Analyzing some Ramanujan formulas: mathematical connections with various equations concerning some sectors of Black Holes and Wormholes Physics IV

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Abstract

The purpose of this paper is to show how using certain mathematical values and / or constants from some Ramanujan expressions, we obtain some mathematical connections with equations of various sectors of Black Holes-Wormholes Physics and an almost equal value to the golden ratio

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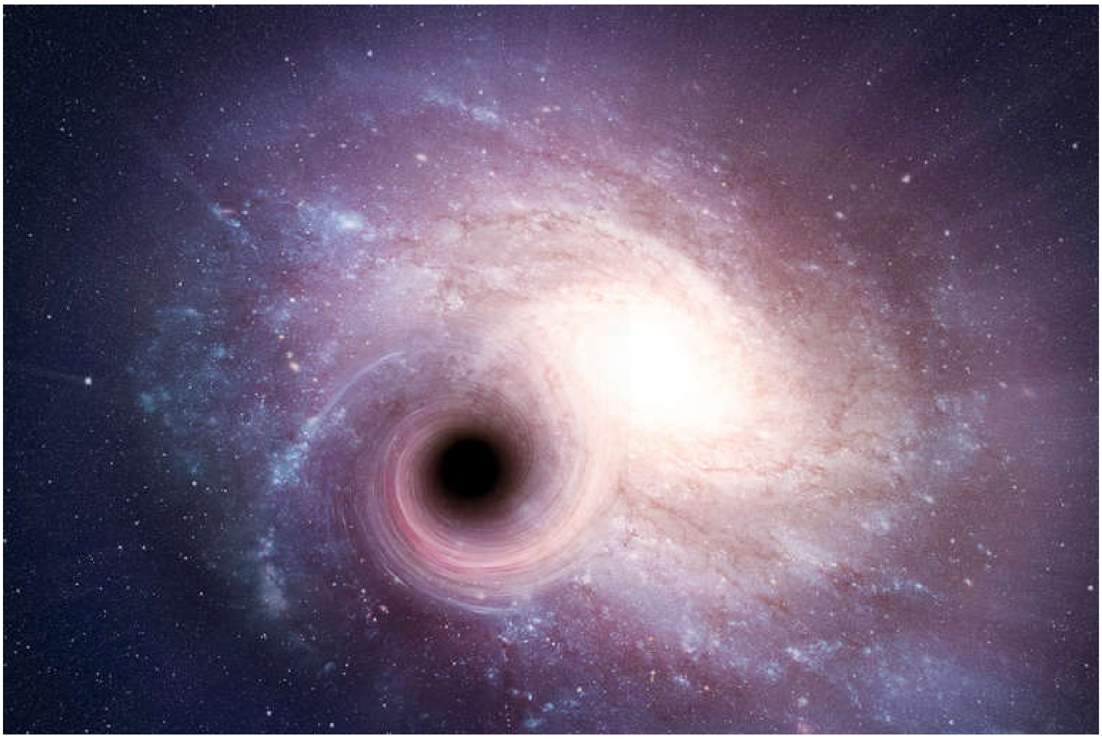

Monster black hole 100,000 times more massive than the sun is found in the heart of our galaxy (SMBH Sagittarius A = $1{,}9891*10^{35}$)

https://www.seeker.com/space/astronomy/new-class-of-black-hole-100000-times-larger-than-the-sun-detected-in-milky-way

(N.O.A – Pics. from the web)

From: **Manuscript Book 2 of Srinivasa Ramanujan**

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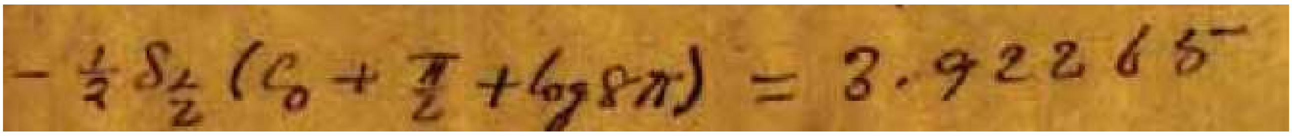
$$-\frac{1}{2} S_{\frac{1}{2}}\left(C_0 + \frac{\pi}{2} + \log 8\pi\right) = 3.92265$$

For C_0 = 0.5772156649 = euler-mascheroni constant, we obtain:

-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi))

Input:

$$-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Decimal approximation:

3.922646139209151727471531446714599513730323971506505209568...

3.922646139…

Alternate forms:

$$-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8) + \log(\pi)\right)$$

$$-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma + \pi + 2\log(8\pi))$$

$$-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma + \pi + 6\log(2) + 2\log(\pi))$$

Alternative representations:

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1) = -\frac{1}{2}\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\zeta\left(\frac{1}{2}, 1\right)$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1) = -\frac{1}{2}\left(\gamma + \frac{\pi}{2} + \log_e(8\pi)\right)\zeta\left(\frac{1}{2}, 1\right)$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)$$

Series representations:

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=\frac{1}{2}(2\gamma+\pi+2\log(8\pi))\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=\frac{1}{4}\left(1+\sqrt{2}\right)(2\gamma+\pi+2\log(8\pi))\sum_{n=0}^{\infty}2^{-1-n}\sum_{k=0}^{n}\frac{(-1)^k\binom{n}{k}}{\sqrt{1+k}}$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=-\frac{1}{4}(2\gamma+\pi+2\log(8\pi))\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}\quad\text{for } s_0\neq 1$$

Integral representations:

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=\frac{\left(1+\sqrt{2}\right)(2\gamma+\pi+2\log(8\pi))}{4\sqrt{\pi}}\int_0^{\infty}\frac{1}{(1+e^t)\sqrt{t}}\,dt$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=\frac{1}{8}\left(2\gamma+\pi+2\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^{\infty}\frac{\operatorname{frac}\left(\frac{1}{t}\right)}{\sqrt{t}}\,dt$$

$$\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)=\frac{\left(1+\sqrt{2}\right)\left(2\gamma+\pi+2\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^{\infty}\frac{1}{(1+e^t)\sqrt{t}}\,dt}{4\sqrt{\pi}}$$

or:

-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi))

Input interpretation:

$$-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\pi)\right)$$

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

$\log(x)$ is the natural logarithm

Result:

$$-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\approx 3.92265$$

γ is the Euler-Mascheroni constant

Alternate forms:

$$-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8)+\log(\pi)\right)$$

$$-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+2\log(8\pi))$$

$$-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+6\log(2)+2\log(\pi))$$

((((-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi))))))^1/e

Input interpretation:

$$\sqrt[e]{-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\pi)\right)}$$

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

$\log(x)$ is the natural logarithm

Result:

$$\sqrt[e]{-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}\approx 1.65335$$

γ is the Euler-Mascheroni constant

Alternate forms:

$$\sqrt[e]{-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+2\log(8\pi))}$$

$$\sqrt[e]{-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+6\log(2)+2\log(\pi))}$$

$$e^{-(2i\pi)/e}\sqrt[e]{\zeta\left(\frac{1}{2}\right)}\sqrt[e]{\frac{1}{2}\left(-\gamma-\frac{\pi}{2}-\log(8\pi)\right)}$$

((((-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi))))))^1/e - (34 + 1)*1/10^3

Input interpretation:

$$\sqrt[e]{-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\pi)\right)}-(34+1)\times\frac{1}{10^3}$$

