_1}(2\pi-z_0)^{k_2}z_0^{-k_1-k_2}}{k_1!\,k_2!}\right) \Bigg/ \left(\exp\left(-\frac{75}{77}\right)\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}\right) \text{ for } (z_0\notin\mathbb{Z} \text{ or } z_0>0)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

i is the imaginary unit

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

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

Integral representations:

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{\sqrt{2}\,\sqrt{2\pi}}{\exp\left(-\frac{75}{77}\right)\int_0^1 1\,dt}$$

•

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{e^{-\int_0^1 0\,dx}\sqrt{2}\sqrt{2\pi}}{\exp\left(-\frac{75}{77}\right)}$$

- $$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} = \frac{\sqrt{2}\sqrt{2\pi}}{\exp\left(-\frac{75}{77}\right)\int_0^\infty e^{-t}\,dt}$$

Furthermore. We have also that:

(29/10^3+4/10^3)+1+1/((-sqrt(2) / ((((((-1* gamma (1) * exp-((1-2/(1+76)))))) / (sqrt(2*Pi)))))))^1/5

Input:

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$\frac{1033}{1000}+\frac{1}{\sqrt[5]{2}\,e^{15/77}\sqrt[10]{\pi}}$$

Decimal approximation:

- More digits

1.671963709091062656449751763652621241257209162259880967645...

1.671963709…

We note that 1.671963709... is a result practically equal to the value of the formula:

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

that is the holographic proton mass

Alternate forms:

$$\frac{500\times 2^{4/5}+1033\,e^{15/77}\sqrt[10]{\pi}}{1000\,e^{15/77}\sqrt[10]{\pi}}$$

- $$\frac{1000+1033\sqrt[5]{2}\,e^{15/77}\sqrt[10]{\pi}}{1000\sqrt[5]{2}\,e^{15/77}\sqrt[10]{\pi}}$$

Alternative representations:

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=1+\frac{33}{10^3}+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\exp\left(-1+\frac{2}{77}\right)}{\sqrt{2\pi}}}}}$$

- $$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=1+\frac{33}{10^3}+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\exp\left(-1+\frac{2}{77}\right)e^0}{\sqrt{2\pi}}}}}$$

- $$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=1+\frac{33}{10^3}+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\exp\left(-1+\frac{2}{77}\right)(1)_0}{\sqrt{2\pi}}}}}$$

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

Series representations:

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{2^{2/5}\,e^{15/77}\sqrt[10]{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}}$$

- $$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{\sqrt[5]{2}\sqrt[10]{\pi}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{15/77}}$$

•

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{\sqrt[5]{2}\ \sqrt[10]{\pi}\left(\frac{1}{\sum_{k=0}^{\infty}\frac{(-1)^k}{k!}}\right)^{15/77}}$$

$n!$ is the factorial function

Integral representations:

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{2^{2/5}\,e^{15/77}\sqrt[10]{\int_0^1\sqrt{1-t^2}\,dt}}$$

•

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{2^{3/10}\,e^{15/77}\sqrt[10]{\int_0^\infty\frac{1}{1+t^2}\,dt}}$$

•

$$\left(\frac{29}{10^3}+\frac{4}{10^3}\right)+1+\frac{1}{\sqrt[5]{-\frac{-\sqrt{2}}{\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}}}=\frac{1033}{1000}+\frac{1}{2^{3/10}\,e^{15/77}\sqrt[10]{\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}}$$

We have that:

$$\prod_{r>0}^{\infty}\left(\int u^2 d\theta_{-r}d\theta_r\, e^{-\frac{r}{2u^2}\theta_{-r}\theta_r-\frac{1}{2}\theta_{-r}\theta_r\pm i\psi_r^\dagger\widetilde{\psi}_r^\dagger+\psi_r^\dagger\theta_r\mp i\theta_{-r}\widetilde{\psi}_r^\dagger}\right)|\,0\,\rangle_{\rm NS}$$

$$=\ \frac{\sqrt{2\pi}}{\Gamma\left(u^2+\frac{1}{2}\right)}e^{\pm\sum_{r>0}^{\infty}\left(1-\frac{2}{1+r/u^2}\right)i\psi_r^\dagger\widetilde{\psi}_r^\dagger}\,|\,0\,\rangle_{\rm NS}\,.$$

For $u = -1$, $u^2 = 1$ and r = 21, that is a Fibonacci number, we obtain:

(((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))

Input:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}$$

$\Gamma(x)$ is the gamma function

Exact result:

$2\sqrt{2}\,e^{10/11}$

Decimal approximation:

7.020340210733174778869048128213632009022809623908429215962...

7.020340210733174….

Property:

$2\sqrt{2}\,e^{10/11}$ is a transcendental number

Alternative representations:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}=\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{e^{-\log G(3/2)+\log G(5/2)}}$$

-

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}=\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{(1)_{\frac{1}{2}}}$$

-

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}=\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{\frac{\sqrt[8]{e}\,\pi^{3/4}}{\frac{2^{23/24}A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)}{A^{3/2}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\exp\left(i\pi\left\lfloor\frac{\arg(2\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k(2\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}}$$

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

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2\pi-z_0)^k z_0^{-k}}{k!}}{\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}}$$

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

i is the imaginary unit

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

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

Integral representations:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^{\infty}e^{-t}\sqrt{t}\,dt}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^{1}\sqrt{\log\left(\frac{1}{t}\right)}\,dt}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \exp\left(-\int_0^{1}\frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2\pi}$$

log(x) is the natural logarithm

We obtain also:

-9/10^3+ (((((((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))))))^1/4

Input:

$$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}$$

Γ(x) is the gamma function

Exact result:

$$2^{3/8}\,e^{5/22}-\frac{9}{1000}$$

Decimal approximation:

- More digits

1.618756880266165150116585859913027296090949476243250209554...

1.6187568802…

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

Property:

$$-\frac{9}{1000}+2^{3/8}\,e^{5/22}$$ is a transcendental number

-

Alternate form:

$$\frac{1000\times 2^{3/8}\,e^{5/22}-9}{1000}$$

Alternative representations:

$$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{10^3}+\sqrt[4]{\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{(1)_{\frac{1}{2}}}}$$

-

$$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{10^3}+\sqrt[4]{\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{e^{-\log G(3/2)+\log G(5/2)}}}$$

- $$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{10^3}+\sqrt[4]{\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{\frac{\sqrt[8]{e}\,\pi^{3/4}}{\frac{2^{23/24}A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)}{A^{3/2}}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{1000}+2^{3/8}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{5/22}$$

- $$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{1000}+2^{13/88}\left(\sum_{k=0}^{\infty}\frac{1+k}{k!}\right)^{5/22}$$

- $$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{1000}+2^{3/8}\left(\sum_{k=0}^{\infty}\frac{(-1+k)^2}{k!}\right)^{5/22}$$

$n!$ is the factorial function

Integral representations:

$$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{1000}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt}}$$

- $$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=-\frac{9}{1000}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^\infty e^{-t}\sqrt{t}\,dt}}$$

- $$-\frac{9}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=$$
$$-\frac{9}{1000}+\sqrt[4]{\exp\left(-\int_0^1\frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}$$

log(x) is the natural logarithm

And:

(47/10^3-3/10^3)+ (((((((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))))))^1/4

Where 47 and 3 are Lucas numbers

Input:

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}$$

Γ(x) is the gamma function

Exact result:

$$\frac{11}{250}+2^{3/8}\,e^{5/22}$$

Decimal approximation:

1.671756880266165150116585859913027296090949476243250209554...

1.6717568802…

We note that 1.6717568802... is a result practically equal to the value of the formula:

$$m_{p'}=2\times\frac{\eta}{R}m_P=1.6714213\times10^{-24}\text{ gm}$$

that is the holographic proton mass

Property:

$\frac{11}{250} + 2^{3/8} e^{5/22}$ is a transcendental number

-

Alternate form:

$\frac{1}{250} \left(11 + 250 \times 2^{3/8} e^{5/22}\right)$

Alternative representations:

$$\left(\frac{47}{10^3} - \frac{3}{10^3}\right) + \sqrt[4]{\frac{\sqrt{2\pi} \exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1 + \frac{1}{2}\right)}} = \frac{44}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right) \sqrt{2\pi}}{(1)_{\frac{1}{2}}}}$$

-

$$\left(\frac{47}{10^3} - \frac{3}{10^3}\right) + \sqrt[4]{\frac{\sqrt{2\pi} \exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1 + \frac{1}{2}\right)}} = \frac{44}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right) \sqrt{2\pi}}{e^{-\log G(3/2) + \log G(5/2)}}}$$

-

$$\left(\frac{47}{10^3} - \frac{3}{10^3}\right) + \sqrt[4]{\frac{\sqrt{2\pi} \exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1 + \frac{1}{2}\right)}} = \frac{44}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right) \sqrt{2\pi}}{\frac{\sqrt[8]{e}\, \pi^{3/4}}{\frac{2^{23/24} A^{3/2} \left(\sqrt[24]{2} \sqrt[8]{e} \sqrt[4]{\pi}\right)}{A^{3/2}}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\left(\frac{47}{10^3} - \frac{3}{10^3}\right) + \sqrt[4]{\frac{\sqrt{2\pi} \exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1 + \frac{1}{2}\right)}} = \frac{11}{250} + 2^{3/8} \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{5/22}$$

-

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{11}{250}+2^{13/88}\left(\sum_{k=0}^{\infty}\frac{1+k}{k!}\right)^{5/22}$$

•

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{11}{250}+2^{3/8}\left(\sum_{k=0}^{\infty}\frac{(-1+k)^2}{k!}\right)^{5/22}$$

$n!$ is the factorial function

Integral representations:

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{11}{250}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt}}$$

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{11}{250}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^\infty e^{-t}\sqrt{t}\,dt}}$$

•

$$\left(\frac{47}{10^3}-\frac{3}{10^3}\right)+\sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=$$
$$\frac{11}{250}+\sqrt[4]{\exp\left(-\int_0^1\frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}$$

$\log(x)$ is the natural logarithm

In conclusion, multiplying the two result, we obtain:

[-sqrt(2) / ((((((-1* gamma (1) * exp-((1-2/(1+76)))))) / (sqrt(2*Pi))))) * (((((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))))]

Input:

$$\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}} \times \frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$4\,e^{145/77}\sqrt{2\pi}$$

Decimal approximation:

65.913928509729166440782027113841344376679281622880154534 55...

