On the mathematical connections with some Hawking's Cosmology equations and a Ramanujan equation linked to a formula concerning the "Pair Creation of Black Holes During Inflation" of Hawking-Bousso

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Abstract

In this paper we have described the mathematical connections with some Hawking's Cosmology equations and a Ramanujan equation linked to a formula concerning the "Pair Creation of Black Holes During Inflation" of Hawking-Bousso

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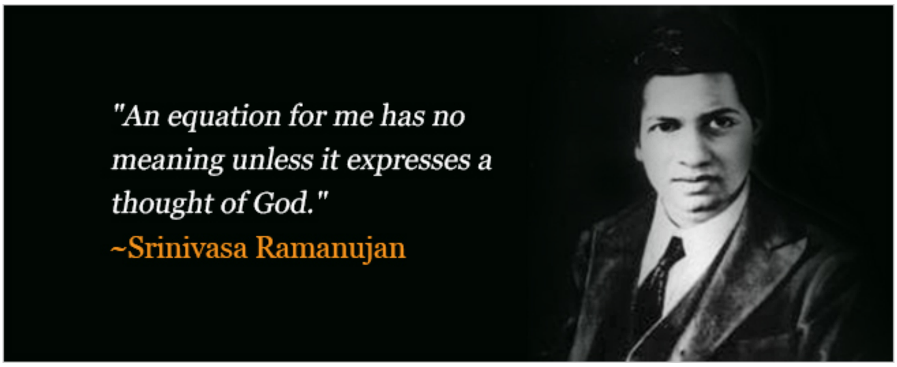


http://www.aicte-india.org/content/srinivasa-ramanujan

From

A Smooth Exit from Eternal Inflation?
S. W. Hawking and Thomas Hertog - arXiv:1707.07702v3 [hep-th] 20 Apr 2018

we have the following equation:

$$\frac{2\pi^2}{\sqrt{(1+A)(1+B)}}\left(\frac{m^2}{f}-\tilde{m}^2\right)=-\frac{\partial\log Z_{\text{free}}[m^2]}{\partial m^2}\,. \qquad (2.13)$$

for A = -0.85, B = 2, m^2 = -0.8, $\tilde{m}^2 = 0.05i$

(2Pi^2)/(((1-0.85)(1+2)))^1/2 ((-0.8/f) +0.05i)

Input:

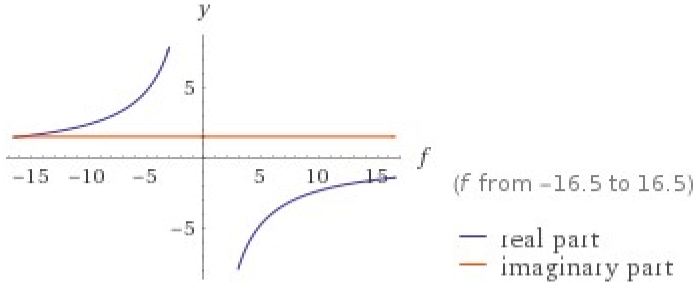
$$\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}}\times\left(-\frac{0.8}{f}+0.05\,i\right)$$

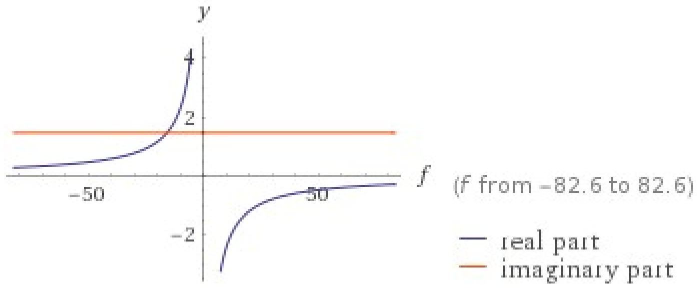
i is the imaginary unit

Result:

$$29.4255\left(-\frac{0.8}{f}+0.05\,i\right)$$

Plots:





Alternate forms:

$$-\frac{23.5404}{f}+1.47127\,i$$

$$-\frac{23.5404-(1.47127\,i)\,f}{f}$$

$$\frac{(1.47127\,i)\,((1+0\,i)\,f+16\,i)}{f}$$

Expanded form:

$$\frac{-23.5404+(1.47127\,i)\,f}{f}$$

Complex root:

$$f=-16\,i$$

-16*i*

Derivative:

$$\frac{d}{df}\left(\frac{(2\,\pi^2)\times\left(-\frac{0.8}{f}+0.05\,i\right)}{\sqrt{(1-0.85)\,(1+2)}}\right)=\frac{23.5404}{f^2}$$

Indefinite integral:

$$\int\frac{(2\,\pi^2)\left(-\frac{0.8}{f}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\,df=-23.5404\log(f)+(1.47127\,i)\,f+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Series representations:

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = \frac{0.596285\,(-16+f\,i)\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}{f}$$

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = \frac{0.149071\,(-16+f\,i)\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50\,k)}{\binom{3k}{k}}\right)^2}{f}$$

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = 2.98142\left(-\frac{0.8}{f}+0.05\,i\right)\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2$$

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

Integral representations:

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = \frac{0.596285\left(-16\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2+f\,i\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2\right)}{f}$$

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = \frac{0.596285\left(-16\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2+f\,i\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2\right)}{f}$$

$$\frac{\left(-\frac{0.8}{f}+0.05\,i\right)(2\,\pi^2)}{\sqrt{(1-0.85)(1+2)}} = \frac{2.38514\left(-16\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2+f\,i\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2\right)}{f}$$

For 1/f = 25/(16 π), we obtain:

(((((2Pi^2)/(((1-0.85)(1+2)))^1/2 ((-0.8*25/((16 π))) +0.05i)))))^(2)

Input:

$$\left(\frac{2\,\pi^2}{\sqrt{(1-0.85)(1+2)}}\left(-0.8\times\frac{25}{16\,\pi}+0.05\,i\right)\right)^2$$

i is the imaginary unit

Result:

134.913... –
34.4514... i

Polar coordinates:

$r = 139.242$ (radius), $\theta = -14.3249°$ (angle)

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

and:

(((((2Pi^2)/(((1-0.85)(1+2)))^1/2 ((-0.8*25/((16 π))) +0.05i)))))^(2)-13-golden ratio