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

$\log(x)$ is the natural logarithm

Result:

$$\sqrt[e]{-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}-\frac{7}{200}\approx 1.61835$$

γ is the Euler-Mascheroni constant

Alternate forms:

$$\sqrt[e]{-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+2\log(8\pi))}-\frac{7}{200}$$

$$\sqrt[e]{-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+6\log(2)+2\log(\pi))}-\frac{7}{200}$$

$$\frac{1}{200}\left(25\times 2^{3-2/e}\sqrt[e]{\zeta\left(\frac{1}{2}\right)(-(2\gamma+\pi+6\log(2)+2\log(\pi)))}-7\right)$$

SMBH87 mass = 1.312806 * 10^{40}

10^39*[4*((((-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi))))))-e+((PI^2)/64)]

Input interpretation:

$$10^{39}\left(4\left(-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\pi)\right)\right)-e+\frac{\pi^2}{64}\right)$$

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

$\log(x)$ is the natural logarithm

Result:

$$1\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \left(-2\,\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)-e+\frac{\pi^2}{64}\right)\approx 1.31265\times10^{40}$$

γ is the Euler-Mascheroni constant

1.31265*10^40

SMBH87 radius = 1.94973*10^13

[((((-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi)))))-sqrt((34+5)/10)]*10^13

Input interpretation:

$$\left(-\frac{1}{2}\,\zeta\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\,\pi)\right)-\sqrt{\frac{34+5}{10}}\right)\times10^{13}$$

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

$\log(x)$ is the natural logarithm

Result:

$$10\,000\,000\,000\,000\left(-\frac{1}{2}\,\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)-\sqrt{\frac{39}{10}}\right)\approx 1.9478\times10^{13}$$

1.9478*10^13

γ is the Euler-Mascheroni constant

Alternate forms:

$$10\,000\,000\,000\,000\left(-\frac{1}{4}\,\zeta\left(\frac{1}{2}\right)(2\,\gamma+\pi+2\log(8\,\pi))-\sqrt{\frac{39}{10}}\right)$$

$$-2\,500\,000\,000\,000\,\pi\,\zeta\left(\frac{1}{2}\right)-1\,000\,000\,000\,000\left(5\,\gamma\,\zeta\left(\frac{1}{2}\right)+5\,\zeta\left(\frac{1}{2}\right)\log(8\,\pi)+\sqrt{390}\right)$$

$$-500\,000\,000\,000\left(10\,\gamma\,\zeta\left(\frac{1}{2}\right)+5\,\pi\,\zeta\left(\frac{1}{2}\right)+10\,\zeta\left(\frac{1}{2}\right)\log(8\,\pi)+2\sqrt{390}\right)$$

From:

Rindler horizons in the Schwarzschild spacetime

Kajol Paithankar_ and Sanved Kolekary
UM-DAE Centre for Excellence in Basic Sciences,
Mumbai 400098, India - June 2019
arXiv:1906.05134v3 [gr-qc] 30 Oct 2019

distance $r = r_{min}$ to the black hole which is the turning point of the trajectory and then returns back to radial infinity. However, due to the curvature effects of the black hole, there is an upper bound $|a|_b$ on the magnitude of acceleration for such a turning point r_{min} to exist. The trajectory having acceleration greater than the bound value, $|a| > |a|_b$ does not have a turning point and must fall into the horizon at r_s. Since the metric being considered is static with the Killing vector $\Xi = \partial_t$, we choose $t = 0$ when $r = r_{min}$ as our boundary condition. For the Schwarzschild metric

$$ds^2 = \left(1 - \frac{r_s}{r}\right) dt^2 - \left(1 - \frac{r_s}{r}\right)^{-1} dr^2 - r^2\, d\theta^2 - r^2 \sin^2\theta\, d\phi^2 \tag{2.6}$$

and

From:

Conformally symmetric traversable wormholes in modified teleparallel gravity

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III. TRAVERSABILITY CONDITIONS AND GENERAL REMARKS FOR WORMHOLES

The spacetime ansatz for seeking traversable wormholes are described by a static and spherically symmetric metric which is in the usual spherical (t, r, θ, ϕ) coordinates, and the corresponding line element can be written as [8],

$$ds^2 = e^{\nu(r)}dt^2 - \left(1 - \frac{b(r)}{r}\right)^{-1} dr^2 - r^2\left(d\theta^2 + \sin^2\theta d\phi^2\right), \tag{12}$$

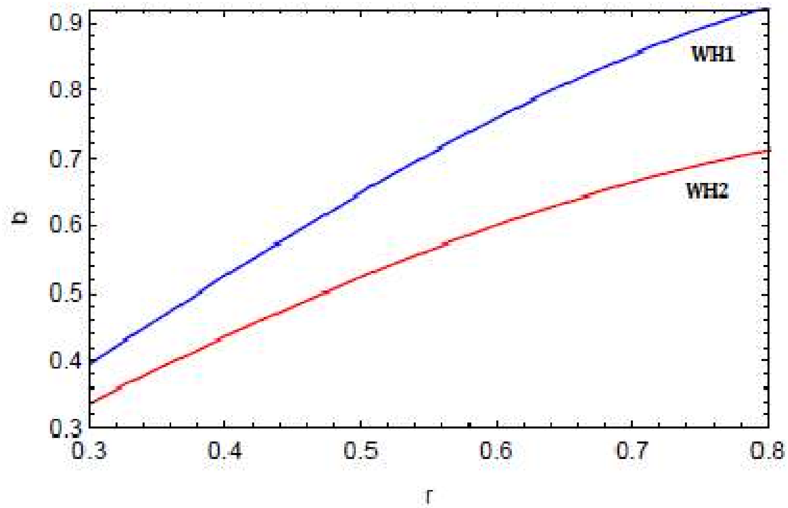

FIG. 1. Variation of shape functions with radial coordinate for $a = 0.1, A = -2, B = 0.5, \omega = -1.4, c_3 = 1.88$ (WH1) and $a = 0.2, d = -0.014, B = 0.5, n = 0.14, c_3 = 0.13$ (WH2).

VI.2. Wormhole (WH1) solution with $p_r = \omega\rho$:

To solve the field equations (31)-(33), we assume an additional information as a linear equation of state (EoS) $p_r = \omega\rho$, and the corresponding solutions can be written as

$$\psi(r) = \frac{1}{\sqrt{6a(\omega+3)}}\left[6aA(\omega+3)r^{-\frac{\omega+3}{\omega}} + c_3^2\left\{6a(\omega+1) + Br^2(\omega+3)\right\}\right]^{1/2}, \tag{43}$$

From (43)

for a = 0.1 , ω = -1.4 , A = -2, B = 0.5, c_3 = 1.88, r = 1.94973e+13:

1/(((6*0.1(-1.4+3))))^1/2 * [6*0.1*(-2)*(-1.4+3)*(1.94973e+13)^-(1.14285714)+ 1.88^2(((6*0.1(-1.4+1)+0.5*(1.94973e+13)^2*(-1.4+3))))]^1/2

Input interpretation:

$$\frac{1}{\sqrt{6\times 0.1\,(-1.4+3)}}\sqrt{\left(\frac{6\times 0.1\times(-2)\,(-1.4+3)}{(1.94973\times 10^{13})^{1.14285714}}+1.88^2\,\left(6\times 0.1\,(-1.4+1)+0.5\,(1.94973\times 10^{13})^2\,(-1.4+3)\right)\right)}$$

Result:

$3.34612\ldots\times 10^{13}$

$3.34612\ldots*10^{13}$

From the previous Ramanujan expression, we obtain:

10^13*(((([(((((-1/2 zeta (1/2) ((sum(1/k - log((k + 1)/k),k=1 to infinity))+ Pi/2 + ln(8Pi))))))]-1/golden ratio+(4*1/10^2)))))

Input interpretation:

$$10^{13}\left(-\frac{1}{2}\,\zeta\!\left(\frac{1}{2}\right)\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\!\left(\frac{k+1}{k}\right)\right)+\frac{\pi}{2}+\log(8\,\pi)\right)-\frac{1}{\phi}+4\times\frac{1}{10^2}\right)$$

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

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

$$10\,000\,000\,000\,000\left(-\frac{1}{2}\,\zeta\!\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)-\frac{1}{\phi}+\frac{1}{25}\right)\approx 3.34461\times 10^{13}$$

$3.34461*10^{13}$

γ is the Euler-Mascheroni constant

Alternate forms:

$$10\,000\,000\,000\,000\,000 \left(-\frac{1}{4}\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+2\log(8\pi)) - \frac{1}{\phi} + \frac{1}{25}\right)$$

$$10\,000\,000\,000\,000\,000 \left(\frac{1}{50}\left(27-25\sqrt{5}\right) - \frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)$$

$$-5\,000\,000\,000\,000\,000\,\gamma\,\zeta\left(\frac{1}{2}\right) - 2\,500\,000\,000\,000\,000\,\pi\,\zeta\left(\frac{1}{2}\right) - 15\,000\,000\,000\,000\,000\,\zeta\left(\frac{1}{2}\right)\log(2) - 5\,000\,000\,000\,000\,000\,\zeta\left(\frac{1}{2}\right)\log(\pi) - \frac{10\,000\,000\,000\,000\,000}{\phi} + 400\,000\,000\,000\,000$$

VI.3. Wormhole (WH2) solution with $p_t = np_t$:

Another closed-form solution is derived by taking $p_t = np_r$ (see Ref. [32?] for more details) and then deduce the following relationship:

$$\psi(r) = (a+b)\left[\frac{c_3^2}{a}\left(\frac{a^2B(n-1)+2an}{2(3n-1)(a+r)^2} - \frac{2aB(n-1)}{(6n-1)(a+r)} + \frac{B(n-1)}{6n}\right) + d(a+r)^{-6n}\right]^{1/2}, \tag{50}$$

where the state parameter n is a constant. We obtain from Eq. (50) yielding for the shape function

$$b(r) = \frac{r}{6}\left[-\frac{B(n-1)(a+r)^2}{an} + \frac{12B(n-1)(a+r)}{6n-1} - \frac{3[aB(n-1)+2n]}{3n-1} - \frac{6d(a+r)^{2-6n}}{c_3^2} + 6\right]. \tag{51}$$

In this case for $n < 1$ implies $b(r)/r \to 0$ as $r \to \infty$ i.e. asymptotically flat spacetimes.

$$(\rho + p_r)|_{r_0} = \frac{a}{24\pi r_0^2}\left[\frac{6d(a+3nr_0)(a+r_0)^{1-6n}}{c_3^2} + \frac{aB(n-1) - B(n-1)(3n-1)r_0 + 6(6n-1)n^2}{n(3n-1)(6n-1)}\right] \quad (56)$$

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We plot the quantities $b(r)$, $b(r)/r$, $b(r) - r$ and $b'(r)$ in Figs. 1-4. For the figures we consider $a = 0.2, d = -0.014, B = 0.5, n = 0.14, c_3 = 0.13$ (WH2). We can see from Fig. 3 and Fig. 7 that $b(r) - r$ cuts r-axis at $r_0 = 0.603$, which is the throat of WH2. One verifies, $b'(0.603) \approx 0.534 < 1$ is shown in Fig. 4.

$$\psi(r) = (a+b)\left[\frac{c_3^2}{a}\left(\frac{a^2B(n-1)+2an}{2(3n-1)(a+r)^2} - \frac{2aB(n-1)}{(6n-1)(a+r)} + \frac{B(n-1)}{6n}\right) + d(a+r)^{-6n}\right]^{1/2}, \quad (50)$$

From (50):

[(0.13^2)/0.2*((((0.2^2*0.5(0.14-1)+2*0.2*0.14)/(2(3*0.14-1)(0.2+1.94973e+13)^2)-(2*0.2*0.5(0.14-1))/((6*0.14-1)(0.2+1.94973e+13))+(0.5(0.14-1))/((6*0.14)))))-0.014(0.2+1.94973e+13)^-(6*0.14)]^1/2

Input interpretation:

$$\sqrt{\left(\frac{0.13^2}{0.2}\left(\frac{0.2^2\times 0.5\,(0.14-1)+2\times 0.2\times 0.14}{2\,(3\times 0.14-1)\,(0.2+1.94973\times 10^{13})^2} - \frac{2\times 0.2\times 0.5\,(0.14-1)}{(6\times 0.14-1)\,(0.2+1.94973\times 10^{13})} + \frac{0.5\,(0.14-1)}{6\times 0.14}\right) - 0.014\,(0.2+1.94973\times 10^{13})^{-(6\times 0.14)}\right)}$$

Result:

0.207981... i

Polar coordinates:

$r = 0.207981$ (radius), $\theta = 90°$ (angle)

0.207981

(0.2+1.08645) 0.207981i

Input interpretation:

$(0.2 + 1.08645) \times 0.207981\, i$

i is the imaginary unit

Result:

$0.267557\ldots\, i$

Polar coordinates:

$r = 0.267557$ (radius), $\theta = 90°$ (angle)

0.267557

From the Ramanujan expression, we obtain:

1/(((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))+12*1/10^3

Input:

$$-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)} + 12 \times \frac{1}{10^3}$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result:

$$\frac{3}{250} - \frac{2}{\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)}$$

Decimal approximation:

0.266929954044136877911594525227982492933709082718833684670...

0.266929954…

Alternate forms:

$$\frac{3}{250} - \frac{2}{\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8) + \log(\pi)\right)}$$

$$\frac{3}{250} - \frac{4}{\zeta\left(\frac{1}{2}\right)(2\gamma + \pi + 2\log(8\pi))}$$

$$\frac{3}{250} - \frac{4}{\zeta\left(\frac{1}{2}\right)(2\gamma + \pi + 6\log(2) + 2\log(\pi))}$$

Alternative representations:

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \frac{12}{10^3} + -\frac{1}{\frac{1}{2}\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\zeta\left(\frac{1}{2}, 1\right)}$$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \frac{12}{10^3} + -\frac{1}{\frac{1}{2}\left(\gamma + \frac{\pi}{2} + \log_e(8\pi)\right)\zeta\left(\frac{1}{2}, 1\right)}$$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \frac{12}{10^3} + -\frac{1}{\frac{1}{2}\left(\gamma + \frac{\pi}{2} + \log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2}, 1\right)}$$

Series representations:

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \frac{3}{250} - \frac{4}{(2\gamma + \pi + 2\log(8\pi))\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k \zeta^{(k)}(s_0)}{k!}} \quad \text{for } s_0 \neq 1$$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \frac{3}{250} + \frac{1}{\left(\gamma + \frac{\pi}{2} + \log(-1 + 8\pi) - \sum_{k=1}^{\infty}\frac{\left(\frac{1}{1-8\pi}\right)^k}{k}\right)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}}$$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\pi)\right)\right)(-1)} + \frac{12}{10^3} = \left(500 + 6\gamma\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n} + 3\pi\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n} + 6\log(8\pi)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right) \Big/ \left(250(2\gamma + \pi + 2\log(8\pi))\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)$$