65.913928509729

Alternative representations:

$$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = -\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{e^{-\log G(3/2)+\log G(5/2)}\left(-\exp\left(-1+\frac{2}{77}\right)e^{0}\right)}{\sqrt{2\pi}}}$$

- $$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = -\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{(1)_{\frac{1}{2}}\left(-\exp\left(-1+\frac{2}{77}\right)(1)_0\right)}{\sqrt{2\pi}}}$$

- $$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = -\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{\left(\sqrt[8]{e}\,\pi^{3/4}\right)\left(-\exp\left(-1+\frac{2}{77}\right)\right)}{\frac{\left(2^{23/24}A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)\right)\sqrt{2\pi}}{A^{3/2}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = \left(\exp\left(\frac{10}{11}\right)\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp^2\left(i\pi\left\lfloor\frac{\arg(2\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3 \left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2\right) \Big/ \left(\exp\left(-\frac{75}{77}\right)\left(\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}\right)$$

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

$$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = \left(\exp\left(\frac{10}{11}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} z_0^{3/2+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} \left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2\pi-z_0)^k z_0^{-k}}{k!}\right)^2\right) \Big/ \left(\exp\left(-\frac{75}{77}\right)\left(\sum_{k=0}^{\infty}\frac{(1-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}\right)$$

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

i is the imaginary unit

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

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

Integral representations:

$$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = \frac{\exp\left(-\int_0^1\frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2}\,\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)}$$

$$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = \frac{\exp\left(\frac{5\gamma}{2}-\int_0^1 \frac{2-x-x^{3/2}+\log(x)+\log\left(x^{3/2}\right)}{\log(x)-x\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2}\,\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)}$$

- $$\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}} = \frac{\exp\left(\frac{10}{11}\right)\sqrt{2}\,\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)\left(\int_0^1 1\,dt\right)\int_0^1 \sqrt{\log\left(\frac{1}{t}\right)}\,dt}$$

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

(3571+123+8)+(2.739911-0.5447171)[-sqrt(2) / ((((((-1* gamma (1) * exp-((1-2/(1+76)))))) / (sqrt(2*Pi))))) * (((((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))))]^e

Where 8 is a Fibonacci number, 123 and 3571 are Lucas numbers. Furthermore, 2.739911 and 0.5447171 are two Ramanujan mock theta functions

Input interpretation:

$$(3571+123+8)+(2.739911-0.5447171)\left(\frac{-\sqrt{2}}{-\frac{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}{\sqrt{2\pi}}}\times\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}\right)^e$$

$\Gamma(x)$ is the gamma function

Result:

196883.5...

196883.5

Alternative representations:

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$3702+2.19519\left(-\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{e^{-\log G(3/2)+\log G(5/2)}\left(-\exp\left(-1+\frac{2}{77}\right)e^0\right)}{\sqrt{2\pi}}}\right)^e$$

-

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$3702+2.19519\left(-\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{(1)_{\frac{1}{2}}\left(-\exp\left(-1+\frac{2}{77}\right)(1)_0\right)}{\sqrt{2\pi}}}\right)^e$$

-

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$3702+2.19519\left(-\frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2}\,\sqrt{2\pi}}{\frac{\left(\sqrt[8]{e}\,\pi^{3/4}\right)\left(-\exp\left(-1+\frac{2}{77}\right)\right)}{\frac{\left(2^{23/24}A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)\right)\sqrt{2\pi}}{A^{3/2}}}}\right)^e$$

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

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

A is the Glaisher-Kinkelin constant

Integral representations:

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$2.19519\left(1686.41+\left(\frac{\exp\left(\frac{10}{11}\right)\sqrt{2}\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)\left(\int_0^1 1\,dt\right)\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt}\right)^e\right)$$

-

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$3702+2.19519\left(\frac{\mathcal{A}^{-\int_0^1\left(\frac{1}{2}-\frac{3x}{2}+x^{3/2}\right)/((-1+x)\log(x))\,dx}\exp\left(\frac{10}{11}\right)\sqrt{2}\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)}\right)^e$$

-

$$(3571+123+8)+(2.73991-0.544717)\left(\frac{\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)\left(-\sqrt{2}\right)}{\frac{\Gamma\left(1+\frac{1}{2}\right)\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)}{\sqrt{2\pi}}}\right)^e =$$

$$2.19519\left(1686.41+\left(\frac{\exp\left(\frac{10}{11}\right)\sqrt{2}\sqrt{2\pi}^2}{\exp\left(-\frac{75}{77}\right)\left(\int_0^\infty \mathcal{A}^{-t}\,dt\right)\int_0^\infty\sqrt{t}\,\mathcal{A}^{-t}\,dt}\right)^e\right)$$

$\log(x)$ is the natural logarithm

From the three results, we obtain also:

(((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))

Input:

$$\frac{\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}$$

$\Gamma(x)$ is the gamma function

Exact result:

$2\sqrt{2}\, e^{10/11}$

Decimal approximation:

7.0203402107331747788690481282136320090228096239084292159 62...

7.02034021…

Property:

$2\sqrt{2}\, e^{10/11}$ is a transcendental number

- **Alternative representations:**

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{e^{-\log G(3/2)+\log G(5/2)}}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{(1)_{\frac{1}{2}}}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(1-\frac{2}{22}\right)\sqrt{2\pi}}{\frac{\sqrt[8]{e}\,\pi^{3/4}}{\frac{2^{23/24}\,A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)}{A^{3/2}}}}$$

Series representations:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\exp\left(i\pi\left\lfloor\frac{\arg(2\pi-x)}{2\pi}\right\rfloor\right)\sqrt{x}\,\sum_{k=0}^{\infty}\frac{(-1)^k(2\pi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}}$$

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

-

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2\pi-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2\pi-z_0)^k z_0^{-k}}{k!}}{\sum_{k=0}^{\infty} \frac{\left(\frac{3}{2}-z_0\right)^k \Gamma^{(k)}(z_0)}{k!}}$$

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

Integral representations:

$$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^{\infty} e^{-t}\sqrt{t}\,dt}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^1 \sqrt{\log\left(\frac{1}{t}\right)}\,dt}$$

- $$\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)} = \exp\left(-\int_0^1 \frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2\pi}$$

$\log(x)$ is the natural logarithm

And:

18/10^3+(((((((sqrt(2Pi)*exp(1-2/(1+21))))) / (((gamma (1+1/2))))))))^1/4

Where 18 is a Lucas number

Input:

$$\frac{18}{10^3} + \sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}$$

$\Gamma(x)$ is the gamma function

Exact result:
$$\frac{9}{500} + 2^{3/8} e^{5/22}$$

Decimal approximation:

1.645756880266165150116585859913027296090949476243250209554...

$1.64575688.... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Property:
$\frac{9}{500} + 2^{3/8} e^{5/22}$ is a transcendental number

-

Alternate form:
$$\frac{1}{500} \left(9 + 500 \times 2^{3/8} e^{5/22}\right)$$

Alternative representations:
$$\frac{18}{10^3} + \sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}} = \frac{18}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right)\sqrt{2\pi}}{(1)_{\frac{1}{2}}}}$$

-

$$\frac{18}{10^3} + \sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}} = \frac{18}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right)\sqrt{2\pi}}{e^{-\log G(3/2) + \log G(5/2)}}}$$

-

$$\frac{18}{10^3} + \sqrt[4]{\frac{\sqrt{2\pi}\exp\left(1 - \frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}} = \frac{18}{10^3} + \sqrt[4]{\frac{\exp\left(1 - \frac{2}{22}\right)\sqrt{2\pi}}{\frac{\sqrt[8]{e}\,\pi^{3/4}}{\frac{2^{23/24} A^{3/2}\left(\sqrt[24]{2}\,\sqrt[8]{e}\,\sqrt[4]{\pi}\right)}{A^{3/2}}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+2^{3/8}\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{5/22}$$

- $$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+2^{13/88}\left(\sum_{k=0}^{\infty}\frac{1+k}{k!}\right)^{5/22}$$

- $$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+2^{3/8}\left(\sum_{k=0}^{\infty}\frac{(-1+k)^2}{k!}\right)^{5/22}$$

$n!$ is the factorial function

Integral representations:

$$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt}}$$

- $$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+\sqrt[4]{\frac{\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}{\int_0^\infty e^{-t}\sqrt{t}\,dt}}$$

- $$\frac{18}{10^3}+\sqrt[4]{\frac{\sqrt{2\pi}\,\exp\left(1-\frac{2}{1+21}\right)}{\Gamma\left(1+\frac{1}{2}\right)}}=\frac{9}{500}+\sqrt[4]{\exp\left(-\int_0^1\frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2\pi}}$$

$\log(x)$ is the natural logarithm

(-1.0018674362)*1/(2Pi)) * sqrt(2) *1 / (((-1* gamma (1) * exp-((1-2/(1+76))))) *1/ (sqrt(2*Pi)) * (((sqrt(2Pi)*exp(1-2/(1+21))))) *1/ (((gamma (1+1/2))))

Where 1.0018674362 is the following Rogers-Ramanujan continued fraction

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

Input interpretation:

$$-1.0018674362 \times \frac{1}{2\pi}\sqrt{2}\left(-\frac{1}{\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)}\right) \times \frac{1}{\sqrt{2\pi}}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right) \times \frac{1}{\Gamma\left(1+\frac{1}{2}\right)}$$

$\Gamma(x)$ is the gamma function

Result:

1.6727372213...

1.6727372213…. result very near to the proton mass

Alternative representations:

$$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = -\frac{1.00186743620000\exp\left(1-\frac{2}{22}\right)\sqrt{2}\sqrt{2\pi}}{(2\pi)\left(-\exp\left(-1+\frac{2}{77}\right)e^{0}\right)e^{-\log G(3/2)+\log G(5/2)}\sqrt{2\pi}}$$

-

$$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = -\frac{1.00186743620000\exp\left(1-\frac{2}{22}\right)\sqrt{2}\sqrt{2\pi}}{(2\pi)\left(-\exp\left(-1+\frac{2}{77}\right)(1)_0\right)(1)_{\frac{1}{2}}\sqrt{2\pi}}$$

- $$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = -\frac{1.00186743620000\exp\left(1-\frac{2}{22}\right)\sqrt{2}\sqrt{2\pi}}{\frac{(2\pi)\left(-\exp\left(-1+\frac{2}{77}\right)\right)\left(\sqrt[8]{e}\,\pi^{3/4}\right)\sqrt{2\pi}}{\frac{2^{23/24}A^{3/2}\left(\sqrt[24]{2}\sqrt[8]{e}\sqrt[4]{\pi}\right)}{A^{3/2}}}}$$

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

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

A is the Glaisher-Kinkelin constant

Series representations:

$$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = \frac{0.500933718100000\exp\left(\frac{10}{11}\right)\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\pi\exp\left(-\frac{75}{77}\right)\left(\sum_{k=0}^{\infty}\frac{(1-z_0)^k\Gamma^{(k)}(z_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}}$$

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

$$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = \left(0.500933718100000\exp\left(\frac{10}{11}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(\pi\exp\left(-\frac{75}{77}\right)\left(\sum_{k=0}^{\infty}\frac{(1-z_0)^k\Gamma^{(k)}(z_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}-z_0\right)^k\Gamma^{(k)}(z_0)}{k!}\right)$$

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

i is the imaginary unit

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

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

Integral representations:

$$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = \frac{0.500933718100000\exp\left(-\int_0^1 \frac{\frac{1}{2}-\frac{3x}{2}+x^{3/2}}{(-1+x)\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2}}{\pi\exp\left(-\frac{75}{77}\right)}$$