Input:

$$\left(\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}}\left(-0.8\times\frac{25}{16\pi}+0.05\,i\right)\right)^2-13-\phi$$

i is the imaginary unit

ϕ is the golden ratio

Result:

120.295... –
34.4514... i

Polar coordinates:

$r = 125.131$ (radius), $\theta = -15.9812°$ (angle)

125.131 result very near to the Higgs boson mass 125.18 GeV

Series representations:

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-13-\phi+0.355556\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2\left(12.5+i-i\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2$$

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-13-\phi+0.0222222\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2\left(25-i\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)\right)^2$$

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

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-\left(13+\phi-222.222\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2+71.1111\,i\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^3-5.68889\,i^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^4\right)$$

Integral representations:

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-\left(13+\phi-55.5556\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2+8.88889\,i\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^3-0.355556\,i^2\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4\right)$$

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-\left(13+\phi-55.5556\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2+8.88889\,i\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^3-0.355556\,i^2\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^4\right)$$

$$\left(\frac{\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}}\right)^2-13-\phi=$$

$$-\left(13+\phi-222.222\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2+71.1111\,i\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^3-5.68889\,i^2\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^4\right)$$

27*1/2((((((((2Pi^2)/(((1-0.85)(1+2)))^1/2 ((-0.8*25/((16 π))) +0.05i)))))^(2)-11-1/golden ratio))+1

Input:

$$27\times\frac{1}{2}\left(\left(\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}}\left(-0.8\times\frac{25}{16\pi}+0.05\,i\right)\right)^2-11-\frac{1}{\phi}\right)+1$$

i is the imaginary unit

ϕ is the golden ratio

Result:

1665.48... –
465.094... i

Polar coordinates:

$r = 1729.21$ (radius), $\theta = -15.6026°$ (angle)

1729.21

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

With regard 27 (From Wikipedia):

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

Series representations:

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=$$
$$1-\frac{0.3\left(45.+495.\,\phi-16\,\phi\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2\left(12.5+i-i\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2\right)}{\phi}$$

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=$$
$$1-\frac{0.3\left(45.+495.\,\phi-\phi\left(\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2\left(25-i\left(x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)\right)^2\right)\right)}{\phi}$$

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

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=\frac{1}{\phi}$$
$$76.8\left(-0.175781-1.92057\,\phi+39.0625\,\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2-12.5\,\phi\,i\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^3+\phi\,i^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^4\right)$$

Integral representations:

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=\frac{1}{\phi}$$
$$4.8\left(-2.8125-30.7292\,\phi+156.25\,\phi\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2-25\,\phi\,i\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^3+\phi\,i^2\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4\right)$$

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=\frac{1}{\phi}$$
$$4.8\left(-2.8125-30.7292\,\phi+156.25\,\phi\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2-25\,\phi\,i\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^3+\phi\,i^2\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^4\right)$$

$$\frac{27}{2}\left(\left(\frac{(2\pi^2)\left(-\frac{0.8\times 25}{16\pi}+0.05\,i\right)}{\sqrt{(1-0.85)(1+2)}}\right)^2-11-\frac{1}{\phi}\right)+1=\frac{1}{\phi}$$
$$76.8\left(-0.175781-1.92057\,\phi+39.0625\,\phi\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2-12.5\,\phi\,i\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^3+\phi\,i^2\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^4\right)$$

or:

for A = -0.85, B = 2, m^2 = -0.8i, f = -16i, $\widetilde{m}^2 = 0.05i$

((((2Pi^2)/(((1-0.85)(1+2)))^1/2 *((-0.8i)/(-16i) -0.05i)))))

Input:

$$\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right)$$

i is the imaginary unit

Result:

1.47127... –
1.47127... i

Polar coordinates:

$r = 2.0807$ (radius), $\theta = -45°$ (angle)

2.0807

Series representations:

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -2.38514\,(-1+i)\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -0.596285\,(-1+i)\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -0.149071\,(-1+i)\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

Integral representations:

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -0.596285\,(-1+i)\left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -2.38514\,(-1+i)\left(\int_0^{1} \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} = -0.596285\,(-1+i)\left(\int_0^{\infty} \frac{\sin(t)}{t}\,dt\right)^2$$

And for: for A = 40, B = 0, $m^2 = -0.8i$, $f = -16i$, $\widetilde{m}^2 = 0.05i$

((((2Pi^2)/(((1+40)))^1/2 *((-0.8i)/(-16i) -0.05i)))))

Input:

$$\frac{2\pi^2}{\sqrt{1+40}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right)$$

i is the imaginary unit

Result:

0.154137... −
0.154137... i

Polar coordinates:

$r = 0.217983$ (radius), $\theta = -45°$ (angle)

0.217983

From which:

(e^pi/π)((((2Pi^2)/(((1+40)))^1/2 *((-0.8i)/(-16i) -0.05i))))+18*1/10^3

Input:

$$\frac{e^\pi}{\pi}\left(\frac{2\pi^2}{\sqrt{1+40}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right)\right) + 18 \times \frac{1}{10^3}$$

i is the imaginary unit

Result:

1.15336... −
1.13536... i

Polar coordinates:

$r = 1.61842$ (radius), $\theta = -44.5494°$ (angle)

1.61842 result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the previous expression

$$\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right)$$

we obtain also:

((((2Pi^2)/(((1-0.85)(1+2)))^1/2 *((-0.8i)/(-16i) -0.05i)))))-(18+4)*1/10

Input:

$$\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right) - (18+4) \times \frac{1}{10}$$

i is the imaginary unit

Result:

$-0.728726\ldots - 1.47127\ldots\, i$

Polar coordinates:

$r = 1.64186$ (radius), $\theta = -116.349°$ (angle)

$1.64186 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Series representations:

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -\frac{11}{5} + (2.38514 - 2.38514\, i)\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -\frac{11}{5} - 0.596285\,(-1+i)\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -\frac{11}{5} + (0.149071 - 0.149071\, i)\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

Integral representations:

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -0.596285\left(3.68951 - \left(\int_0^\infty \frac{1}{1+t^2}\, dt\right)^2 + i\left(\int_0^\infty \frac{1}{1+t^2}\, dt\right)^2\right)$$