Integral representations:

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}+\frac{12}{10^3}=\frac{3}{250}+\frac{4\left(-1+\sqrt{2}\right)\sqrt{\pi}}{2\gamma+\pi+2\log(8\pi)\int_0^\infty \frac{1}{(1+e^t)\sqrt{t}}\,dt}$$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}+\frac{12}{10^3}=$$
$$\left(1000\pi^{3/2}-500\sqrt{2}\,\pi^{3/2}+6\gamma\pi\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt+3\pi^2\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt-3i\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt\right)\Big/$$
$$\left(250\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt\right)$$

for $-1<\gamma<0$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}+\frac{12}{10^3}=$$
$$\left(-1000\pi^{3/2}+1000\sqrt{2}\,\pi^{3/2}+6\gamma\pi\int_0^\infty\frac{1}{(1+e^t)\sqrt{t}}\,dt+3\pi^2\int_0^\infty\frac{1}{(1+e^t)\sqrt{t}}\,dt-3i\left(\int_0^\infty\frac{1}{(1+e^t)\sqrt{t}}\,dt\right)\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\Big/$$
$$\left(250\left(\int_0^\infty\frac{1}{(1+e^t)\sqrt{t}}\,dt\right)\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)$$

for $-1<\gamma<0$

$$\frac{1}{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}+\frac{12}{10^3}=$$
$$\left(2000\pi^{3/2}-1000\sqrt{2}\,\pi^{3/2}+6\gamma\pi\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt+3\pi^2\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt-3i\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt\right)\Big/$$
$$\left(250\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt\right)$$

for $-1<\gamma<0$

(((1/((((0.2+1.08645) 0.207981i))))))^4-64+8+1/golden ratio

Input interpretation:

$$\left(\frac{1}{(0.2 + 1.08645) \times 0.207981\, i}\right)^4 - 64 + 8 + \frac{1}{\phi}$$

i is the imaginary unit

ϕ is the golden ratio

Result:

139.752...

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

Alternative representations:

$$\left(\frac{1}{(0.2 + 1.08645)\, 0.207981\, i}\right)^4 - 64 + 8 + \frac{1}{\phi} = -56 + \left(\frac{1}{0.267557\, i}\right)^4 + \frac{1}{2 \sin(54\,°)}$$

$$\left(\frac{1}{(0.2 + 1.08645)\, 0.207981\, i}\right)^4 - 64 + 8 + \frac{1}{\phi} = -56 + -\frac{1}{2 \cos(216\,°)} + \left(\frac{1}{0.267557\, i}\right)^4$$

$$\left(\frac{1}{(0.2 + 1.08645)\, 0.207981\, i}\right)^4 - 64 + 8 + \frac{1}{\phi} = -56 + \left(\frac{1}{0.267557\, i}\right)^4 + -\frac{1}{2 \sin(666\,°)}$$

(((1/((((0.2+1.08645) 0.207981i))))))^4-55-13-golden ratio

Input interpretation:

$$\left(\frac{1}{(0.2 + 1.08645) \times 0.207981\, i}\right)^4 - 55 - 13 - \phi$$

i is the imaginary unit

ϕ is the golden ratio

Result:

125.516...

125.516… result 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

Alternative representations:

$$\left(\frac{1}{(0.2+1.08645)\,0.207981\,i}\right)^4 - 55 - 13 - \phi = -68 + \left(\frac{1}{0.267557\,i}\right)^4 - 2\sin(54°)$$

$$\left(\frac{1}{(0.2+1.08645)\,0.207981\,i}\right)^4 - 55 - 13 - \phi = -68 + 2\cos(216°) + \left(\frac{1}{0.267557\,i}\right)^4$$

$$\left(\frac{1}{(0.2+1.08645)\,0.207981\,i}\right)^4 - 55 - 13 - \phi = -68 + \left(\frac{1}{0.267557\,i}\right)^4 + 2\sin(666°)$$

We have:

$$(\rho + p_r)|_{r_0} = \frac{a}{24\pi r_0^2}\left[\frac{6d(a+3nr_0)(a+r_0)^{1-6n}}{c_3^2} + \frac{aB(n-1) - B(n-1)(3n-1)r_0 + 6(6n-1)n^2}{n(3n-1)(6n-1)}\right] \quad (56)$$

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We plot the quantities $b(r)$, $b(r)/r$, $b(r) - r$ and $b'(r)$ in Figs. 1-4. For the figures we consider $a = 0.2, d = -0.014, B = 0.5, n = 0.14, c_3 = 0.13$ (WH2). We can see from Fig. 3 and Fig. 7 that $b(r) - r$ cuts r-axis at $r_0 = 0.603$, which is the throat of WH2. One verifies, $b'(0.603) \approx 0.534 < 1$ is shown in Fig. 4.

From

$$(\rho + p_r)|_{r_0} = \frac{a}{24\pi r_0^2}\left[\frac{6d(a+3nr_0)(a+r_0)^{1-6n}}{c_3^2} + \frac{aB(n-1) - B(n-1)(3n-1)r_0 + 6(6n-1)n^2}{n(3n-1)(6n-1)}\right] \quad (56)$$

in Figs. 1-4. For the figures we consider $a = 0.2, d = -0.014, B = 0.5, n = 0.14, c_3 = 0.13$ (WH2). We can see from Fig. 3 and Fig. 7 that $b(r) - r$ cuts r-axis at $r_0 = 0.603$, which is the throat of WH2. One verifies,

We obtain:

0.2/(24Pi*0.603^2)*[((6*(-0.014)(0.2+3*0.14*0.603)(0.2+0.603)^(1-6*0.14)))/(0.13)^2+(((0.2*0.5(0.14-1)-0.5(0.14-1)(3*0.14-1)*0.603+6(6*0.14-1)*0.14^2)))/(((0.14(3*0.14-1)(6*0.14-1))))]

Input:

$$\frac{0.2}{24\pi\times 0.603^2}\left(\frac{6\times(-0.014)(0.2+3\times 0.14\times 0.603)(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5(0.14-1)-0.5(0.14-1)((3\times 0.14-1)\times 0.603)+6(6\times 0.14-1)\times 0.14^2}{0.14(3\times 0.14-1)(6\times 0.14-1)}\right)$$

Result:

−0.159168...