- $$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = \frac{0.500933718100000\exp\left(\frac{5\gamma}{2}-\int_0^1 \frac{2-x-x^{3/2}+\log(x)+\log\left(x^{3/2}\right)}{\log(x)-x\log(x)}\,dx\right)\exp\left(\frac{10}{11}\right)\sqrt{2}}{\pi\exp\left(-\frac{75}{77}\right)}$$

- $$\frac{-1.00186743620000\sqrt{2}\left(\sqrt{2\pi}\exp\left(1-\frac{2}{1+21}\right)\right)}{\left(\left(-\Gamma(1)\exp\left(-\left(1-\frac{2}{1+76}\right)\right)\right)\sqrt{2\pi}\,\Gamma\left(1+\frac{1}{2}\right)\right)(2\pi)} = \frac{0.500933718100000\exp\left(\frac{10}{11}\right)\sqrt{2}}{\pi\exp\left(-\frac{75}{77}\right)\left(\int_0^1 1\,dt\right)\int_0^1\sqrt{\log\left(\frac{1}{t}\right)}\,dt}$$

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

From:

Commutative Geometry for Non-commutative D-branes by Tachyon Condensation

Tsuguhiko Asakawa, Goro Ishiki, Takaki Matsumoto, So Matsuura and Hisayoshi Muraki

https://arxiv.org/abs/1804.00161v1

Now, we have that:

A NC D2-brane on a fuzzy sphere can be made out of k D0-branes, if the scalar field has the profile

$$\Phi^i = \rho L_i, \qquad [L_i, L_j] = i\varepsilon_{ij}{}^k L_k, \tag{3.23}$$

where ρ is a real parameter and L_i $(i = 1, 2, 3)$ are $su(2)$ generators in the spin-ℓ irreducible representation [31]. Thus it is possible for $k \geq 2$. We denote corresponding $k = 2\ell + 1$ states as $|\, m \,\rangle$ $(m = -\ell, -\ell+1, \ldots, \ell-1, \ell)$. Because $\Phi^2 = \rho^2 \boldsymbol{L}^2 = \rho^2 \ell(\ell+1) 1_k = \rho^2 \frac{k^2-1}{4} 1_k$, a naive guess of the radius of this fuzzy sphere is $\rho\sqrt{\frac{k^2-1}{4}}$. We will compare it with the radius of S^2 obtained from the tachyon condensation below.

$$T^{(m)} \begin{pmatrix} a_m \\ b_m \end{pmatrix} = u \begin{pmatrix} |x| - \rho m & -\rho\sqrt{(\ell-m)(\ell+m+1)} \\ -\rho\sqrt{(\ell-m)(\ell+m+1)} & -|x| + \rho(m+1) \end{pmatrix} \begin{pmatrix} a_m \\ b_m \end{pmatrix}. \tag{3.44}$$

This matrix is diagonalized in a standard way (see Appendix A.3 for more detail) and the eigenvalues at each point (i.e., functions) are found to be

$$\lambda_{\pm}^{(m)}(|\boldsymbol{x}|) = u\left[\tfrac{\rho}{2} \pm \left|M^{(m)}\right|\right], \tag{3.45}$$

with

$$\left|M^{(m)}\right| \equiv \sqrt{\rho^2(\ell-m)(\ell+m+1)\left(|x| - \rho(m+\tfrac{1}{2})\right)^2}. \tag{3.46}$$

For all $m = -\ell, -\ell+1, \ldots, \ell-1$, $|M^{(m)}|^2$ satisfies $|M^{(m)}|^2 \geq 2\rho^2\ell$, and thus $|M^{(m)}| > \rho/2$ for all spin $\ell \geq 1/2$. This implies that for any ℓ and m, two eigenvalues $\lambda_{\pm}^{(m)}$ are always non-zero at any point $x \in \mathcal{U}_N$. Therefore, the tachyon condensation annihilates the corresponding eigenstates.

$x \in \mathcal{U}_N$ with the radius $|x| = \rho\ell$

For ρ = 3, ℓ = 1, m = -1.8

sqrt((((9(1+1.8)(1-1.8+1)(3*1 – 3(-1.8+1/2))^2)))

Input:

$$\sqrt{9(1+1.8)(1-1.8+1)\left(3\times1-3\left(-1.8+\frac{1}{2}\right)\right)^2}$$

Result:

15.4905...

15.4905.... result very near to the value of the black hole entropy 15.6730

(15127+843-47-11)+((((sqrt((((9(1+1.8)(1-1.8+1)(3*1 – 3(-1.8+1/2))^2)))))))^4

Where 11, 47, 843 and 15127 are Lucas numbers

Input:

$$(15\,127+843-47-11)+\sqrt{9(1+1.8)(1-1.8+1)\left(3\times1-3\left(-1.8+\frac{1}{2}\right)\right)^2}^4$$

Result:

73490.11407936

73490.114....

And:

(15127+843+29-2)+Pi*((((sqrt((((9(1+1.8)(1-1.8+1)(3*1 – 3(-1.8+1/2))^2)))))))^4

Input:

$$(15\,127+843+29-2)+\pi\sqrt{9(1+1.8)(1-1.8+1)\left(3\times1-3\left(-1.8+\frac{1}{2}\right)\right)^2}^4$$

Result:

196883.98019927241730951725686820828982669476704441873525 65...

196883.98019....

Series representations:

$$(15\,127+843+29-2)+\pi\sqrt{9(1+1.8)(1-1.8+1)\left(3\times1-3\left(-1.8+\frac{1}{2}\right)\right)^2}^4 =$$

$$15\,997+\pi\sqrt{238.954}^4\left(\sum_{k=0}^{\infty}e^{-5.47627k}\binom{\frac{1}{2}}{k}\right)^4$$

$$(15127 + 843 + 29 - 2) + \pi \sqrt{9 (1 + 1.8) (1 - 1.8 + 1) \left(3 \times 1 - 3 \left(-1.8 + \frac{1}{2}\right)\right)^2}^4 =$$

$$15997 + \pi \sqrt{238.954}^4 \left(\sum_{k=0}^{\infty} \frac{(-0.0041849)^k \left(-\frac{1}{2}\right)_k}{k!}\right)^4$$

- $$(15127 + 843 + 29 - 2) + \pi \sqrt{9 (1 + 1.8) (1 - 1.8 + 1) \left(3 \times 1 - 3 \left(-1.8 + \frac{1}{2}\right)\right)^2}^4 =$$

$$15997 + \frac{\pi \left(\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} e^{-5.47627 s} \, \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)\right)^4}{16 \sqrt{\pi}^4}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

From:

Spherical D-brane by Tachyon Condensation
Tsuguhiko Asakawa and So Matsuura - arXiv:1703.10352v1 [hep-th] 30 Mar 2017

Now, we have that:

Combining (3.27) and (3.29), we obtain the effective potential for the transverse scalar field in the radial direction R in the constant RR 4-form field strength:

$$V(R) = 4\pi\sqrt{R^4 + \frac{\lambda^2}{4}}T_2 - \mu_2\frac{8\pi}{3}fR^3 = 4\pi T_2\left(\sqrt{R^4 + \frac{\lambda^2}{4}} - \frac{2}{3}fR^3\right), \tag{3.30}$$

whose shape is drawn in the Fig.1. When f satisfies

$$\lambda f^2 < 1, \tag{3.31}$$

$V(R)$ has a local minimum at

$$R = R_- \equiv \frac{\sqrt{1 - \sqrt{1 - \lambda^2 f^4}}}{\sqrt{2}f}, \tag{3.32}$$

while there is no local minimum for $\lambda f^2 \geq 1$. In particular, if $\lambda f^2 \ll 1$, the local minimum R_- and its energy is given approximately as

$$R_- \sim \frac{\lambda}{2}f, \quad V(R_-) \sim T_0\left(1 - \frac{\lambda^2 f^4}{24}\right). \tag{3.33}$$

This means that the spherical D2-brane is stabilized at a very small radius with the size of the string length. It is more stable than a single D0-brane ($R = 0$) but the difference of the energy is small.

One way to stabilize the spherical D2-brane in a macroscopic radius is to construct a bound state of a D2-brane and a large number k of D0-branes as discussed in [9]. In fact, when the $U(1)$ gauge flux is $F = \frac{k}{2}\sin\theta$, the effective potential for R becomes

$$V_k(R) = 4\pi T_2\left(\sqrt{R^4 + \frac{\lambda^2 k^2}{4}} - \frac{2}{3}fR^3\right). \tag{3.34}$$

$\mu_2 = \sqrt{2\pi\lambda}\mu_3$

$\mu_3 = \frac{2\pi}{g_s(2\pi\sqrt{\alpha'})^4}, \quad \lambda = 2\pi\alpha'$

our case is not a familiar type mentioned above. However, it is in accordance with the charge quantization since our tachyon profile can be regarded as a topological soliton in the region $0 \leq r < \infty$ only in the limit of $u \to \infty$ as argued in the previous section.

From Wikipedia:

In a non-Abelian gauge theory, the **gauge coupling parameter**, g, appears in the Lagrangian as

$$\frac{1}{4g^2}\operatorname{Tr} G_{\mu\nu}G^{\mu\nu},$$

(where G is the gauge field tensor) in some conventions. In another widely used convention, G is rescaled so that the coefficient of the kinetic term is 1/4 and g appears in the covariant derivative. This should be understood to be similar to a dimensionless version of the elementary charge defined as

$$\frac{e}{\sqrt{\varepsilon_0 \hbar c}} = \sqrt{4\pi\alpha} \approx 0.30282212 \quad .$$

For R = 0.97536759 ; g_s = 0.30282212; f =0.724963711183;

λ = 1.90268749507; α' = 0.95686

(((((sqrt(((((1-(sqrt(1-1.90268749507^2*0.724963711183^4)))))))))))))*1 / ((((sqrt(2)*0.724963711183)))) = R

Input interpretation:

$$\sqrt{1-\sqrt{1-1.90268749507^2 \times 0.724963711183^4}} \times \frac{1}{\sqrt{2} \times 0.724963711183}$$

Result:

0.97536759794428857941642263066748428580462355978202593938 1...

0.97536759...

Numerator:

(((((sqrt(((((1-(sqrt(1-1.90268749507^2*0.724963711183^4)))))))))))))

Input interpretation:

$$\sqrt{1-\sqrt{1-1.90268749507^2 \times 0.724963711183^4}}$$

Result:

0.99999905585234706148294699658577063128514097714925136652 7...

0.999999055852347.....

Denominator:

((((sqrt(2)*0.724963711183))))

Input interpretation:

$\sqrt{2}\times 0.724963711183$

Result:

1.02525351258...

1.02525351258...

(2Pi)/ ((((0.30282212(((2*Pi*sqrt(0.95686))^4))))) = **μ₃**

Input interpretation:

$$\frac{2\pi}{0.30282212\left(2\pi\sqrt{0.95686}\right)^4}$$

Result:

0.0145404...