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -0.596285\left(3.68951 - \left(\int_0^\infty \frac{\sin(t)}{t}\, dt\right)^2 + i\left(\int_0^\infty \frac{\sin(t)}{t}\, dt\right)^2\right)$$

$$\frac{\left(\frac{-0.8 i}{-16 i} - i\, 0.05\right)(2 \pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} = -2.38514\left(0.922378 - \left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2 + i\left(\int_0^1 \sqrt{1-t^2}\, dt\right)^2\right)$$

and:

((((2Pi^2)/(((1-0.85)(1+2))^1/2 *((-0.8i)/(-16i) -0.05i)))))-(18+4)*1/10+(47+7)1/10^3

Input:

$$\frac{2\pi^2}{\sqrt{(1-0.85)(1+2)}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right) - (18+4) \times \frac{1}{10} + (47+7) \times \frac{1}{10^3}$$

i is the imaginary unit

Result:

$-0.674726\ldots - 1.47127\ldots\, i$

Polar coordinates:

$r = 1.61861$ (radius), $\theta = -114.636°$ (angle)

1.61861 result that is a very good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} = -\frac{1073}{500} + (2.38514 - 2.38514\,i)\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} = -\frac{1073}{500} - 0.596285\,(-1+i)\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} = -\frac{1073}{500} + (0.149071 - 0.149071\,i)\left(\sum_{k=0}^{\infty} \frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2$$

Integral representations:

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\pi^2)}{\sqrt{(1-0.85)(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} = -0.596285\left(3.59895 - \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 + i\left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2\right)$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\,\pi^2)}{\sqrt{(1-0.85)\,(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} =$$
$$-0.596285\left(3.59895 - \left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2 + i\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2\right)$$

$$\frac{\left(\frac{-0.8\,i}{-16\,i} - i\,0.05\right)(2\,\pi^2)}{\sqrt{(1-0.85)\,(1+2)}} - \frac{18+4}{10} + \frac{47+7}{10^3} =$$
$$-2.38514\left(0.899738 - \left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2 + i\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2\right)$$

and:

((((2Pi^2)/(((1-0.85)(1+2)))^1/2 *((-0.8i)/(-16i) -0.05i))))-(24*10^3-144)1/10^4

Input interpretation:

$$\frac{2\,\pi^2}{\sqrt{(1-0.85)\,(1+2)}} \times \left(-\frac{-0.8\,i}{16\,i} - 0.05\,i\right) - (24 \times 10^3 - 144) \times \frac{1}{10^4}$$

i is the imaginary unit

Result:

$-0.914326... - 1.47127...\,i$

Polar coordinates:

$r = 1.73224$ (radius), $\theta = -121.859°$ (angle)

$1.73224 \approx \sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q

$$M_0 = \sqrt{3q^2 - \Sigma^2},$$
$$q = \frac{(3\sqrt{3})\,M_s}{2}.$$

(see: Can massless wormholes mimic a Schwarzschild black hole in the strong field lensing? - arXiv:1909.13052v1 [gr-qc] 28 Sep 2019)

Possible closed forms:

$\sqrt{3} \approx 1.73205080$

$\lambda + \frac{10}{7} \approx 1.73223443$1

From:

Pair Creation of Black Holes During Inflation
Raphael Bousso and Stephen W. Hawking - arXiv:gr-qc/9606052v2 25 Jun 1996

Now, we have that:

suppressed for large Λ, i.e. at the earliest stage of inflation. However, unlike the neutral case a magnetically charged black hole cannot be arbitrarily small since it must carry at least one unit of magnetic charge:

$$q_0 = \frac{1}{2e_0}, \tag{6.5}$$

where $e_0 = \sqrt{\alpha}$ is the unit of electric charge, and $\alpha \approx 1/137$ is the fine structure constant. In the following we shall only consider black holes with $q = q_0$, since they are they first to be created, and since more highly charged black holes are exponentially suppressed relative to them. We see from Fig. 3 that pair creation

For:

$$q_0 = \frac{1}{2e_0},$$

$$e_0 = \sqrt{\alpha}$$

$$\alpha \approx 1/137$$

$$m \approx 10^{-6}$$

We obtain:

1/(2*(1/137.035)^1/2)

Input interpretation:

$$\frac{1}{2\sqrt{\frac{1}{137.035}}}$$

Result:

5.85310...

5.85310... = q_0

$$\Lambda_{\text{eff}} = \Lambda^{\text{E}} = \left(4\sqrt{3} - 6\right)\alpha,$$

(4sqrt3-6)*(1/137.035)

Input interpretation:

$$\left(4\sqrt{3} - 6\right) \times \frac{1}{137.035}$$

Result:

0.00677348...

0.00677348... = Λ_{eff}

We have the following equation:

$$\Gamma = \exp\left[-\left(I^{\text{E}} - I_{\text{de Sitter}}\right)\right] = \exp\left[-\frac{\left(2+\sqrt{3}\right)\pi}{2\alpha}\right], \qquad (6.7)$$

exp((((((-(2+sqrt3))Pi))*1/((2*1/137.035)))))

Input interpretation:

$$\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right) \times \frac{1}{2 \times \frac{1}{137.035}}\right)$$

Result:

$1.3008974253460685898533803592384756379503850211636 42... \times 10^{-349}$

$1.300897425... * 10^{-349} = \Gamma$

From the following equation

$$D_{\mathrm{end}} \approx d_{\mathrm{end}}\left(\phi_{\mathrm{pc}}^{\max}\right) \approx \left(\frac{\pi^2}{3\,\alpha m^2}\right)^{1/2} \exp\left[-\left(\frac{9\pi^2}{16\,\alpha m^2}\right)^{1/3}\right]. \qquad (6.13)$$

We obtain:

((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3))))))))

Input interpretation:

$$\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)$$

Result:

$1.163885761466493714518424010635833512316990254195 57\ldots \times 10^{-39639}$

$1.163885761466\ldots{*}10^{-39639} = D_{\mathrm{end}}$

From the ratio of the two previous results, we obtain:

((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3)))))))) *1/ exp((((((-(2+sqrt3))Pi))*1/((2*1/137.035)))))

Input interpretation:

$$\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\times\frac{1}{\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right)\times\frac{1}{2\times\frac{1}{137.035}}\right)}$$

Result:

$8.94679\ldots \times 10^{-39291}$

$8.94679\ldots{*}10^{-39291}$

Series representations:

$$\frac{\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137.035}}\right)} = \frac{6.75857\times10^6\sqrt{\pi^2}\exp\left(-42558.3\sqrt[3]{\pi^2}\right)}{\exp\left(-68.5175\,\pi\left(2+\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)\right)}$$

$$\frac{\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137.035}}\right)} = \frac{6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)}{\exp\left(-68.5175\,\pi\left(2+\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)}$$

$$\frac{\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137.035}}\right)} = \frac{6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)}{\exp\left(\pi\left(-137.035-\frac{34.2588\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{\sqrt{\pi}}\right)\right)}$$

Performing the ln of the previous expression, i.e.

$$\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)$$

we obtain:

ln[((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3))))))))]

Input interpretation:

$$\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\right)$$

$\log(x)$ is the natural logarithm

Result:

−91272.0...