-0.159168…

Alternative representations:

$$\frac{1}{24\pi\,0.603^2}\left(\frac{6(-0.014)(0.2+3\times 0.14\times 0.603)(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5(0.14-1)+6(6\times 0.14-1)\,0.14^2}{0.14(3\times 0.14-1)(6\times 0.14-1)}\right)0.2=\frac{0.2\left(\frac{-0.236388-0.96\times 0.14^2}{0.012992}-\frac{0.0380738\times 0.803^{0.16}}{0.13^2}\right)}{4320^\circ\,0.603^2}$$

$$\frac{1}{24\pi\,0.603^2}\left(\frac{6(-0.014)(0.2+3\times 0.14\times 0.603)(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5(0.14-1)+6(6\times 0.14-1)\,0.14^2}{0.14(3\times 0.14-1)(6\times 0.14-1)}\right)0.2=-\frac{0.2\left(\frac{-0.236388-0.96\times 0.14^2}{0.012992}-\frac{0.0380738\times 0.803^{0.16}}{0.13^2}\right)}{24\,i\log(-1)\,0.603^2}$$

$$\frac{1}{24\pi\,0.603^2}\left(\frac{6(-0.014)(0.2+3\times 0.14\times 0.603)(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5(0.14-1)+6(6\times 0.14-1)\,0.14^2}{0.14(3\times 0.14-1)(6\times 0.14-1)}\right)0.2=\frac{0.2\left(\frac{-0.236388-0.96\times 0.14^2}{0.012992}-\frac{0.0380738\times 0.803^{0.16}}{0.13^2}\right)}{24\cos^{-1}(-1)\,0.603^2}$$

Series representations:

$$\frac{1}{24\,\pi\,0.603^2}\left(\frac{6\,(-0.014)\,(0.2+3\times 0.14\times 0.603)\,(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5\,(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5\,(0.14-1)+6\,(6\times 0.14-1)\,0.14^2}{0.14\,(3\times 0.14-1)\,(6\times 0.14-1)}\right)0.2=-\frac{0.12501}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{1}{24\,\pi\,0.603^2}\left(\frac{6\,(-0.014)\,(0.2+3\times 0.14\times 0.603)\,(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5\,(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5\,(0.14-1)+6\,(6\times 0.14-1)\,0.14^2}{0.14\,(3\times 0.14-1)\,(6\times 0.14-1)}\right)0.2=-\frac{0.250021}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{1}{24\,\pi\,0.603^2}\left(\frac{6\,(-0.014)\,(0.2+3\times 0.14\times 0.603)\,(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5\,(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5\,(0.14-1)+6\,(6\times 0.14-1)\,0.14^2}{0.14\,(3\times 0.14-1)\,(6\times 0.14-1)}\right)0.2=-\frac{0.500042}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{1}{24\,\pi\,0.603^2}\left(\frac{6\,(-0.014)\,(0.2+3\times 0.14\times 0.603)\,(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5\,(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5\,(0.14-1)+6\,(6\times 0.14-1)\,0.14^2}{0.14\,(3\times 0.14-1)\,(6\times 0.14-1)}\right)0.2=-\frac{0.250021}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{1}{24\,\pi\,0.603^2}\left(\frac{6\,(-0.014)\,(0.2+3\times 0.14\times 0.603)\,(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5\,(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5\,(0.14-1)+6\,(6\times 0.14-1)\,0.14^2}{0.14\,(3\times 0.14-1)\,(6\times 0.14-1)}\right)0.2=-\frac{0.12501}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{1}{24\pi\, 0.603^2}\left(\frac{6(-0.014)(0.2+3\times 0.14\times 0.603)(0.2+0.603)^{1-6\times 0.14}}{0.13^2}+\frac{0.2\times 0.5(0.14-1)-(3\times 0.14-1)\,0.603\times 0.5(0.14-1)+6(6\times 0.14-1)\,0.14^2}{0.14(3\times 0.14-1)(6\times 0.14-1)}\right)0.2=-\frac{0.250021}{\int_0^\infty \frac{\sin(t)}{t}\,dt}$$

From the previous Ramanujan expression, we obtain:

-1/2*(((1/(((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))+64*1/10^3)))

Input:

$$-\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+64\times\frac{1}{10^3}\right)$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result:

$$\frac{1}{2}\left(\frac{2}{\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}-\frac{8}{125}\right)$$

Decimal approximation:

−0.15946497702206843895579726261399124646685454135941684233...

-0.159464977…

Alternate forms:

$$\frac{1}{\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8)+\log(\pi)\right)}-\frac{4}{125}$$

$$\frac{1}{\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}-\frac{4}{125}$$

$$\frac{2}{\zeta\left(\frac{1}{2}\right)(2\gamma+\pi+2\log(8\pi))}-\frac{4}{125}$$

Alternative representations:

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=\frac{1}{2}\left(-\frac{64}{10^3}--\frac{1}{\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=\frac{1}{2}\left(-\frac{64}{10^3}--\frac{1}{\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log_e(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=$$
$$\frac{1}{2}\left(-\frac{64}{10^3}--\frac{1}{\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

Series representations:

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=$$
$$-\frac{4}{125}+\frac{1}{\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}}\quad \text{for } s_0\neq 1$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=$$
$$-\frac{4}{125}-\frac{1}{\left(2\gamma+\pi+2\log(-1+8\pi)-2\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1-8\pi}\right)^k}{k}\right)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}}$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=$$
$$-\left(\left(125+8\gamma\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}+4\pi\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}+\right.\right.$$
$$\left.8\log(8\pi)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)\Bigg/$$
$$\left.\left(125(2\gamma+\pi+2\log(8\pi))\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)\right)$$

Integral representations:

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)=-\frac{4}{125}-\frac{2\left(-1+\sqrt{2}\right)\sqrt{\pi}}{2\gamma+\pi+2\log(8\pi)\int_0^\infty \frac{1}{\left(1+e^t\right)\sqrt{t}}\,dt}$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)= -\left(\left(250\pi^{3/2}-125\sqrt{2}\,\pi^{3/2}+8\gamma\pi\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt+4\pi^2\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt-4i\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt\right)\Big/\left(125\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\sqrt{t}\,\operatorname{sech}^2(t)\,dt\right)\right) \text{ for } -1<\gamma<0$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)= -\left(\left(2\left(-125\pi^{3/2}+125\sqrt{2}\,\pi^{3/2}+4\gamma\pi\int_0^\infty\frac{1}{\left(1+e^t\right)\sqrt{t}}\,dt+2\pi^2\int_0^\infty\frac{1}{\left(1+e^t\right)\sqrt{t}}\,dt-2i\left(\int_0^\infty\frac{1}{\left(1+e^t\right)\sqrt{t}}\,dt\right)\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)\Big/\left(125\left(\int_0^\infty\frac{1}{\left(1+e^t\right)\sqrt{t}}\,dt\right)\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)\right) \text{ for } -1<\gamma<0$$

$$\frac{1}{2}\left(-\frac{1}{\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)}+\frac{64}{10^3}\right)(-1)= -\left(\left(2\left(250\pi^{3/2}-125\sqrt{2}\,\pi^{3/2}+4\gamma\pi\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt+2\pi^2\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt-2i\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt\right)\right)\Big/\left(125\left(2\gamma\pi+\pi^2-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+8\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_0^\infty\frac{e^{-t}\operatorname{sech}(t)}{\sqrt{t}}\,dt\right)\right) \text{ for } -1<\gamma<0$$

Now, we have that:

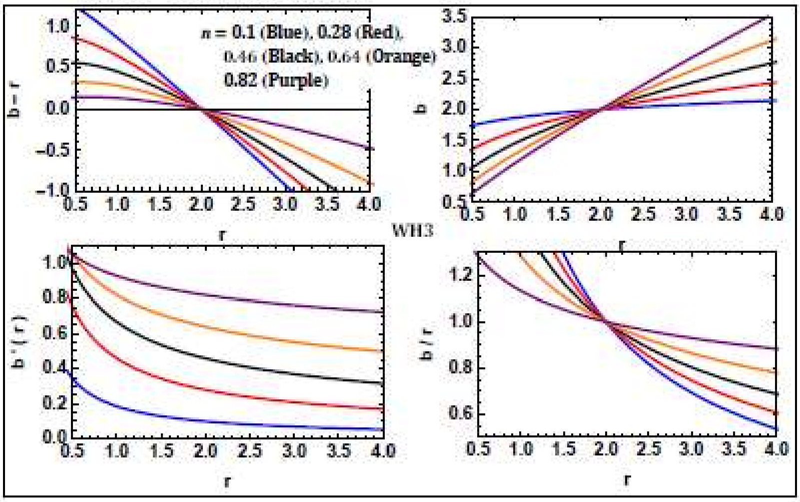


FIG. 8. Characteristics of the shape function of WH3 for $a = 0.6, R = 2, B = 0.5, c_3 = 1.165$.