0.0145404…. = **μ_3**

Series representations:

$$\frac{2\pi}{0.302822\left(2\pi\sqrt{0.95686}\right)^4} = \frac{0.412784}{\pi^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(-0.04314)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^4}$$

•

$$\frac{2\pi}{0.302822\left(2\pi\sqrt{0.95686}\right)^4} = \frac{6.60454\sqrt{\pi}^4}{\pi^3\left(\sum_{j=0}^{\infty}\text{Res}_{s=-j}\,(-0.04314)^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)^4}$$

$$\frac{2\pi}{0.302822\left(2\pi\sqrt{0.95686}\right)^4} = \frac{0.412784}{\pi^3\sqrt{z_0}^4\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(0.95686-z_0)^k z_0^{-k}}{k!}\right)^4}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

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

(((sqrt(2Pi*1.90268749507)))* 0.0145404 = $\mathbf{\mu_2}$

Input interpretation:

$$\sqrt{2\pi\times 1.90268749507}\times 0.0145404$$

Result:

0.0502748...

0.0502748…. = $\mathbf{\mu_2}$

Series representations:

$$\sqrt{2\pi\, 1.902687495070000}\ 0.0145404 = 0.0145404\sqrt{-1+3.805374990140000\,\pi}\sum_{k=0}^{\infty}(-1+3.805374990140000\,\pi)^{-k}\binom{\frac{1}{2}}{k}$$

•

$$\sqrt{2\pi\, 1.902687495070000}\ 0.0145404 = 0.0145404\sqrt{-1+3.805374990140000\,\pi}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+3.805374990140000\,\pi)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

•

$$\sqrt{2\pi\, 1.902687495070000}\ 0.0145404 = 0.0145404\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3.805374990140000\,\pi-z_0)^k z_0^{-k}}{k!}$$

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

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

$n!$ is the factorial function

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

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

((((4*Pi*sqrt(((0.97536759^4+(1.90268749507^2)/4))T)))-4*Pi*Tsqrt(((0.97536759^4+(1.90268749507^2)/4)))-2/3*0.724963711183*0.97536759^3))))) = 0.0502748*((8*Pi)/3)*0.724963711183*0.97536759^3

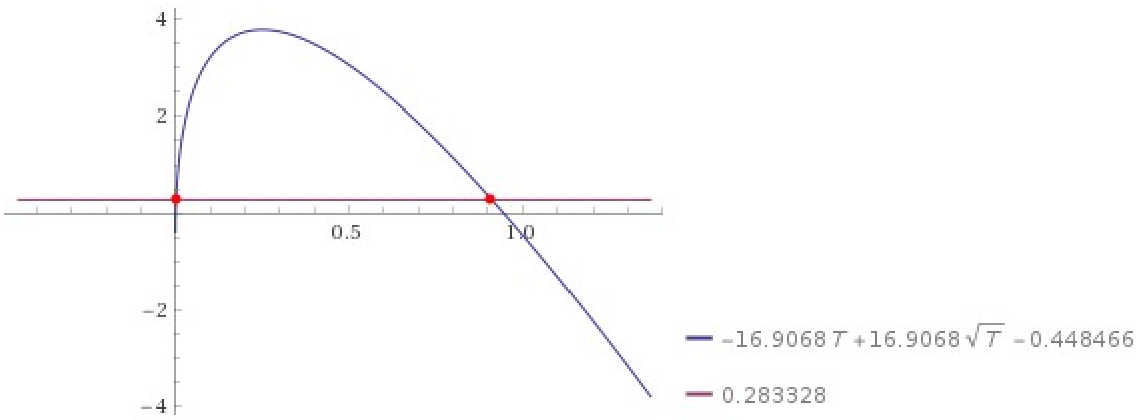
Input interpretation:

$$4\pi\sqrt{\left(0.97536759^4+\frac{1.90268749507^2}{4}\right)T}-4\pi T\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}+\frac{2}{3}\times 0.97536759^3\times(-0.724963711183)=0.0502748\times\frac{8\pi}{3}\times 0.724963711183\times 0.97536759^3$$

Result:

$$-16.9068\,T+16.9068\sqrt{T}-0.448466=0.283328$$

Plot:



- **Alternate form:**

$$-16.9068\left(\sqrt{T}-0.972731\right)\left(\sqrt{T}-0.0272694\right)=0.283328$$

- **Alternate form assuming T is positive:**

$$T+0.043284=\sqrt{T}$$

Solutions:

$T \approx 0.00205569$

-

$T \approx 0.911376$

T = 0.907673

For

R = 0.97536759 ; g_s = 0.30282212; f =0.724963711183;

λ = 1.90268749507; α' = 0.95686; $\boldsymbol{\mu_2}$ = 0.0502748

$$4\pi T_2 \left(\sqrt{R^4 + \frac{\lambda^2}{4}} - \frac{2}{3} f R^3 \right)$$

4*Pi*0.907673 (((((sqrt(((0.97536759^4+(1.90268749507^2)/4))))))-2/3*0.724963711183*0.97536759^3

Input interpretation:

$$4\pi \times 0.907673 \left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}} + \frac{2}{3} \times 0.97536759^3 \times (-0.724963711183) \right)$$

Result:

10.2306...

10.2306…

Series representations:

$$4\pi\, 0.907673\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times 0.7249637111830000\times 0.975368^3}{3}\right)=$$

$$-1.62824\pi+3.63069\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

- $$4\pi\, 0.907673\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times 0.7249637111830000\times 0.975368^3}{3}\right)=$$

$$-1.62824\pi-\frac{1.81535\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j} e^{0.21059 s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$4\pi\, 0.907673\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times 0.7249637111830000\times 0.975368^3}{3}\right)=$$

$$-1.62824\pi+3.63069\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

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

We obtain also:

18/10^3+1/(2Pi) (((((4*Pi*0.907673 (((((sqrt(((0.97536759^4+(1.90268749507^2)/4))))))-2/3*0.724963711183*0.97536759^3)))))))

Where 18 is a Lucas number

Input interpretation:

$$\frac{18}{10^3} + \frac{1}{2\pi}\left(4\pi \times 0.907673\left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}} + \frac{2}{3} \times 0.97536759^3 \times (-0.724963711183)\right)\right)$$

Result:

1.64625...

1.64625…. ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Series representations:

$$\frac{18}{10^3} + \frac{4\pi\, 0.907673\left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right)}{2\pi} = -0.796122 + 1.81535 \sum_{k=0}^{\infty} \frac{(-0.810106)^k \left(-\frac{1}{2}\right)_k}{k!}$$

- $$\frac{18}{10^3} + \frac{4\pi\, 0.907673\left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right)}{2\pi} = -0.796122 - \frac{0.907673 \sum_{j=0}^{\infty} \text{Res}_{s=-j}\, e^{0.21059 s}\, \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{\sqrt{\pi}}$$

$$\frac{18}{10^3} + \frac{1}{2\pi} 4\pi\, 0.907673 \left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right) =$$

$$-0.796122 + 1.81535 \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (1.81011 - z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

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

And:

(47/10^3-4/10^3)+1/(2Pi) (((((4*Pi*0.907673 (((((sqrt(((0.97536759^4+(1.90268749507^2)/4))))))-2/3*0.724963711183*0.97536759^3)))))))

Input interpretation:

$$\left(\frac{47}{10^3} - \frac{4}{10^3}\right) + \frac{1}{2\pi}\left(4\pi \times 0.907673 \left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}} + \frac{2}{3} \times 0.97536759^3 \times (-0.724963711183)\right)\right)$$

Result:

1.671248248273008083632001148140858655592507517622144737179...

1.671248248…

We note that 1.671248248... is a result practically equal to the value of the formula:

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

that is the holographic proton mass

Series representations:

$$\left(\frac{47}{10^3} - \frac{4}{10^3}\right) + \frac{4\pi\, 0.907673 \left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right)}{2\pi} = -0.771122 + 1.81535 \sum_{k=0}^{\infty} \frac{(-0.810106)^k \left(-\frac{1}{2}\right)_k}{k!}$$

-

$$\left(\frac{47}{10^3} - \frac{4}{10^3}\right) + \frac{4\pi\, 0.907673 \left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right)}{2\pi} = -0.771122 - \frac{0.907673 \sum_{j=0}^{\infty} \text{Res}_{s=-j}\, e^{0.21059 s}\, \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{\sqrt{\pi}}$$

$$\left(\frac{47}{10^3} - \frac{4}{10^3}\right) + \frac{1}{2\pi} 4\pi\, 0.907673 \left(\sqrt{0.975368^4 + \frac{1.902687495070000^2}{4}} - \frac{2 \times 0.7249637111830000 \times 0.975368^3}{3}\right) = -0.771122 + 1.81535 \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (1.81011 - z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

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

Now, from the result:

$$-16.9068\, T + 16.9068 \sqrt{T} - 0.448466 = 0.283328$$

and the solution T_1 = 0.907673, we have 0.907673 – 0.283328 = T_2 = 0.624345

$$4\pi\sqrt{R^4 + \frac{\lambda^2}{4}T_2} - \mu_2 \frac{8\pi}{3} f R^3$$

4*Pi ((((((((sqrt(((0.97536759^4+(1.90268749507^2)/4))))))*0.624345))))) - ((((((0.0502748*((8Pi)/3)* 0.724963711183*0.97536759^3))))))

Input interpretation:

$$4\pi\left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}} \times 0.624345\right) - 0.0502748 \times \frac{8\pi}{3} \times 0.724963711183 \times 0.97536759^3$$

Result:

10.2724...

10.2724…

Percent decrease:

$$4\pi\left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}}\ 0.624345\right) - \frac{1}{3} \times 0.0502748\,(8\pi)\,0.724963711183 \times 0.97536759^3 = 10.2724 \text{ is } 2.68413$$

$$\%\ \text{smaller than } 4\pi\left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}}\ 0.624345\right) = 10.5557.$$

-

Series representations:

$$(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}\ 0.624345-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=-0.0901862\,\pi+2.49738\,\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

-

$$(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}\ 0.624345-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=-0.0901862\,\pi-\frac{1.24869\,\pi\sum_{j=0}^{\infty}\text{Res}_{s=-j}\,e^{0.21059\,s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}\ 0.624345-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=-0.0901862\,\pi+2.49738\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\text{Res}_{z=z_0} f$ is a complex residue

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

Or, for T = 1/16, we obtain:

4*Pi ((((((((sqrt(((0.97536759^4+(1.90268749507^2)/4))))))*1/16))))) - ((((((0.0502748*((8Pi)/3)* 0.724963711183*0.97536759^3))))))

Input interpretation:

$$4\pi\left(\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}\times\frac{1}{16}\right)-0.0502748\times\frac{8\pi}{3}\times 0.724963711183\times 0.97536759^3$$

Result:

0.773348…

0.773348…

Percent decrease:

$$\frac{4}{16}\pi\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}-\frac{1}{3}\times 0.0502748\,(8\pi)\,0.724963711183\times 0.97536759^3=0.773348 \text{ is}$$

$$26.8132\% \text{ smaller than } \frac{4}{16}\pi\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}=1.05668.$$

- **Series representations:**

$$\frac{1}{16}(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=$$
$$-0.0901862\,\pi+0.25\,\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

-

$$\frac{1}{16}(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=$$
$$-0.0901862\,\pi-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}\,e^{0.21059\,s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{8\sqrt{\pi}}$$

$$\frac{1}{16}(4\pi)\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{1}{3}\times 0.0502748\left((8\pi)\,0.7249637111830000\times 0.975368^3\right)=$$

$$-0.0901862\,\pi+0.25\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k\,z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\operatorname{Res}} f$ is a complex residue

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

4Pi*1/16*(((sqrt((((0.97536759^4+(1.90268749507^2)/4))))-((2/3*0.724963711183*0.97536759^3)))))

Input interpretation:

$$4\pi\times\frac{1}{16}\left(\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}-\frac{2}{3}\times 0.724963711183\times 0.97536759^3\right)$$

Result:

0.70445148...