-91272

Alternative representations:

$$\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)=\left(\log_e\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)=\log_e\left(6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)\right)$$

$$\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)=\left(\log(a)\log_a\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)=\log(a)\log_a\left(6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)\right)$$

Series representation:

$$\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)=-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)^k}{k}$$

Integral representation:

$$\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)=\int_1^{6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)}\frac{1}{t}\,dt$$

Performing the ln of the previous expression, i.e.

$$\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\times\frac{1}{\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right)\times\frac{1}{2\times\frac{1}{137.035}}\right)}$$

we obtain:

ln[((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp(((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3)))))))) *1/ exp((((((-(2+sqrt3))Pi))*1/((2*1/137.035)))))]

Input interpretation:

$$\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\times\frac{1}{\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right)\times\frac{1}{2\times\frac{1}{137.035}}\right)}\right)$$

$\log(x)$ is the natural logarithm

Result:

−90468.7...

-90468.7…

Alternative representations:

$$\log\left(\frac{\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)}{\exp\left(-\frac{\frac{\left(2+\sqrt{3}\right)\pi}{2}}{137.035}\right)}\right) = \left(\log_e\left(\frac{\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}}{\exp\left(\frac{\frac{\pi\left(-2-\sqrt{3}\right)}{2}}{137.035}\right)}\right) = \log_e\left(\frac{6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)}{\exp\left(68.5175\,\pi\left(-2-\sqrt{3}\right)\right)}\right)\right)$$

$$\log\left(\frac{\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)}{\exp\left(-\frac{\frac{\left(2+\sqrt{3}\right)\pi}{2}}{137.035}\right)}\right) = \left(\log(a)\log_a\left(\frac{\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}}{\exp\left(\frac{\frac{\pi\left(-2-\sqrt{3}\right)}{2}}{137.035}\right)}\right) = \log(a)\log_a\left(\frac{6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)}{\exp\left(68.5175\,\pi\left(-2-\sqrt{3}\right)\right)}\right)\right)$$

Series representation:

$$\log\left(\frac{\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}\;\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)}{\exp\left(-\frac{\frac{\left(2+\sqrt{3}\right)\pi}{2}}{137.035}\right)}\right) = -\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\frac{6.75857\times10^6\,\sqrt{\pi^2}\,\exp\left(-42\,558.3\,\sqrt[3]{\pi^2}\right)}{\exp\left(-68.5175\,\pi\left(2+\sqrt{3}\right)\right)}\right)^k}{k}$$

Integral representation:

$$\log\left(\frac{\sqrt{\frac{\frac{\pi^2}{3\left(\frac{1}{10^6}\right)^2}}{137.035}}\;\exp\left(-\sqrt[3]{\frac{\frac{9\pi^2}{16\left(\frac{1}{10^6}\right)^2}}{137.035}}\right)}{\exp\left(-\frac{\frac{\left(2+\sqrt{3}\right)\pi}{2}}{137.035}\right)}\right) = \int_1^{\frac{6.75857\times10^6\,\sqrt{\pi^2}\,\exp\left(-42\,558.3\,\sqrt[3]{\pi^2}\right)}{\exp\left(-68.5175\,\pi\left(2+\sqrt{3}\right)\right)}}\frac{1}{t}\,dt$$

Performing the ln of the previous expression, i.e.

$$\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\;\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\right)$$

we obtain:

ln(ln[((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp(((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3))))))))])

Input interpretation:

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\right)\right)$$

$\log(x)$ is the natural logarithm

Result:

11.42160... +
3.141593... i

Polar coordinates:

$r = 11.84578155018151233125$ (radius), $\theta = 15.37929559978279019733°$ (angle)

11.84578155018151233125 result practically equal to the black hole entropy 11.8458 that is equal to ln(139503)

Alternative representations:

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) =$$

$$\left(\log_e\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) =$$

$$\left(\log_e\left(\log\left(6.75857\times10^6\sqrt{\pi^2}\exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)\right)\right)$$

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\,\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) =$$

$$\left(\log(a)\log_a\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right) =\right.$$

$$\left.\log(a)\log_a\left(\log\left(6.75857\times10^6\sqrt{\pi^2}\,\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)\right)\right)$$

Series representation:

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\,\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) =$$

$$\log\left(-1+\log\left(6.75857\times10^6\sqrt{\pi^2}\,\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)\right) -$$

$$\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\log\left(6.75857\times10^6\sqrt{\pi^2}\,\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)\right)^{-k}}{k}$$

Integral representation:

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\,\exp\left(-\sqrt[3]{\frac{9\,\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) = \int_1^{\log\left(6.75857\times10^6\sqrt{\pi^2}\,\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)}\frac{1}{t}\,dt$$

From which, we obtain:

11((ln(ln[((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp(((((((-(((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3))))))))]))))+4

Input interpretation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{3\times \frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times \frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\right)\right)+4$$

$\log(x)$ is the natural logarithm

Result:

129.6376... +
34.55752... i

Polar coordinates:

$r = 134.1645562901122545238$ (radius), $\theta = 14.92625668982169969393°$ (angle)

134.1645562901122545238 result practically equal to the rest mass of Pion meson 134.9766 MeV

Alternative representations:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right)+4 =$$

$$\left(4 + 11\log(a)\log_a\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right) = \right.$$

$$\left. 4 + 11\log(a)\log_a\left(\log\left(6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)\right)\right)$$