The components of the energy-momentum tensor (31)-(33) then take the form

$$\rho = \frac{2anr_0\,(r/r_0)^n + Br^3}{16\pi r^3}, \tag{58}$$

$$\rho + p_r = \frac{a\left[(n-3)r_0\left(\frac{r}{r_0}\right)^n + 2r\right]}{8\pi r^3}, \tag{59}$$

$$\rho + p_t = \frac{a(n-1)r_0(a+3r),\left(\frac{r}{r_0}\right)^n + 2ar^2}{16\pi r^4} \tag{60}$$

$$\rho + p_r + 2p_t = \frac{1}{8\pi r^4}\Big[ar_0[a(n-1) + 2(n-3)r] \left(\frac{r}{r_0}\right)^n + 4ar^2 - Br^4\Big]. \tag{61}$$

Note that at the throat, Eq. (59) reduces to

$$(\rho + p_r)|_{r_0} = \frac{a(n-1)}{8\pi r_0^2}. \tag{62}$$

From (62), considering $R = r_0 = 2$ and $n = 0.82$, we obtain :

(0.6(0.82-1)) / (8Pi*2^2)

Input:

$$\frac{0.6\,(0.82-1)}{8\,\pi\times 2^2}$$

Result:

$-0.00107430\ldots$

-0.0010743…

Alternative representations:

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.108}{5760\,°}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = \frac{-0.108}{-32\,i\log(-1)}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.108}{32\cos^{-1}(-1)}$$

Series representations:

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.00084375}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.0016875}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.003375}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.0016875}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.00084375}{\int_0^1 \sqrt{1-t^2}\,dt}$$

$$\frac{0.6\,(0.82-1)}{8\,\pi\,2^2} = -\frac{0.0016875}{\int_0^\infty \frac{\sin(t)}{t}\,dt}$$

-1/(((0.6(0.82-1)) / (8Pi*2^2))) + 8 -1/golden ratio

Input:

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\times 2^2}} + 8 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

938.224...

938.224… result practically equal to the proton mass in MeV

Alternative representations:

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\,2^2}} + 8 - \frac{1}{\phi} = 8 - -\frac{1}{2\cos(216\,°)} - -\frac{1}{\frac{0.108}{32\,\pi}}$$

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\,2^2}} + 8 - \frac{1}{\phi} = 8 - -\frac{1}{2\cos(216\,°)} - -\frac{1}{\frac{0.108}{5760\,°}}$$

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\,2^2}} + 8 - \frac{1}{\phi} = 8 - \frac{1}{2\cos\left(\frac{\pi}{5}\right)} - -\frac{1}{\frac{0.108}{32\,\pi}}$$

Series representations:

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\,2^2}} + 8 - \frac{1}{\phi} = 8 - \frac{1}{\phi} + 1185.19 \sum_{k=0}^{\infty} \frac{(-1)^k}{1+2\,k}$$

$$-\frac{1}{\frac{0.6\,(0.82-1)}{8\,\pi\,2^2}} + 8 - \frac{1}{\phi} = -584.593 - \frac{1}{\phi} + 592.593 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2\,k}{k}}$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+8-\frac{1}{\phi}=8-\frac{1}{\phi}+296.296\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+8-\frac{1}{\phi}=8-\frac{1}{\phi}+592.593\int_0^\infty \frac{1}{1+t^2}\,dt$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+8-\frac{1}{\phi}=8-\frac{1}{\phi}+1185.19\int_0^1 \sqrt{1-t^2}\,dt$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+8-\frac{1}{\phi}=8-\frac{1}{\phi}+592.593\int_0^\infty \frac{\sin(t)}{t}\,dt$$

-1/(((0.6(0.82-1)) / (8Pi*2^2))) + (9^3-1)+76-11+5

Input:

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi\times 2^2}}+(9^3-1)+76-11+5$$

Result:

1728.84...

1728.84... ≈ 1729

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

Alternative representations:

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=69+9^3--\frac{1}{\frac{0.108}{5760^\circ}}$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=69+9^3--\frac{1}{-\frac{0.108}{32\, i \log(-1)}}$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=69+9^3--\frac{1}{\frac{0.108}{32\cos^{-1}(-1)}}$$

Series representations:

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=798+1185.19\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=205.407+592.593\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=798+296.296\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}$$

Integral representations:

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=798+592.593\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=798+1185.19\int_0^{1}\sqrt{1-t^2}\,dt$$

$$-\frac{1}{\frac{0.6(0.82-1)}{8\pi 2^2}}+(9^3-1)+76-11+5=798+592.593\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

From (59)

$$\rho + p_r = \frac{a\left[(n-3)r_0\left(\frac{r}{r_0}\right)^n + 2r\right]}{8\pi r^3}, \qquad (59)$$

For r = 1.94973e+13, R = r_0 = 2 and n = 0.82 and a = 0.6

we obtain:

0.6*(((((0.82-3)*2*(((1.94973e+13)/2))^0.82 + 2*(1.94973e+13))))) *1/(8Pi*(1.94973^3))

Input interpretation:

$$0.6\left((0.82-3)\times 2\left(\frac{1.94973\times 10^{13}}{2}\right)^{0.82}+2\times 1.94973\times 10^{13}\right)\times \frac{1}{8\,\pi\times 1.94973^3}$$

Result:

$1.24972...\times 10^{11}$

1.24972...*10^{11}

10^11((((((((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))))^1/6 - 7*1/10^3)))

Input:

$$10^{11}\left(\sqrt[6]{-\frac{1}{2}\,\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)}-7\times\frac{1}{10^3}\right)$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result:

$$100\,000\,000\,000\left(\sqrt[6]{-\frac{1}{2}\,\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)}-\frac{7}{1000}\right)$$

Decimal approximation:

$1.248827113724997803314049663967710663432713571137511 7... \times 10^{11}$

1.24882711…*10^{11}

Alternate forms:

$$50\,000\,000\,000\times 2^{5/6}\sqrt[6]{\zeta\left(\frac{1}{2}\right)\left(-\left(\gamma+\frac{\pi}{2}+\log(8\,\pi)\right)\right)}-700\,000\,000$$

$$50\,000\,000\,000\times 2^{2/3}\sqrt[6]{\zeta\left(\frac{1}{2}\right)(-(2\,\gamma+\pi+6\log(2)+2\log(\pi)))}-700\,000\,000$$

$$100\,000\,000\left(500\times 2^{2/3}\sqrt[6]{\zeta\left(\frac{1}{2}\right)(-(2\,\gamma+\pi+2\log(8\,\pi)))}-7\right)$$

Alternative representations:

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=10^{11}\left(-\frac{7}{10^3}+\sqrt[6]{-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=10^{11}\left(-\frac{7}{10^3}+\sqrt[6]{-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log_e(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=10^{11}\left(-\frac{7}{10^3}+\sqrt[6]{-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)}\right)$$

Series representations:

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=100\,000\,000\left(-7+500\times 2^{5/6}\sqrt[6]{2\gamma+\pi+2\log(8\pi)}\sqrt[6]{\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}}\right)$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=100\,000\,000\left(-7+500\times 2^{2/3}\sqrt[6]{\frac{2\gamma+\pi+2\log(8\pi)}{-1+\sqrt{2}}}\sqrt[6]{\sum_{n=0}^{\infty}2^{-1-n}\sum_{k=0}^{n}\frac{(-1)^k\binom{n}{k}}{\sqrt{1+k}}}\right)$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=-700\,000\,000+50\,000\,000\,000\times 2^{2/3}\sqrt[6]{2\gamma+\pi+2\log(8\pi)}\sqrt[6]{-\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}}\quad\text{for } s_0\neq 1$$

Integral representations:

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=$$

$$100\,000\,000\left(-7+500\sqrt{2}\sqrt[6]{\left(2\gamma+\pi+2\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^\infty\frac{\text{frac}\left(\frac{1}{t}\right)}{\sqrt{t}}\,dt}\right)$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=$$

$$-700\,000\,000+\frac{50\,000\,000\,000\times 2^{5/6}\sqrt[6]{-\frac{1}{1-\sqrt{2}}\int_0^\infty\frac{1}{(1+e^t)\sqrt{t}}\,dt}\sqrt[6]{\gamma+\frac{\pi}{2}+\log(8\pi)}}{\sqrt[12]{\pi}}$$

$$10^{11}\left(\sqrt[6]{\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)}-\frac{7}{10^3}\right)=\frac{1}{\sqrt[6]{-1+\sqrt{2}}\sqrt[12]{\pi}}100\,000\,000$$

$$\left(-7\sqrt[6]{-1+\sqrt{2}}\sqrt[12]{\pi}+500\times 2^{3/4}\sqrt[6]{\left(2\gamma+\pi+2\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^\infty\sqrt{t}\,\text{sech}^2(t)\,dt}\right)$$

Now, we have that:

VII.2. Wormhole (WH7) with $b(r)=\alpha r_0^3\log(r_0/r)+r_0$:

Consider the specific shape function $b(r)=\alpha r_0^3\log(r_0/r)+r_0$. For this choice, the conformal factor becomes

$$\psi=c_3\sqrt{1-\frac{\alpha r_0^3\log(r_0/r)+r_0}{r}}, \tag{75}$$

and corresponding the stress energy components are

$$\rho=\frac{1}{16\pi r^6}\Big[Br^6-36a\alpha^2 r_0^6\log^2\left(\frac{r_0}{r}\right)-12a(r-r_0)(3r+2\alpha r_0^3-3r_0)+24a\alpha r_0^3\left(3r+\alpha r_0^3-3r_0\right)\log\left(\frac{r_0}{r}\right)\Big] \tag{76}$$

For $\alpha = 0.3$, $c_3 = 1.165$, $r = 1.94973e+13$, $R = r_0 = 1.8$ and $B = 0.2$ and $a = 0.5$

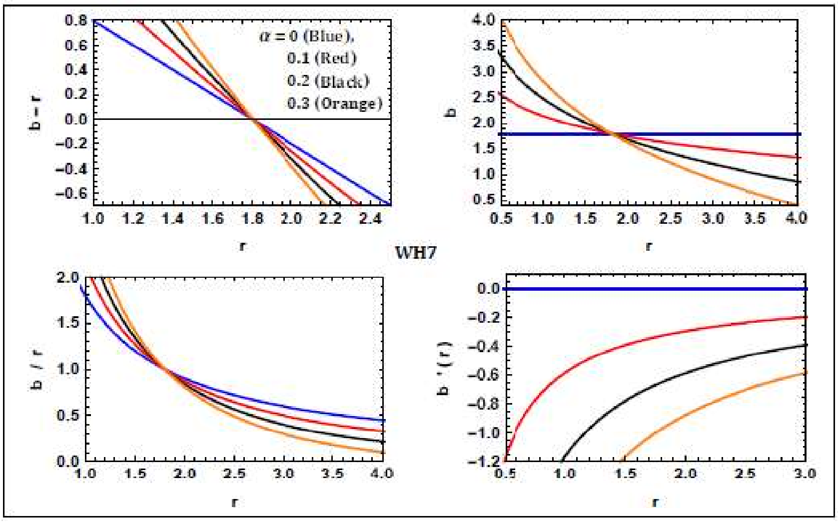


FIG. 17. Characteristics of shape function for WH7 with $a = 0.5, R = 1.8, c_3 = 1.165, B = 0.2$.

1.165*(1-(((((0.3*1.8^3 ln((((1.8/1.94973e+13))))))+1.8 *1/((1.94973e+13))))))^1/2

Input interpretation:

$$1.165\sqrt{1-\left(0.3\times 1.8^3 \log\left(\frac{1.8}{1.94973\times 10^{13}}\right)+1.8\times \frac{1}{1.94973\times 10^{13}}\right)}$$

log(x) is the natural logarithm

Result:

8.52217...

8.52217…

1+1/(((1/(2e)((((1.165*(1-(((((0.3*1.8^3 ln((((1.8/1.94973e+13))))))+1.8 *1/((1.94973e+13))))))^1/2)))))))

Input interpretation:

$$1+\frac{1}{\frac{1}{2e}\left(1.165\sqrt{1-\left(0.3\times 1.8^3 \log\left(\frac{1.8}{1.94973\times 10^{13}}\right)+1.8\times \frac{1}{1.94973\times 10^{13}}\right)}\right)}$$

log(x) is the natural logarithm

Result:

1.637932062274071860884583494883343495091584885558175728961...

1.63793206227…

1/10^27(((1+1/(((1/(2e)((((1.165*(1-(((((0.3*1.8^3 ln((((1.8/1.94973e+13))))))+1.8 *1/((1.94973e+13))))))^1/2)))))))+34/10^3)))

Input interpretation:

$$\frac{1}{10^{27}}\left(1+\frac{1}{\frac{1}{2e}\left(1.165\sqrt{1-\left(0.3\times 1.8^3\log\left(\frac{1.8}{1.94973\times 10^{13}}\right)+1.8\times\frac{1}{1.94973\times 10^{13}}\right)}\right)}+\frac{34}{10^3}\right)$$

log(x) is the natural logarithm

Result:

$1.67193... \times 10^{-27}$

$1.67193...*10^{-27}$ result very near to the proton mass in kg

From the Ramanujan expression, we obtain:

2*(((((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))))+1/(sqrt2)-3/10^2

Input:

$$2\left(-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}$$

ζ(s) is the Riemann zeta function

log(x) is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result:

$$-\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)-\frac{3}{100}+\frac{1}{\sqrt{2}}$$

Decimal approximation:

8.522399059604850979343907255534048066745483880701484455724...