0.70445148…

Series representations:

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi+0.25\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

•

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi-\frac{0.125\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}e^{0.21059s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi+0.25\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

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

Thence, we obtain:

$$V(R) = 4\pi\sqrt{R^4 + \frac{\lambda^2}{4}}T_2 - \mu_2\frac{8\pi}{3}fR^3 = 4\pi T_2\left(\sqrt{R^4 + \frac{\lambda^2}{4}} - \frac{2}{3}fR^3\right)$$

0.773348… ≈ 0.70445148...

Now, we have that:

$$V_k(R) = 4\pi T_2\left(\sqrt{R^4 + \frac{\lambda^2 k^2}{4}} - \frac{2}{3}fR^3\right)$$

For k = 1, we obtain:

4*Pi*1/16*((((sqrt((((0.97536759^4+(1.90268749507^2)/4))))-((2/3*0.724963711183 *0.97536759^3))))))

Input interpretation:

$$4\pi\times\frac{1}{16}\left(\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}-\frac{2}{3}\times 0.724963711183\times 0.97536759^3\right)$$

Result:

0.70445148...

0.70445148…

Note that:

0.70445148 * 2 = 1.40890296 result very near to √2 = 1.414... and to the value of the Ramanujan mock theta function:

$$1+\frac{0.449329}{1+0.449329^2}+\frac{0.449329^4}{(1+0.449329^2)(1+0.449329^4)}$$

1.406436589504891048492970141912370852583779342136575571764...

$\boldsymbol{\phi(q) = 1.40643658\ldots}$

Series representations:

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi+0.25\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

- $$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi-\frac{0.125\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}e^{0.21059 s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2}{3}\left(0.7249637111830000\times 0.975368^3\right)\right)=$$

$$-0.112117\pi+0.25\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

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

Now, we have:

7/3(((((((4*Pi*1/16*((((sqrt((((0.97536759^4+(1.90268749507^2)/4))))-((2/3*0.724963711183 *0.97536759^3))))))))))))

Where 7 and 3 are Lucas numbers

Input interpretation:

$$\frac{7}{3}\left(4\pi\times\frac{1}{16}\left(\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}-\frac{2}{3}\times 0.724963711183\times 0.97536759^3\right)\right)$$

Result:

1.6437201...

1.6437201…. ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Series representations:

$$\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.9026874950700002^2}{4}}-\frac{2\times 0.72496371118300000\times 0.975368^3}{3}\right)\right)7}{16\times 3}=-0.261605\,\pi+0.583333\,\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

-

$$\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.9026874950700002^2}{4}}-\frac{2\times 0.72496371118300000\times 0.975368^3}{3}\right)\right)7}{16\times 3}=-0.261605\,\pi-\frac{0.291667\,\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}e^{0.21059\,s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.9026874950700002^2}{4}}-\frac{2\times 0.72496371118300000\times 0.975368^3}{3}\right)\right)7}{16\times 3}=-0.261605\,\pi+0.583333\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\underset{z=z_0}{\text{Res}} f$ is a complex residue

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

And:

(21/10^3+7/10^3)+7/3(((((((4*Pi*1/16*((((sqrt((((0.97536759^4+(1.90268749507^2)/4))))-((2/3*0.724963711183 *0.97536759^3))))))))))))

Where 21 is a Fibonacci number

Input interpretation:

$$\left(\frac{21}{10^3}+\frac{7}{10^3}\right)+\frac{7}{3}\left(4\pi\times\frac{1}{16}\left(\sqrt{0.97536759^4+\frac{1.90268749507^2}{4}}-\frac{2}{3}\times 0.724963711183\times 0.97536759^3\right)\right)$$

Result:

1.6717201...

1.6717201…

We note that 1.6717201... is a result practically equal to the value of the formula:

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

that is the holographic proton mass

Series representations:

$$\left(\frac{21}{10^3}+\frac{7}{10^3}\right)+\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times0.7249637111830000\times0.975368^3}{3}\right)\right)7}{16\times3}=$$

$$0.028-0.261605\,\pi+0.583333\,\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

- $$\left(\frac{21}{10^3}+\frac{7}{10^3}\right)+\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times0.7249637111830000\times0.975368^3}{3}\right)\right)7}{16\times3}=$$

$$0.028-0.261605\,\pi-\frac{0.291667\,\pi\sum_{j=0}^{\infty}\mathrm{Res}_{s=-j}\,e^{0.21059\,s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$\left(\frac{21}{10^3}+\frac{7}{10^3}\right)+\frac{\left(4\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{2\times0.7249637111830000\times0.975368^3}{3}\right)\right)7}{16\times3}=$$

$$0.028-0.261605\,\pi+0.583333\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k\,z_0^{-k}}{k!}$$

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

We have also:

where $C > 0$ is a positive constant parameter. As in the previous discussion, we obtain the effective potential for R as

$$V(R) = 4\pi T_2 \left(\sqrt{R^4 + \frac{\lambda^2}{4}} - CR^2 \right). \quad (3.38)$$

Here we assume $C < 1$ then the shape of the potential can be drawn as in Fig.2. There is a global minimum at R_c given by

$$R_c^2 = \frac{\lambda}{2}\sqrt{\frac{C^2}{1-C^2}}. \quad (3.39)$$

In particular, if C satisfies

$$C^2 = 1 - \epsilon^2 \quad (\epsilon \ll 1), \quad (3.40)$$

then the radius R_c and the value of the potential becomes

$$R_c \sim \frac{\lambda}{2\epsilon}, \quad V(R_c) \sim 4\pi T_2 \frac{\lambda}{2}\epsilon = T_0\epsilon. \quad (3.41)$$

Therefore, the spherical D2-brane is stable at the macroscopic radius much larger than the string scale, even if $k = 1$, and the energy of the system is much smaller than that of the single D0-brane.

For C = 1/64, we obtain:

4*Pi*1/16* ((((((((sqrt((((0.97536759^4+(1.90268749507^2)/4))))))))-1/64*0.97536759^2))))

Input interpretation:

$$4\pi \times \frac{1}{16}\left(\sqrt{0.97536759^4 + \frac{1.90268749507^2}{4}} - \frac{1}{64} \times 0.97536759^2\right)$$

Result:

1.0450015...

1.0450015…

Series representations:

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{0.975368^2}{64}\right)=$$

$$-0.00371618\,\pi+0.25\,\pi\sum_{k=0}^{\infty}\frac{(-0.810106)^k\left(-\frac{1}{2}\right)_k}{k!}$$

- $$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{0.975368^2}{64}\right)=$$

$$-0.00371618\,\pi-\frac{0.125\,\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}e^{0.21059\,s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}$$

$$\frac{4}{16}\pi\left(\sqrt{0.975368^4+\frac{1.902687495070000^2}{4}}-\frac{0.975368^2}{64}\right)=$$

$$-0.00371618\,\pi+0.25\,\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(1.81011-z_0)^k\,z_0^{-k}}{k!}$$

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

$n!$ is the factorial function

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

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

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

From:

$$R_c^2=\frac{\lambda}{2}\sqrt{\frac{C^2}{1-C^2}}.$$

And

$$C^2=1-\epsilon^2\quad(\epsilon\ll 1)$$

$C^2 = 1 – (1/64)^2 = 0.999755859375$

1.90268749507/2*(((sqrt(((0.999755859375/(1-0.999755859375))))))

Input interpretation:

$$\frac{1.90268749507}{2}\sqrt{\frac{0.999755859375}{1-0.999755859375}}$$

Result:

60.8785670...

60.8785670...

From:

$$R_c \sim \frac{\lambda}{2\epsilon}, \quad V(R_c) \sim 4\pi T_2 \frac{\lambda}{2}\epsilon = T_0\epsilon.$$

And

$$V(R_c) \sim 4\pi T_2 \frac{\lambda}{2}\epsilon$$

4Pi*1/16*(1.90268749507/2)*1/64

Input interpretation:

$$4\pi \times \frac{1}{16} \times \frac{1.90268749507}{2} \times \frac{1}{64}$$

Result:

0.0116747442512...

0.0116747442512…

Alternative representations:

$$\frac{(4\pi)\,1.902687495070000}{16 \times 2 \times 64} = \frac{684.9674982252000\,°}{16 \times 64}$$

- $$\frac{(4\pi)\,1.902687495070000}{16 \times 2 \times 64} = -\frac{3.805374990140000\,i \log(-1)}{16 \times 64}$$

- $$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = \frac{3.805374990140000 \cos^{-1}(-1)}{16\times 64}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = 0.01486474605523438 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

- $$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = -0.007432373027617188 + 0.007432373027617188 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

- $$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = 0.003716186513808594 \sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

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

Integral representations:

$$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = 0.007432373027617188 \int_0^{\infty} \frac{1}{1+t^2}\, dt$$

- $$\frac{(4\pi)\, 1.902687495070000}{16\times 2\times 64} = 0.01486474605523438 \int_0^{1} \sqrt{1-t^2}\, dt$$

- $$\frac{(4\pi)\,1.902687495070000}{16 \times 2 \times 64} = 0.007432373027617188 \int_0^\infty \frac{\sin(t)}{t}\,dt$$

From:

Fat Inflatons, Large Turns and the η-problem
Dibya Chakraborty, Roberta Chiovoloni, Oscar Loaiza-Brito, Gustavo Niz, Ivonne Zavala - arXiv:1908.09797v2 [hep-th] 27 Aug 2019

4.1 Effective 4D action and cosmological equations

Our starting action is given by (see eq. (3.24))

$$S_4 = \int d^4x\sqrt{-\mathrm{g}}\left[\frac{M_{\mathrm{Pl}}^2}{2}R_4 + \frac{1}{2}g_{ij}v^iv^j - V(r,\theta)\right] \tag{4.1}$$

where the four dimensional metric is the FRW metric (2.2), g_{ij} is defined in (3.25) and the full expression for the scalar potential is given by (see (3.25), (3.31), (3.33)):

$$V(r,\theta) = V_0 + 4\pi p T_5 \mathcal{H}^{-1}\left[\mathcal{F}^{1/2} - \ell_s^2\pi q g_s\right] + \gamma\left[\overline{\Phi}_- + \Phi_h\right], \tag{4.2}$$

where $\gamma = 4\pi^2\ell_s^2 pqT_5 g_s$ and (see (3.24),(3.25))

$$\mathcal{F} = \frac{\mathcal{H}}{9}(r^2+3u^2)^2 + (\pi\ell_s^2 q)^2 \tag{4.3}$$

$$\overline{\Phi}_- = \frac{5}{72}\left[81\left(9\rho^2-2\right)\rho^2 + 162\log\left(9\left(\rho^2+1\right)\right) - 9 - 160\log(10)\right] \tag{4.4}$$

$$\Phi_h = a_0\left[\frac{2}{\rho^2} - 2\log\left(\frac{1}{\rho^2}+1\right)\right] + 2a_1\left[6+\frac{1}{\rho^2} - 2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta + \frac{b_1}{2}\left(2+3\rho^2\right)\cos\theta\,. \tag{4.5}$$

As we explained in the previous section, the coefficients a_0, a_1, b_1 are arbitrary, but small (in [46] $a_1 = 0$). We have also introduced a constant piece V_0, which we tune in order to downlift the de Sitter minimum of the potential to Minkowski. The reasons behind are twofold. This term will encode any unknown physics that may shift these minima to Minkowski. For example, due to the explicit stabilisation mechanism of the closed string moduli, which we haven't included. Moreover, the recently proposed dS swampland conjectures [5–7] exclude dS minima in string theory, if correct, while Minkowski minima are allowed.