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right)+4 =$$

$$\left(4 + 11\log_e\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right) = \right.$$

$$\left. 4 + 11\log_e\left(\log\left(6.75857\times 10^6\sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)\right)\right)$$

Series representation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right)+4 =$$

$$4+11\log\left(-1+\log\left(6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)\right)-$$

$$11\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1+\log\left(6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)\right)^{-k}}{k}$$

Integral representation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right)+4 =$$

$$4+11\int_1^{\log\left(6.75857\times10^6\sqrt{\pi^2}\ \exp\left(-42558.3\sqrt[3]{\pi^2}\right)\right)}\frac{1}{t}\,dt$$

and:

11((ln(ln[((((Pi^2 / ((3*1/137.035*(10^-6)^2))))))^1/2 * exp(((((((-((((((9Pi^2)/(((16*1/137.035*(10^-6)^2))))))^1/3))))))))])))-5

Input interpretation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\right)\right)-5$$

$\log(x)$ is the natural logarithm

Result:

120.6376... +
34.55752... i

Polar coordinates:

$r = 125.4896468036192799223$ (radius), $\theta = 15.98474656448606761198°$ (angle)

125.4896468036192799223 result very near to the Higgs boson mass 125.18 GeV

Alternative representations:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) - 5 =$$

$$\left(-5 + 11 \log(a) \log_a\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right) = \\ -5 + 11 \log(a) \log_a\left(\log\left(6.75857\times 10^6 \sqrt{\pi^2}\ \exp\left(-42\,558.3 \sqrt[3]{\pi^2}\right)\right)\right)\right)$$

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) - 5 =$$

$$\left(-5 + 11 \log_e\left(\log\left(\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right) = \\ -5 + 11 \log_e\left(\log\left(6.75857\times 10^6 \sqrt{\pi^2}\ \exp\left(-42\,558.3 \sqrt[3]{\pi^2}\right)\right)\right)\right)$$

Series representation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\ \exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) - 5 =$$

$$-5 + 11 \log\left(-1 + \log\left(6.75857\times 10^6 \sqrt{\pi^2}\ \exp\left(-42\,558.3 \sqrt[3]{\pi^2}\right)\right)\right) - \\ 11 \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1 + \log\left(6.75857\times 10^6 \sqrt{\pi^2}\ \exp\left(-42\,558.3 \sqrt[3]{\pi^2}\right)\right)\right)^{-k}}{k}$$

Integral representation:

$$11 \log\left(\log\left(\sqrt{\frac{\pi^2}{\frac{3\left(\frac{1}{10^6}\right)^2}{137.035}}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16\left(\frac{1}{10^6}\right)^2}{137.035}}}\right)\right)\right) - 5 =$$

$$-5 + 11\int_1^{\log\left(6.75857\times10^6 \sqrt{\pi^2}\exp\left(-42\,558.3\sqrt[3]{\pi^2}\right)\right)} \frac{1}{t}\,dt$$

Performing the ln of the following expression, i.e.

$$\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137.035}\left(\frac{1}{10^6}\right)^2}}\right)\times\frac{1}{\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right)\times\frac{1}{2\times\frac{1}{137.035}}\right)}\right)$$

we obtain:

ln(ln[((((Pi^2 / ((3*1/137*(10^-6)^2))))))^1/2 * exp((((((((-((((((9Pi^2)/(((16*1/137*(10^-6)^2))))))^1/3)))))))) *1/ exp((((((-(2+sqrt3))Pi))*1/((2*1/137)))))])

Input:

$$\log\left(\log\left(\sqrt{\frac{\pi^2}{3\times\frac{1}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{16\times\frac{1}{137}\left(\frac{1}{10^6}\right)^2}}\right)\times\frac{1}{\exp\left(\left(-\left(2+\sqrt{3}\right)\pi\right)\times\frac{1}{2\times\frac{1}{137}}\right)}\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$\log\left(-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\,\pi\exp\left(-\frac{137}{2}\left(-2-\sqrt{3}\right)\pi - 2500\sqrt[3]{137}\,(6\pi)^{2/3}\right)\right)\right) + i\pi$$

Decimal approximation:

11.41267533825301390583101442480652542255603059532072328 71... +
3.141592653589793238462643383279502884197169399375105820 97... i

Polar coordinates:

$r \approx 11.83717714564827723053$ (radius), $\theta \approx 15.39075152565179988427°$ (angle)

11.83717714564827723053 result very near to the black hole entropy 11.8458 that is equal to ln(139503)

Alternate forms:

$$\log\left(-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\;e^{137/2\left(2+\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\;\pi\right)\right)+i\pi$$

$$\log\left(-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\;e^{1/2\left(274+137\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\;\pi\right)\right)+i\pi$$

$$\log\left(\frac{1}{2}\left(-274\pi-137\sqrt{3}\;\pi+5000\sqrt[3]{137}\,(6\pi)^{2/3}-12\log(10)-\log\left(\frac{137}{3}\right)-2\log(\pi)\right)\right)+i\pi$$

Alternative representations:

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\;\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=\log_e\left(\log\left(\frac{\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}}{\exp\left(\frac{\pi\left(-2-\sqrt{3}\right)}{\frac{2}{137}}\right)}\right)\right)$$

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\;\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=\log(a)\log_a\left(\log\left(\frac{\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}}{\exp\left(\frac{\pi\left(-2-\sqrt{3}\right)}{\frac{2}{137}}\right)}\right)\right)$$

Series representations:

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=$$

$$i\pi+\log\left(-1-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\,e^{137/2\left(2+\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)\right)-\sum_{k=1}^{\infty}\frac{2^k\left(\frac{1}{2+137\left(2+\sqrt{3}\right)\pi-5000\sqrt[3]{137}\,(6\pi)^{2/3}+\log\left(\frac{137}{3}\right)+2\log(1\,000\,000\,\pi)}\right)^k}{k}$$

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=$$

$$i\pi+2i\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\,e^{137/2\left(2+\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)-z_0\right)^k z_0^{-k}}{k}$$

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=$$

$$i\pi+\log\left(-1-\log\left(1\,000\,000\sqrt{\frac{137}{3}}\,e^{-\frac{137}{2}\left(-2-\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)\right)-\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{-1-\log\left(1000\,000\sqrt{\frac{137}{3}}\,e^{-\frac{137}{2}\left(-2-\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)}\right)^k}{k}$$