Finally, the four dimensional Planck mass, M_{Pl} after compactification is given by (see (3.1))

$$M_{\mathrm{Pl}}^2 \gtrsim \kappa_{10}^{-2}\,\mathrm{Vol}\left(T^{1,1}\right)\int_0^u y^5\mathcal{H}(y) \sim \frac{Nu^2}{4(2\pi)^3 g_s\ell_s^4}\,. \tag{4.6}$$

where we used that $\mathrm{Vol}\left(T^{1,1}\right) = 16\pi^3/27$ and assumed that most of the volume comes from the throat, approximating $\mathcal{H}\sim L^4/\rho^4$. For concreteness, for the cosmological solutions we fix M_{Pl} to the lower bound.

N	g_s	ℓ_s	u	q	a_0	a_1	b_1
1000	0.01	501.961	$50\ell_s$	1	0.001	0.0005	0.001

(remember that $\rho = r/3u$)

$$n_s = 1 - 2\,\epsilon - \eta\,, \qquad r = 16\epsilon$$

$r_{min} = 21.414$ and $\theta_{min} = \pi$,

u = 50 * 501.961 = 25098.05 Planck units

ρ = 0.000284404565

$$\overline{\Phi}_{-} = \frac{5}{72}\left[81\left(9\rho^2 - 2\right)\rho^2 + 162\log\left(9\left(\rho^2+1\right)\right) - 9 - 160\log(10)\right]$$

5/72(((((((81(9* 0.000284404565^2-2)* 0.000284404565^2+162 ln(9*(0.000284404565^2+1))-9-160 ln(10))))))))

Input interpretation:

$$\frac{5}{72}\left(81\left(9\times 0.000284404565^2 - 2\right)\times 0.000284404565^2 + 162\log\left(9\left(0.000284404565^2+1\right)\right) - 9 - 160\log(10)\right)$$

log(x) is the natural logarithm

Result:

−1.49050231601219...

-1.49050231601219….

Alternative representations:

$$\frac{1}{72}\left(81\left(9\times 0.000284405^2 - 2\right)0.000284405^2 + 162\log\left(9\left(0.000284405^2+1\right)\right) - 9 - 160\log(10)\right)5 = \frac{5}{72}\left(-9 - 160\log(a)\log_a(10) + 162\log(a)\log_a\left(9\left(1+0.000284405^2\right)\right) + 81\times 0.000284405^2\left(-2 + 9\times 0.000284405^2\right)\right)$$

•

$$\frac{1}{72}\left(81\left(9\times0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=\frac{5}{72}\left(-9-160\log_e(10)+162\log_e\left(9\left(1+0.000284405^2\right)\right)+81\times0.000284405^2\left(-2+9\times0.000284405^2\right)\right)$$

- $$\frac{1}{72}\left(81\left(9\times0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=\frac{5}{72}\left(-9+160\,\mathrm{Li}_1(-9)-162\,\mathrm{Li}_1\left(1-9\left(1+0.000284405^2\right)\right)+81\times0.000284405^2\left(-2+9\times0.000284405^2\right)\right)$$

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

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

Series representations:

$$\frac{1}{72}\left(81\left(9\times0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=-0.625001+11.25\log(8.)-11.1111\log(9)+\sum_{k=1}^{\infty}\frac{11.1111\left(-\frac{1}{9}\right)^k-11.25\,(-1)^k\,e^{-2.07944\,k}}{k}$$

- $$\frac{1}{72}\left(81\left(9\times0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=-0.625001+22.5\,i\,\pi\left\lfloor\frac{\arg(9.-x)}{2\,\pi}\right\rfloor-22.2222\,i\,\pi\left\lfloor\frac{\arg(10-x)}{2\,\pi}\right\rfloor+0.138889\log(x)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(-11.25\,(9.-x)^k+11.1111\,(10-x)^k\right)x^{-k}}{k}\quad\text{for } x<0$$

-

$$\frac{1}{72}\left(81\left(9\times 0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=$$
$$-0.625001+\frac{45}{4}\left\lfloor\frac{\arg(9.-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-11.1111\left\lfloor\frac{\arg(10-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+$$
$$0.138889\log(z_0)+\frac{45}{4}\left\lfloor\frac{\arg(9.-z_0)}{2\pi}\right\rfloor\log(z_0)-11.1111\left\lfloor\frac{\arg(10-z_0)}{2\pi}\right\rfloor\log(z_0)+$$
$$\sum_{k=1}^{\infty}\frac{(-1)^k\left(-11.25\,(9.-z_0)^k+11.1111\,(10-z_0)^k\right)z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

Integral representations:

$$\frac{1}{72}\left(81\left(9\times 0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=-0.625001+\int_1^{9.}\frac{-1.25+0.138889\,t}{(-0.111111+t)\,t}\,dt$$

-

$$\frac{1}{72}\left(81\left(9\times 0.000284405^2-2\right)0.000284405^2+162\log\left(9\left(0.000284405^2+1\right)\right)-9-160\log(10)\right)5=-0.625001+$$
$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{5.625\times 9^{-s}\,e^{-2.07944\,s}\left(9^s-0.987654\,e^{2.07944\,s}\right)\Gamma(-s)^2\,\Gamma(1+s)}{i\,\pi\,\Gamma(1-s)}\,ds$$
for $-1<\gamma<0$

Γ(x) is the gamma function

And:

0.001*((((2/0.000284404565^2-2ln(1/(0.000284404565^2)+1)))))+2*0.0005*((((((6+1/0.000284404565^2-2(2+3*0.000284404565^2)ln(1+1/(0.000284404565^2))))))))*cosPi + 0.001/2(2+3*0.000284404565^2)*cosPi

$$\Phi_h = a_0\left[\frac{2}{\rho^2} - 2\log\left(\frac{1}{\rho^2}+1\right)\right] + 2a_1\left[6 + \frac{1}{\rho^2} - 2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta + \frac{b_1}{2}(2+3\rho^2)\cos\theta\,.$$

Input interpretation:

$$0.001\left(\frac{2}{0.000284404565^2} - 2\log\left(\frac{1}{0.000284404565^2}+1\right)\right) + 2\times 0.0005\left(6 + \frac{1}{0.000284404565^2} - 2\left(2+3\times 0.000284404565^2\right)\log\left(1+\frac{1}{0.000284404565^2}\right)\right)\cos(\pi) + \frac{0.001}{2}\left(2+3\times 0.000284404565^2\right)\cos(\pi)$$

log(x) is the natural logarithm

Result:

12363.1...

12363.1….

Alternative representations:

$$0.001\left(\frac{2}{0.000284405^2} - 2\log\left(\frac{1}{0.000284405^2}+1\right)\right) + 2\times 0.0005\left(6 + \frac{1}{0.000284405^2} - 2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi) + \frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 0.0005\cosh(-i\pi)\left(2+3\times 0.000284405^2\right) + 0.001\cosh(-i\pi)\left(\left(6 - 2\log\left(1+\frac{1}{0.000284405^2}\right)\right)\left(2+3\times 0.000284405^2\right) + \frac{1}{0.000284405^2}\right) + 0.001\left(-2\log\left(1+\frac{1}{0.000284405^2}\right) + \frac{2}{0.000284405^2}\right)$$

-

$$0.001\left(\frac{2}{0.000284405^2} - 2\log\left(\frac{1}{0.000284405^2}+1\right)\right) + 2\times 0.0005\left(6 + \frac{1}{0.000284405^2} - 2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi) + \frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 0.0005\cosh(i\pi)\left(2+3\times 0.000284405^2\right) + 0.001\cosh(i\pi)\left(\left(6 - 2\log(a)\log_a\left(1+\frac{1}{0.000284405^2}\right)\right)\left(2+3\times 0.000284405^2\right) + \frac{1}{0.000284405^2}\right) + 0.001\left(-2\log(a)\log_a\left(1+\frac{1}{0.000284405^2}\right) + \frac{2}{0.000284405^2}\right)$$

-

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 =$$

$$0.0005\cosh(i\pi)\left(2+3\times 0.000284405^2\right)+0.001\cosh(i\pi)\left(6-2\log_e\left(1+\frac{1}{0.000284405^2}\right)\left(2+3\times 0.000284405^2\right)+\frac{1}{0.000284405^2}\right)+0.001\left(-2\log_e\left(1+\frac{1}{0.000284405^2}\right)+\frac{2}{0.000284405^2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

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

i is the imaginary unit

Series representations:

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 24726.2-0.002\log\left(1.23631\times 10^7\right)+\left(12363.1-0.004\log\left(1.23631\times 10^7\right)\right)\sum_{k=0}^{\infty}\frac{(-1)^k\pi^{2k}}{(2k)!}$$

•

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 24726.2-0.002\log\left(1.23631\times 10^7\right)+\left(12363.1-0.004\log\left(1.23631\times 10^7\right)\right)\sum_{k=0}^{\infty}\frac{\cos\left(\frac{k\pi}{2}+z_0\right)(\pi-z_0)^k}{k!}$$

•

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 24726.2+12363.1\,J_0(\pi)-0.002\log\left(1.23631\times 10^7\right)-0.004\,J_0(\pi)\log\left(1.23631\times 10^7\right)+\sum_{k=1}^{\infty}(-1)^k J_{2k}(\pi)\left(24726.2-0.008\log\left(1.23631\times 10^7\right)\right)$$

$n!$ is the factorial function

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

Integral representations:

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 37089.3+\int_0^1 \pi\left(-12363.1+0.004\log\left(1.23631\times 10^7\right)\right)\sin(\pi t)\,dt-0.006\log\left(1.23631\times 10^7\right)$$

•

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 24726.2+\int_{\frac{\pi}{2}}^{\pi}\left(-12363.1+0.004\log\left(1.23631\times 10^7\right)\right)\sin(t)\,dt-0.002\log\left(1.23631\times 10^7\right)$$

•

$$0.001\left(\frac{2}{0.000284405^2}-2\log\left(\frac{1}{0.000284405^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.000284405^2}-2\left(2+3\times 0.000284405^2\right)\log\left(1+\frac{1}{0.000284405^2}\right)\right)\cos(\pi)+\frac{1}{2}\left(\left(2+3\times 0.000284405^2\right)\cos(\pi)\right)0.001 = 37089.3+\int_1^{1.23631\times 10^7}\left(-\frac{0.006}{t}-0.001\,\pi\sin\left(8.0886\times 10^{-8}\,\pi(-1+t)\right)\right)dt+8.0886\times 10^{-8}\int_0^1\int_0^1\frac{\sin(\pi t_2)}{8.0886\times 10^{-8}+t_1}\,dt_2\,dt_1$$

Multiplying the two results, we obtain:

((-(12363.11119623* (-1.49050231601219))))

Input interpretation:

$-(12\,363.11119623\times(-1.49050231601219))$

Result:

18427.245871097051794162043 7

Repeating decimal:

18 427.245871097051794162043 7

18427.245871….

-(199+18)+4*((-(12363.11119623* (-1.49050231601219))))

Input interpretation:

$-(199+18)+4(-(12\,363.11119623\times(-1.49050231601219)))$

Result:

73491.98348438820717664817 48

73491.98348….

We can to obtain, the following mathematical connection, with the previous equation:

$$-(199+18)+4\left(\begin{array}{c}\frac{5}{72}\left[81\left(9\rho^2-2\right)\rho^2+162\log\left(9\left(\rho^2+1\right)\right)-9-160\log(10)\right]\\ \times -a_0\left[\frac{2}{\rho^2}-2\log\left(\frac{1}{\rho^2}+1\right)\right]+2a_1\left[6+\frac{1}{\rho^2}-2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta\\ +\frac{b_1}{2}\left(2+3\rho^2\right)\cos\theta\,.\end{array}\right)$$

$= 73491.98438 \Rightarrow$

$$-3927+2\left(\sqrt[13]{\frac{N\exp\left[\int d\widehat{\sigma}\left(-\frac{1}{4u^2}\mathbf{P}_i D\mathbf{P}_i\right)\right]|Bp\rangle_{\rm NS}}{\int[d\mathbf{X}^\mu]\exp\left\{\int d\widehat{\sigma}\left(-\frac{1}{4v^2}D\mathbf{X}^\mu D^2\mathbf{X}^\mu\right)\right\}|\mathbf{X}^\mu,\mathbf{X}^i=0\rangle_{\rm NS}}+}\right)$$

= 73490.8437525....

And:

-(((5778+29+8)-11*((-(12363.11119623* (-1.49050231601219))))))

Input interpretation:

$$-((5778+29+8)-11(-(12363.11119623\times(-1.49050231601219))))$$

Result:

196884.7045820675697357824807

196884.7….

$$-(5778+29+8)-11\left(\begin{array}{c}\frac{5}{72}\left[81\left(9\rho^2-2\right)\rho^2+162\log\left(9\left(\rho^2+1\right)\right)-9-160\log(10)\right]\\ \times-a_0\left[\frac{2}{\rho^2}-2\log\left(\frac{1}{\rho^2}+1\right)\right]+2a_1\left[6+\frac{1}{\rho^2}-2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta\\ +\frac{b_1}{2}\left(2+3\rho^2\right)\cos\theta\,.\end{array}\right)$$

= 196884.704582...

that can be connected with another previous equation:

$$\left((3571+233+11)+\frac{1}{4}\left(-\left(-\frac{3}{2\sqrt{2}}\left(2.33181\times10^{21}\times\frac{1}{4096}\right)+\left(\frac{3}{2\sqrt{2}}\times4.1666\times10^{-19}\left(2.33181\times10^{21}\right)^2\right)\left(\frac{1}{4096}\right)^2\right)\right)\wedge(1/3)\right)$$

$$= 196884.3612355790262930818210234562962529826220937890171828...$$

$$= 196884.36$$

Thence:

$$-(5778+29+8)-11\left(\begin{array}{c}\frac{5}{72}\left[81\left(9\rho^2-2\right)\rho^2+162\log\left(9\left(\rho^2+1\right)\right)-9-160\log(10)\right] \\ \times -a_0\left[\frac{2}{\rho^2}-2\log\left(\frac{1}{\rho^2}+1\right)\right]+2a_1\left[6+\frac{1}{\rho^2}-2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta \\ +\frac{b_1}{2}\left(2+3\rho^2\right)\cos\theta\,.\end{array}\right)$$

= 196884.704582... ⇒

$$\Rightarrow\left((3571+233+11)+\frac{1}{4}\left(-\left(-\frac{3}{2\sqrt{2}}\left(2.33181\times10^{21}\times\frac{1}{4096}\right)+\left(\frac{3}{2\sqrt{2}}\times4.1666\times10^{-19}\left(2.33181\times10^{21}\right)^2\right)\left(\frac{1}{4096}\right)^2\right)\right)\wedge(1/3)\right)=$$

= 196884.3612355790262930818210234562962529826220937890171828...

= 196884.36

Now, we have that:

Finally, the four dimensional Planck mass, $M_{\rm Pl}$ after compactification is given by (3.1))

$$M_{\rm Pl}^2 \gtrsim \kappa_{10}^{-2}\,{\rm Vol}\,(T^{1,1})\int_0^u y^5\mathcal{H}(y) \sim \frac{Nu^2}{4(2\pi)^3 g_s \ell_s^4}\,.$$

From:

$$M_{\rm Pl}^2 \gtrsim \kappa_{10}^{-2}\,{\rm Vol}\,(T^{1,1})\int_0^u y^5\mathcal{H}(y) \sim \frac{Nu^2}{4(2\pi)^3 g_s \ell_s^4}$$

We obtain:

((1000*(50*501.961)^2)) / (((4*(2Pi)^3*0.01*501.961^4)))

Input interpretation:

$$\frac{1000\,(50\times501.961)^2}{4\,(2\,\pi)^3\times0.01\times501.961^4}$$

Result:

1.000001060617684410186205575315043304529922624690292755028...

1.000001060617…

Alternative representations:

$$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{1000 \times 25\,098.1^2}{0.04 \times 501.961^4 \, (360\,°)^3}$$

- $$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{1000 \times 25\,098.1^2}{0.04 \times 501.961^4 \, (-2\, i \log(-1))^3}$$

- $$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{1000 \times 25\,098.1^2}{0.04 \times 501.961^4 \, (2 \cos^{-1}(-1))^3}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{0.484474}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^3}$$

- $$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{3.87579}{\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^3}$$

- $$\frac{1000 (50 \times 501.961)^2}{4 (2 \pi)^3 \, 0.01 \times 501.961^4} = \frac{31.0063}{\left(\sum_{k=0}^{\infty} \frac{2^{-k} (-6+50k)}{\binom{3k}{k}}\right)^3}$$

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

Integral representations:

$$\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4} = \frac{3.87579}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^3}$$

- $$\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4} = \frac{0.484474}{\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^3}$$

- $$\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4} = \frac{3.87579}{\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^3}$$

From the inverse, we obtain:

1/(((((1000*(50*501.961)^2)) / (((4*(2Pi)^3*0.01*501.961^4))))))

Input interpretation:

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\times 0.01\times 501.961^4}}$$

Result:

0.99999893938344049849318001132499555729564996978468976 5221...

0.99999893938344…. result that is a good approximation to the value of the following Rogers-Ramanujan continued fraction:

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

Alternative representations:

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = \frac{1}{\frac{1000\times 25\,098.1^2}{0.04\times 501.961^4\,(360\,°)^3}}$$

- $$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = \frac{1}{\frac{1000\times 25\,098.1^2}{0.04\times 501.961^4\,(-2\,i\log(-1))^3}}$$

- $$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = \frac{1}{\frac{1000\times 25\,098.1^2}{0.04\times 501.961^4\,\left(2\cos^{-1}(-1)\right)^3}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations:

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 2.0641\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^3$$

- $$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 0.258012\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}\right)^3$$

- $$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 0.0322515\left(\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^3$$

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

Integral representations:

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 0.258012\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^3$$

-

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 2.0641\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^3$$

•

$$\frac{1}{\frac{1000\,(50\times 501.961)^2}{4\,(2\,\pi)^3\,0.01\times 501.961^4}} = 0.258012\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^3$$

For this other values:

N	g_s	ℓ_s	u	q	a_0	a_1	b_1
1000	0.01	501.961	$50\ell_s$	1	0.001	0.0005	0.001

(remember that $\rho = r/3u$)

$$n_s = 1 - 2\,\epsilon - \eta\,, \qquad r = 16\epsilon$$

$r_{min} = 456.797$ and $\theta_{min} = 33\pi$,

u = 50 * 501.961 = 25098.05 Planck units

ρ = 456.797/(3*25098.05) = 0.00606683254940788892

we obtain:

5/72(((((((81(9* 0.006066832549^2-2)* 0.006066832549^2+162 ln(9*(0.006066832549^2+1))-9-160 ln(10))))))))

Input interpretation:

$$\frac{5}{72}\left(81\left(9\times 0.006066832549^2 - 2\right)\times 0.006066832549^2 + 162\log\left(9\left(0.006066832549^2 + 1\right)\right) - 9 - 160\log(10)\right)$$

log(x) is the natural logarithm

Result:

−1.490502255050...

-1.490502255050…

Alternative representations:

$$\frac{1}{72}\left(81\left(9\times0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=\frac{5}{72}\left(-9-160\log(a)\log_a(10)+162\log(a)\log_a\left(9\left(1+0.00606683^2\right)\right)+81\times0.00606683^2\left(-2+9\times0.00606683^2\right)\right)$$

- $$\frac{1}{72}\left(81\left(9\times0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=\frac{5}{72}\left(-9-160\log_e(10)+162\log_e\left(9\left(1+0.00606683^2\right)\right)+81\times0.00606683^2\left(-2+9\times0.00606683^2\right)\right)$$

- $$\frac{1}{72}\left(81\left(9\times0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=\frac{5}{72}\left(-9+160\,\mathrm{Li}_1(-9)-162\,\mathrm{Li}_1\left(1-9\left(1+0.00606683^2\right)\right)+81\times0.00606683^2\left(-2+9\times0.00606683^2\right)\right)$$

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

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

Series representations:

$$\frac{1}{72}\left(81\left(9\times0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=-0.625414+11.25\log(8.00033)-11.1111\log(9)+\sum_{k=1}^{\infty}\frac{11.1111\left(-\frac{1}{9}\right)^k-11.25\,(-1)^k\,e^{-2.07948\,k}}{k}$$

-

$$\frac{1}{72}\left(81\left(9\times 0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=-0.625414+22.5\,i\,\pi\left\lfloor\frac{\arg(9.00033-x)}{2\pi}\right\rfloor-22.2222\,i\,\pi\left\lfloor\frac{\arg(10-x)}{2\pi}\right\rfloor+0.138889\log(x)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(-11.25\,(9.00033-x)^k+11.1111\,(10-x)^k\right)x^{-k}}{k}\quad\text{for } x<0$$