Integral representations:

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=$$

$$i\pi+\int_1^{-\log\left(1000000\sqrt{\frac{137}{3}}\,e^{-\frac{137}{2}\left(-2-\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)}\frac{1}{t}\,dt$$

$$\log\left(\log\left(\frac{\sqrt{\frac{\pi^2}{\frac{3}{137}\left(\frac{1}{10^6}\right)^2}}\exp\left(-\sqrt[3]{\frac{9\pi^2}{\frac{16}{137}\left(\frac{1}{10^6}\right)^2}}\right)}{\exp\left(-\frac{\left(2+\sqrt{3}\right)\pi}{\frac{2}{137}}\right)}\right)\right)=i\pi-\frac{i}{2\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{1}{\Gamma(1-s)}\Gamma(-s)^2\,\Gamma(1+s)$$

$$\left(-1-\log\left(1000000\sqrt{\frac{137}{3}}\,e^{-\frac{137}{2}\left(-2-\sqrt{3}\right)\pi-2500\sqrt[3]{137}\,(6\pi)^{2/3}}\,\pi\right)\right)^{-s}$$

ds for $-1<\gamma<0$

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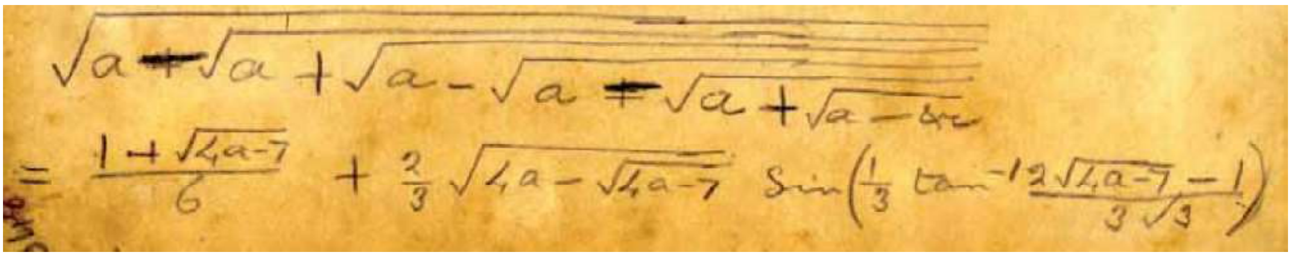


$$\sqrt{a-\sqrt{a+\sqrt{a-\sqrt{a-\sqrt{a+\sqrt{a-\&c}}}}}}=\frac{1+\sqrt{4a-7}}{6}+\frac{2}{3}\sqrt{4a-\sqrt{4a-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\frac{2\sqrt{4a-7}-1}{3\sqrt{3}}\right)$$

1/6(1+(4a-7)^1/2)+2/3(4a-sqrt(4a-7))^1/2 * sin(((1/3 tan^-1(2(4a-7)^1/2-1)/(3sqrt3)))

For a = 206 = 199 + 7 (where 199 and 7 are Lucas numbers), we obtain:

(((1/6(1+(((199+7)-7)^1/2)))+2/3((199+7)-sqrt((199+7)-7))^1/2 * sin(((1/3 tan^-1(((2(((199+7)-7)^1/2))-1)/(3sqrt3)))))))

Input:

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{2}{3}\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result:

$$\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2}{3}\sqrt{206-\sqrt{199}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{199}-1}{3\sqrt{3}}\right)\right)$$

(result in radians)

Decimal approximation:

6.623531817785305318392618224544919983788613528667426823371...

(result in radians)

6.623531817785…

Alternate forms:

$$\frac{1}{6}\left(1+\sqrt{199}-4\sqrt{206-\sqrt{199}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{1}{9}\left(\sqrt{3}-2\sqrt{597}\right)\right)\right)\right)$$

$$\frac{1}{6}\left(1+\sqrt{199}+4\sqrt{206-\sqrt{199}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{199}-1}{3\sqrt{3}}\right)\right)\right)$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}+\frac{2}{3}\sqrt{206-\sqrt{199}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{199}-1}{3\sqrt{3}}\right)\right)$$

Alternative representations:

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2}{3}\cos\left(\frac{\pi}{2}-\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=\frac{1}{6}\left(1+\sqrt{199}\right)-\frac{2}{3}\cos\left(\frac{\pi}{2}+\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2\left(-e^{-\frac{1}{3}i\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)}+e^{1/3\,i\tan^{-1}\left(\left(-1+2\sqrt{199}\right)/\left(3\sqrt{3}\right)\right)}\right)\sqrt{206-\sqrt{199}}}{3\,(2\,i)}$$

Series representations:

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}+\frac{2}{3}\sqrt{206-\sqrt{199}}\sum_{k=0}^{\infty}\frac{(-1)^k\,3^{-1-2k}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1+2k}}{(1+2k)!}$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}+\frac{2}{3}\sqrt{206-\sqrt{199}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{\pi}{2}+\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)^{2k}}{(2k)!}$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}+\frac{1}{9}\sqrt{\left(206-\sqrt{199}\right)\pi}\ \tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}\frac{36^s\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}$$

Integral representations:

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}+\frac{2}{9}\sqrt{206-\sqrt{199}}\ \tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\int_0^1\cos\left(\frac{1}{3}t\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)dt$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}-\frac{1}{18}i\sqrt{\frac{206-\sqrt{199}}{\pi}}\ \tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36s)}}{s^{3/2}}\,ds\ \text{ for }\gamma>0$$

$$\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2=$$

$$\frac{1}{6}+\frac{\sqrt{199}}{6}-\frac{1}{3}i\sqrt{\frac{206-\sqrt{199}}{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\left(\frac{1}{6}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\ \text{ for } 0<\gamma<1$$

From which, we obtain:

golden ratio(((1/6(1+(((199+7)-7)^1/2)))+2/3((199+7)-sqrt((199+7)-7))^1/2 * sin(((1/3 tan^-1(((2(((199+7)-7)^1/2))-1)/(3sqrt3)))))))+2(0.5269391135)

where 0.5269391135 is the value of the following Rogers-Ramanujan continued fraction:

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

Input interpretation:

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{2}{3}\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)+2\times 0.5269391135$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

Result:

11.770977834...