- $$\frac{1}{72}\left(81\left(9\times 0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=-0.625414+22.5\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{9.00033}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor-22.2222\,i\,\pi\left\lfloor-\frac{-\pi+\arg\left(\frac{10}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+0.138889\log(z_0)+\sum_{k=1}^{\infty}\frac{(-1)^k\left(-11.25\,(9.00033-z_0)^k+11.1111\,(10-z_0)^k\right)z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

Integral representations:

$$\frac{1}{72}\left(81\left(9\times 0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=-0.625414+\int_1^{9.00033}\frac{-1.24959+0.138889\,t}{(-0.111074+t)\,t}\,dt$$

- $$\frac{1}{72}\left(81\left(9\times 0.00606683^2-2\right)0.00606683^2+162\log\left(9\left(0.00606683^2+1\right)\right)-9-160\log(10)\right)5=-0.625414+\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{5.625\times 9^{-s}\,e^{-2.07948\,s}\left(9^s-0.987654\,e^{2.07948\,s}\right)\Gamma(-s)^2\,\Gamma(1+s)}{i\,\pi\,\Gamma(1-s)}\,ds\quad\text{for } -1<\gamma<0$$

And:

0.001*((((2/0.006066832549^2-2ln(1/(0.006066832549^2)+1)))))+2*0.0005*((((((6+1/0.006066832549^2-2(2+3*0.006066832549^2)ln(1+1/(0.006066832549^2))))))))*cos33Pi + 0.001/2(2+3*0.006066832549^2)*cos33Pi

Input interpretation:

$$0.001\left(\frac{2}{0.006066832549^2}-2\log\left(\frac{1}{0.006066832549^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.006066832549^2}-2\left(2+3\times 0.006066832549^2\right)\log\left(1+\frac{1}{0.006066832549^2}\right)\right)\cos(33)\,\pi+\frac{0.001}{2}\left(2+3\times 0.006066832549^2\right)\cos(33)\,\pi$$

log(x) is the natural logarithm

Result:

53.1861...

53.1861…

Alternative representations:

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\,\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\,\pi=0.0005\,\pi\cosh(-33\,i)\left(2+3\times 0.00606683^2\right)+0.001\,\pi\cosh(-33\,i)\left(6-2\log\left(1+\frac{1}{0.00606683^2}\right)\left(2+3\times 0.00606683^2\right)+\frac{1}{0.00606683^2}\right)+0.001\left(-2\log\left(1+\frac{1}{0.00606683^2}\right)+\frac{2}{0.00606683^2}\right)$$

•

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\,\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\,\pi=0.0005\,\pi\cosh(33\,i)\left(2+3\times 0.00606683^2\right)+0.001\,\pi\cosh(33\,i)\left(6-2\log(a)\log_a\left(1+\frac{1}{0.00606683^2}\right)\left(2+3\times 0.00606683^2\right)+\frac{1}{0.00606683^2}\right)+0.001\left(-2\log(a)\log_a\left(1+\frac{1}{0.00606683^2}\right)+\frac{2}{0.00606683^2}\right)$$

•

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+ 2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right) \cos(33)\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi =$$
$$0.0005\,\pi\cosh(33\,i)\left(2+3\times 0.00606683^2\right)+0.001\,\pi\cosh(33\,i) \left(6-2\log_e\left(1+\frac{1}{0.00606683^2}\right)\left(2+3\times 0.00606683^2\right)+\frac{1}{0.00606683^2}\right)+ 0.001\left(-2\log_e\left(1+\frac{1}{0.00606683^2}\right)+\frac{2}{0.00606683^2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

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

i is the imaginary unit

Series representations:

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+ 2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right) \cos(33)\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi =$$
$$54.3383-0.002\log(27\,170.1)+\sum_{k=0}^{\infty}\frac{(-1089)^k\,\pi\,(27.1761-0.00400022\log(27\,170.1))}{(2k)!}$$

•

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005 \left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\pi+ \frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi = 54.3383-0.002\log(27\,170.1)+ \pi\,(27.1761-0.00400022\log(27\,170.1))\sum_{k=0}^{\infty}\frac{\cos\left(\frac{k\pi}{2}+z_0\right)(33-z_0)^k}{k!}$$

•

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi = 54.3383+27.1761\pi J_0(33)-0.002\log(27\,170.1)-0.00400022\pi J_0(33)\log(27\,170.1)+\sum_{k=1}^{\infty}(-1)^k\pi J_{2k}(33)(54.3523-0.00800044\log(27\,170.1))$$

$n!$ is the factorial function

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

Integral representations:

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi = 54.3383+\int_{\frac{\pi}{2}}^{33}\pi(-27.1761+0.00400022\log(27\,170.1))\sin(t)\,dt-0.002\log(27\,170.1)$$

-

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\left(2+3\times 0.00606683^2\right)\log\left(1+\frac{1}{0.00606683^2}\right)\right)\cos(33)\pi+\frac{1}{2}\left(2+3\times 0.00606683^2\right)0.001\cos(33)\pi = 54.3383+27.1761\pi+\int_0^1\pi(-896.813+0.132007\log(27\,170.1))\sin(33t)\,dt-0.002\log(27\,170.1)-0.00400022\pi\log(27\,170.1)$$

-

$$0.001\left(\frac{2}{0.00606683^2}-2\log\left(\frac{1}{0.00606683^2}+1\right)\right)+ 2\times 0.0005\left(6+\frac{1}{0.00606683^2}-2\,(2+3\times 0.00606683^2)\log\left(1+\frac{1}{0.00606683^2}\right)\right) \cos(33)\,\pi+\frac{1}{2}\,(2+3\times 0.00606683^2)\,0.001\cos(33)\,\pi =$$

$$0.132007\left(411.631+205.869\,\pi+7.57534\int_1^{27170.1}\frac{-0.002-0.00400022\,\pi-0.0330085\,\pi\,t\sin(-0.00121461+0.00121461\,t)}{t}\,dt+ 0.0000368065\int_0^1\int_0^1\frac{\sin(33\,t_2)}{0.0000368065+t_1}\,dt_2\,dt_1\right)$$

Multiplying the two results, we obtain:

(-2207+199+89)+12*(53.1860546717078120379056 * -1.490502255050)^2

Where 2207 and 199 are Lucas numbers, while 89 is a Fibonacci number

Input interpretation:

$$(-2207+199+89)+12\,(53.1860546717078120379056\times(-1.490502255050))^2$$

Result:

73493.28015137826735292028933722943158470896857611755023431...

73493.28015…

Thence, we have the following mathematical connection:

$$-2207+199+89)+12\left(\begin{array}{c}\frac{5}{72}\left[81\left(9\rho^2-2\right)\rho^2+162\log\left(9\left(\rho^2+1\right)\right)-9-160\log(10)\right]\\ \times-a_0\left[\frac{2}{\rho^2}-2\log\left(\frac{1}{\rho^2}+1\right)\right]+2a_1\left[6+\frac{1}{\rho^2}-2(2+3\rho^2)\log\left(1+\frac{1}{\rho^2}\right)\right]\cos\theta\\ +\frac{b_1}{2}\left(2+3\rho^2\right)\cos\theta.\end{array}\right)$$

$$= 73493.28015\ldots \Rightarrow$$

$$\Rightarrow -3927 + 2\left(\sqrt[13]{\frac{N \exp\left[\int d\hat{\sigma}\left(-\frac{1}{4u^2}\mathbf{P}_i D\mathbf{P}_i\right)\right] |Bp\rangle_{\rm NS}}{\int [d\mathbf{X}^\mu] \exp\left\{\int d\hat{\sigma}\left(-\frac{1}{4v^2} D\mathbf{X}^\mu D^2\mathbf{X}^\mu\right)\right\} |\mathbf{X}^\mu, \mathbf{X}^i = 0\rangle_{\rm NS}}} + \right)$$

= 73490.8437525....

From the simple multiplication of the two results, we obtain:

(53.18605467170781203790 56 * -1.490502255050)

Input interpretation:

53.18605467170781203790 56 × (−1.490502255050)

Result:

−79.27393442539308127719983287902328

-79.273934425…

And from the following algebraic sum:

-(-53.18605467170781203790 56 -1.490502255050)

Input interpretation:

−(−53.18605467170781203790 56 − 1.490502255050)

Result:

54.67655692675781203790 56

54.6765569… near to the Fibonacci number 55

And:

-7/10^3+(-(53.18605467170781203790 56 * -1.490502255050))^1/9

where 7 is a Lucas number

Input interpretation:

$$-\frac{7}{10^3} + \sqrt[9]{-(53.18605467170781203790 56 \times (-1.490502255050))}$$

Result:

1.6186029934945...
1.61860299...

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

Fig.1 – Ramanujan mock theta functions (values)

Now, we have also these other results concerning the Ramanujan mock theta functions:

$R = -1.08185$; $R = 1.08753454$; $R = 1.08094974$; $SUM = R_a = 1.08663428$

$R_b = -4267.24$; $R_c = 6.5960861587 * 10^{20}$

$R_d = -1.0058343895 * 10^{-12}$; $R_e = -5.74968 * 10^{-40}$; $R_f = -4.9290621621 * 10^{6}$;

$R_g = 4.04237000433962 * 10^{14}$; $R_h = 3.0773505768788923 * 10^{13}$;

$R_i = -0.0818160338$; $R_l = -2498.279529$; $R_m = -0.07609064$; $R_n = 0.923910279$;

$R_o = 33021.1005$; $R_p = -2122.1867$; $R_q = 1.63161 * 10^{20}$; $R_r = 9.39267 * 10^{17}$;

$R_s = -0.0814135...$; $R_t = -1.0061571663...$; $R_u = 0.924340867458$.

Table 1

From:

Three-dimensional AdS gravity and extremal CFTs at
c = 8m - *Spyros D. Avramis, Alex Kehagias and Constantina Mattheopoulou*
Received: September 7, 2007 - Accepted: October 28, 2007 - Published: November 9, 2007

m	L_0	d	S	S_{BH}
3	1	196883	12.1904	12.5664
	2	21296876	16.8741	17.7715
	3	842609326	20.5520	21.7656
4	2/3	139503	11.8458	11.8477
	5/3	69193488	18.0524	18.7328
	8/3	6928824200	22.6589	23.6954
5	1/3	20619	9.9340	9.3664
	4/3	86645620	18.2773	18.7328
	7/3	24157197490	23.9078	24.7812

m	L_0	d	S	S_{BH}
6	1	42987519	17.5764	17.7715
	2	40448921875	24.4233	25.1327
	3	8463511703277	29.7668	30.7812
7	2/3	7402775	15.8174	15.6730
	5/3	33934039437	24.2477	24.7812
	8/3	16953652012291	30.4615	31.3460
8	1/3	278511	12.5372	11.8477
	4/3	13996384631	23.3621	23.6954
	7/3	19400406113385	30.5963	31.3460

Table 1: Degeneracies, microscopic entropies and semiclassical entropies for the first few values of m and L_0.

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