(result in radians)

11.770977834…. result very near to the black hole entropy 11.8458 that is equal to ln(139503)

Alternative representations:

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939=1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2}{3}\cos\left(\frac{\pi}{2}-\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)$$

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939 = 1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)-\frac{2}{3}\cos\left(\frac{\pi}{2}+\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)$$

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939 = 1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2\left(-e^{-\frac{1}{3}i\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)}+e^{1/3\,i\tan^{-1}\left(\left(-1+2\sqrt{199}\right)/\left(3\sqrt{3}\right)\right)}\right)\sqrt{206-\sqrt{199}}}{3(2i)}\right)$$

Series representations:

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939 = 1.33333\left(0.790409+1.88834\,\phi+\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 0.166667\left(6.32327+15.1067\,\phi+8\,\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 0.666667\left(1.58082+3.77668\,\phi+\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,3^{-1-2k}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1+2k}}{(1+2k)!}\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

Integral representations:

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 1.05388+2.51779\,\phi+0.222222\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\int_0^1\cos\left(\frac{1}{3}\,t\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)dt$$

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 1.05388 + 2.51779\,\phi + \frac{0.0555556\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{i\,\pi}$$

$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36\,s)}}{s^{3/2}}\,d\,s \quad \text{for } \gamma>0$$

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 1.05388 + \frac{\phi}{6} + \frac{\sqrt{199}\,\phi}{6} + \frac{\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{18\,i\,\pi}$$

$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36\,s)}}{s^{3/2}}\,d\,s \quad \text{for } \gamma>0$$

$$\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+$$

$$2\times 0.526939 = 1.05388 + 2.51779\,\phi + \frac{0.333333\,\phi\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{i\,\pi}$$

$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{6^{-1+2\,s}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1-2\,s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,d\,s \quad \text{for } 0<\gamma<1$$

From which, we obtain:

11*(((golden ratio(((1/6(1+(((199+7)-7)^1/2))+2/3((199+7)-sqrt((199+7)-7))^1/2 * sin(((1/3 tan^-1(((2(((199+7)-7)^1/2))-1)/(3sqrt3)))))))+2(0.5269391135))))+5

Input interpretation:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{2}{3}\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)+2\times 0.5269391135\right)+5$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

Result:

134.48075617...

(result in radians)

134.48075617… result practically equal to the rest mass of Pion meson 134.9766 MeV

Alternative representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5 = 5+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2}{3}\cos\left(\frac{\pi}{2}-\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)\right)$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5 = 5+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)-\frac{2}{3}\cos\left(\frac{\pi}{2}+\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)\right)$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times0.526939\right)+5 =$$

$$5+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{1}{3(2i)}2\left(-e^{-\frac{1}{3}i\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)}+e^{1/3\,i\tan^{-1}\left(\left(-1+2\sqrt{199}\right)/\left(3\sqrt{3}\right)\right)}\right)\sqrt{206-\sqrt{199}}\right)\right)$$

Series representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times0.526939\right)+5 =$$

$$14.6667\left(1.13132+1.88834\,\phi+\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times0.526939\right)+5 =$$

$$1.83333\left(9.05054+15.1067\,\phi+8\,\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\right.\right.\right.$$
$$\left.\left.\left.\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5=$$
$$7.33333\left(2.26264+3.77668\,\phi+\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\,3^{-1-2k}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1+2k}}{(1+2k)!}\right)\right.$$
$$\left.\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(199-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

Integral representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\right.\right.\right.$$
$$\left.\left.\left.\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5=$$
$$16.5927+27.6957\,\phi+2.44444\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}$$
$$\int_0^1\cos\left(\frac{1}{3}\,t\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)dt$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\right.\right.\right.$$
$$\left.\left.\left.\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5=$$
$$16.5927+27.6957\,\phi+\frac{0.611111\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\,\sqrt{\pi}}{i\pi}$$
$$\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36s)}}{s^{3/2}}\,ds\quad\text{for }\gamma>0$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5 =$$

$$16.5927+\frac{11\phi}{6}+\frac{11\sqrt{199}\ \phi}{6}+\frac{11\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{18\,i\,\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36s)}}{s^{3/2}}\,ds \text{ for } \gamma>0$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)+5 =$$

$$16.5927+27.6957\,\phi+\frac{3.66667\,\phi\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{i\,\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{6^{-1+2s}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds \text{ for } 0<\gamma<1$$

and:

11*(((golden ratio(((1/6(1+(((199+7)-7)^1/2)))+2/3((199+7)-sqrt((199+7)-7))^1/2 * sin(((1/3 tan^-1(((2(((199+7)-7)^1/2))-1)/(3sqrt3)))))))+2(0.5269391135))))-4

Input interpretation:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{2}{3}\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)+2\times 0.5269391135\right)-4$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

Result:

125.48075617...

(result in radians)

125.48075617… result very near to the Higgs boson mass 125.18 GeV

Alternative representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=-4+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{2}{3}\cos\left(\frac{\pi}{2}-\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)\right)$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=-4+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)-\frac{2}{3}\cos\left(\frac{\pi}{2}+\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\sqrt{206-\sqrt{199}}\right)\right)$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\,\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=-4+11\left(1.05388+\phi\left(\frac{1}{6}\left(1+\sqrt{199}\right)+\frac{1}{3(2i)}2\left(-e^{-\frac{1}{3}i\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)}+e^{1/3\,i\tan^{-1}\left(\left(-1+2\sqrt{199}\right)/\left(3\sqrt{3}\right)\right)}\right)\sqrt{206-\sqrt{199}}\right)\right)$$

Series representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$14.6667\left(0.517681+1.88834\,\phi+\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$1.83333\left(4.14145+15.1067\,\phi+8\,\phi\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}\left(\frac{1}{3}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$7.33333\left(1.03536+3.77668\,\phi+\phi\left(\sum_{k=0}^{\infty}\frac{(-1)^k 3^{-1-2k}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1+2k}}{(1+2k)!}\right)\sqrt{206-\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)$$

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

Integral representations:

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$7.59266+27.6957\,\phi+2.44444\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\int_0^1\cos\left(\frac{1}{3}\,t\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\right)dt$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$7.59266+27.6957\,\phi+\frac{0.611111\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36\,s)}}{s^{3/2}}\,ds\ \text{ for } \gamma>0$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\ \sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}-1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$7.59266+\frac{11\,\phi}{6}+\frac{11\sqrt{199}\,\phi}{6}+\frac{11\,\phi\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{18\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^2/(36\,s)}}{s^{3/2}}\,ds\ \text{ for } \gamma>0$$

$$11\left(\phi\left(\frac{1}{6}\left(1+\sqrt{(199+7)-7}\right)+\frac{1}{3}\left(\sqrt{(199+7)-\sqrt{(199+7)-7}}\right.\right.\right.$$
$$\left.\left.\left.\sin\left(\frac{1}{3}\tan^{-1}\left(\frac{2\sqrt{(199+7)-7}\ -1}{3\sqrt{3}}\right)\right)\right)2\right)+2\times 0.526939\right)-4=$$

$$7.59266+27.6957\,\phi+\frac{3.66667\,\phi\sqrt{206-\sqrt{199}}\ \sqrt{\pi}}{i\,\pi}$$
$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{6^{-1+2s}\tan^{-1}\left(\frac{-1+2\sqrt{199}}{3\sqrt{3}}\right)^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\quad \text{for } 0<\gamma<1$$

Observations

Figs.

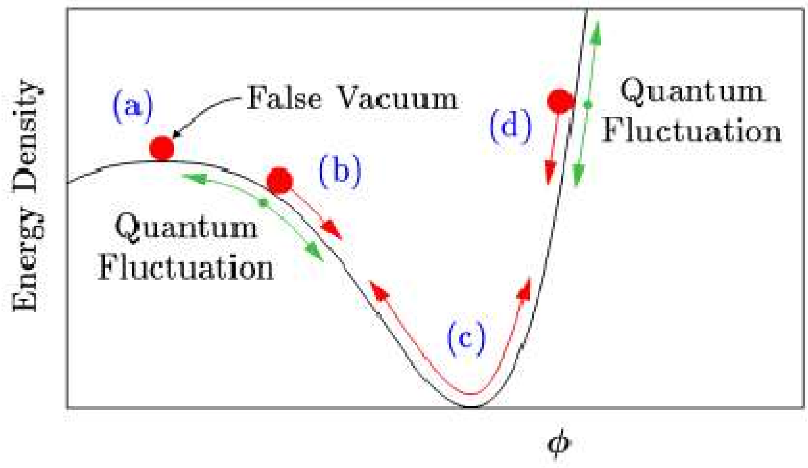
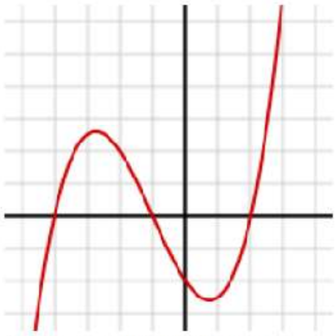


FIG. 1: In simple inflationary models, the universe at early times is dominated by the potential energy density of a scalar field, ϕ. Red arrows show the classical motion of ϕ. When ϕ is near region (a), the energy density will remain nearly constant, $\rho \cong \rho_f$, even as the universe expands. Moreover, cosmic expansion acts like a frictional drag, slowing the motion of ϕ: Even near regions (b) and (d), ϕ behaves more like a marble moving in a bowl of molasses, slowly creeping down the side of its potential, rather than like a marble sliding down the inside of a polished bowl. During this period of "slow roll," ρ remains nearly constant. Only after ϕ has slid most of the way down its potential will it begin to oscillate around its minimum, as in region (c), ending inflation.



Graph of a cubic function with 3 real roots (where the curve crosses the horizontal axis at $y = 0$). The case shown has two critical points. Here the function is $f(x) = (x^3 + 3x^2 - 6x - 8)/4$.

The ratio between M_0 and q

$$M_0 = \sqrt{3q^2 - \Sigma^2},$$

$$q = \frac{\left(3\sqrt{3}\right) M_s}{2}.$$

i.e. the gravitating mass M_0 and the Wheelerian mass q of the wormhole, is equal to:

$$\frac{\sqrt{3\,(2.17049 \times 10^{37})^2 - 0.001^2}}{\frac{1}{2}\left(\left(3\sqrt{3}\right)(4.2 \times 10^{6} \times 1.9891 \times 10^{30})\right)}$$

1.7320507879051944207039476256710181600835665488020824605 20...

1.7320507879

$1.7320507879 \approx \sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q of the wormhole

We note that:

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

i is the imaginary unit

$i\sqrt{3}$

1.732050807568877293527446341505872366942805253810380628055... i

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

1.73205

This result is very near to the ratio between M_0 and q, that is equal to 1.7320507879 $\approx \sqrt{3}$

With regard $\sqrt{3}$, we note that is a fundamental value of the formula structure that we need to calculate a Cubic Equation

We have that the previous result

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

$= 1.732050807568877293527446341505872366942805253810380628055... i$

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

can be related with:

$$u^2(-u)\left(\frac{1}{2}\pm\frac{i\sqrt{3}}{2}\right)+v^2(-v)\left(\frac{1}{2}\pm\frac{i\sqrt{3}}{2}\right)=q$$

Considering:

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

$= i\sqrt{3} =$ 1.732050807568877293527446341505872366942805253810380628055... i

$r \approx 1.73205$ (radius), $\theta = 90°$ (angle)

Thence:

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

$$\Rightarrow (-1)\left(\frac{1}{2}-\frac{i\sqrt{3}}{2}\right)-(-1)\left(\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)=q=1.73205\approx\sqrt{3}$$

We observe how the graph above, concerning the cubic function, is very similar to the graph that represent the scalar field (in red). It is possible to hypothesize that cubic functions and cubic equations, with their roots, are connected to the scalar field.

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

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

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

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

From Wikipedia

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

Can be this the motivation that from the development of the Ramanujan's equations we obtain results very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV and practically equal to the rest mass of Pion meson 139.57 MeV

Note that:

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

Hence

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

so that

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

Hence

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

Thence:

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

And

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

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

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

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

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

The beginning of the sequence is thus:

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

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

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

The sequence of Lucas numbers is:

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

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

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

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

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

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

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