8.5223990596...

lternate forms:

$$\zeta\left(\frac{1}{2}\right)\left(-\gamma-\frac{\pi}{2}-\log(8)-\log(\pi)\right)-\frac{3}{100}+\frac{1}{\sqrt{2}}$$

$$\frac{1}{100}\left(50\sqrt{2}-3\right)-\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)$$

$$-\gamma\,\zeta\left(\frac{1}{2}\right)-\frac{\pi\,\zeta\left(\frac{1}{2}\right)}{2}-3\,\zeta\left(\frac{1}{2}\right)\log(2)-\zeta\left(\frac{1}{2}\right)\log(\pi)-\frac{3}{100}+\frac{1}{\sqrt{2}}$$

Alternative representations:

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=-\frac{3}{10^2}+\frac{1}{\sqrt{2}}-\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\zeta\left(\frac{1}{2},1\right)$$

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=-\frac{3}{10^2}+\frac{1}{\sqrt{2}}-\left(\gamma+\frac{\pi}{2}+\log_e(8\pi)\right)\zeta\left(\frac{1}{2},1\right)$$

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$-\frac{3}{10^2}+\frac{1}{\sqrt{2}}-\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)$$

Series representations:

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$\frac{1}{100}\left(-3+50\sqrt{2}+200\,\gamma\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}+100\,\pi\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}+200\log(-1+8\pi)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}-200\left(\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1-8\pi}\right)^k}{k}\right)\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)$$

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$\frac{1}{100}\left(-3+50\sqrt{2}-100\,\gamma\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}-50\,\pi\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}-100\log(-1+8\pi)\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}+100\sum_{k_1=1}^{\infty}\sum_{k_2=0}^{\infty}\frac{\left(-\frac{1}{-1+8\pi}\right)^{k_1}\left(\frac{1}{2}-s_0\right)^{k_2}\zeta^{(k_2)}(s_0)}{k_2!\,k_1}\right)\text{ for } s_0\neq 1$$

Integral representations:

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$-\frac{3}{100}+\frac{1}{\sqrt{2}}+\frac{(1+\sqrt{2})(2\gamma+\pi+2\log(8\pi))}{2\sqrt{\pi}}\int_0^\infty \frac{1}{(1+e^t)\sqrt{t}}\,dt$$

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$\frac{1}{100}\left(-3+50\sqrt{2}+50\gamma\int_0^\infty \frac{\text{frac}\left(\frac{1}{t}\right)}{\sqrt{t}}\,dt+ 25\pi\int_0^\infty \frac{\text{frac}\left(\frac{1}{t}\right)}{\sqrt{t}}\,dt+50\left(\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^\infty \frac{\text{frac}\left(\frac{1}{t}\right)}{\sqrt{t}}\,dt\right)$$

$$\frac{2}{2}(-1)\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)+\frac{1}{\sqrt{2}}-\frac{3}{10^2}=$$
$$\frac{1}{100(-1+\sqrt{2})}\left(103-53\sqrt{2}+100\gamma\sqrt{\frac{2}{\pi}}\int_0^\infty \sqrt{t}\,\text{sech}^2(t)\,dt+ 50\sqrt{2\pi}\int_0^\infty \sqrt{t}\,\text{sech}^2(t)\,dt+100\sqrt{\frac{2}{\pi}}\left(\int_1^{8\pi}\frac{1}{t}\,dt\right)\int_0^\infty \sqrt{t}\,\text{sech}^2(t)\,dt\right)$$

Now, we have that:

$$\rho=\frac{1}{16\pi r^6}\left[Br^6-36a\alpha^2 r_0^6\log^2\left(\frac{r_0}{r}\right)-12a(r-r_0)(3r+2\alpha r_0^3-3r_0)+24a\alpha r_0^3\left(3r+\alpha r_0^3-3r_0\right)\log\left(\frac{r_0}{r}\right)\right] \quad (76)$$

For $\alpha = 0.3$, $c_3 = 1.165$, $r = 1.94973e+13$, $R = r_0 = 1.8$ and $B = 0.2$ and $a = 0.5$

1/((16Pi*(1.94973e+13)^6))

Input interpretation:

$$\frac{1}{16\pi(1.94973\times 10^{13})^6}$$

Result:

$3.62146\ldots \times 10^{-82}$

$3.62146\ldots*10^{-82}$

3.62146e-82[0.2*(1.94973e+13)^6-36*0.5*0.3^2*1.8^6* ln^2(1.8/1.94973e+13)-12*0.5(1.94973e+13-1.8)(3*1.94973e+13+2*0.3*1.8^3-3*1.8)+24*0.5*0.3*1.8^3(3*1.94973e+13+0.3*1.8^3-3*1.8) ln(1.8/1.94973e+13)]

Input interpretation:

$$3.62146\times 10^{-82}\left(0.2\,(1.94973\times 10^{13})^6-36\times 0.5\times 0.3^2\times 1.8^6\log^2\left(\frac{1.8}{1.94973\times 10^{13}}\right)-12\times 0.5\,(1.94973\times 10^{13}-1.8)\,(3\times 1.94973\times 10^{13}+2\times 0.3\times 1.8^3-3\times 1.8)+24\times 0.5\times 0.3\times 1.8^3\,(3\times 1.94973\times 10^{13}+0.3\times 1.8^3-3\times 1.8)\log\left(\frac{1.8}{1.94973\times 10^{13}}\right)\right)$$

log(x) is the natural logarithm

Result:

0.00397888...

0.0039788771752402708894087340632913338787999999999999

1/0.0039788771752402708894087340632913338787999999999999

Input interpretation:

$$\frac{1}{0.0039788771752402708894087340632913338787999999999999}$$

Result:

251.3271850216420399361175558969866703817480854455161581709...

251.32718502...

Possible closed forms:

$\sqrt{51796+10368\,e-5027\,\pi-1473\log(2)}\approx$ 251.32718502164203993536113375034754705662626451306

$\frac{\sqrt[4]{359216131064262877}}{\pi^4}\approx$ 251.32718502164203998932217268045717624440807723637

$\frac{5366\,e\,e!+2296+6737\,e+4980\,e^2}{175\,e}\approx$ 251.32718502164203993531659814329035895611101756652

1/2(1/0.0039788771752402708890)

Input interpretation:

$$\frac{1}{2}\times\frac{1}{0.0039788771752402708890}$$

Result:

125.66359251082101998096769383419987804026068653390261715090...

125.6635925108... result 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

1/2(1/0.0039788771752402708890)+13+1/golden ratio

Input interpretation:

$$\frac{1}{2}\times\frac{1}{0.0039788771752402708890}+13+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.28162649957091 48...

139.28162649... result practically equal to the rest mass of Pion meson 139.57 MeV

Alternative representations:

$$\frac{1}{0.0039788771752402708890000\times 2}+13+\frac{1}{\phi}=13+\frac{1}{2\times 0.0039788771752402708890000}+\frac{1}{2\sin(54°)}$$

$$\frac{1}{0.0039788771752402708890000\times 2}+13+\frac{1}{\phi}=13+\frac{1}{2\times 0.0039788771752402708890000}+-\frac{1}{2\cos(216°)}$$

$$\frac{1}{0.0039788771752402708890000\times 2}+13+\frac{1}{\phi}=13+\frac{1}{2\times 0.0039788771752402708890000}+-\frac{1}{2\sin(666°)}$$

From the Ramanujan expression, we obtain:

(((((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))))^4+13+golden ratio

Input:

$$\left(-\frac{1}{2}\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)^4+13+\phi$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

ϕ is the golden ratio

Exact result:

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4+\phi+13$$

Decimal approximation:

251.3825032313435219001115951481052876218538315482976226964...

251.382503231…

Alternate forms:

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4+\frac{1}{2}\left(27+\sqrt{5}\right)$$

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8)+\log(\pi)\right)^4+13+\frac{1}{2}\left(1+\sqrt{5}\right)$$

$$\frac{1}{256}\left(16\gamma^4\zeta\left(\frac{1}{2}\right)^4+32\gamma^3\pi\zeta\left(\frac{1}{2}\right)^4+24\gamma^2\pi^2\zeta\left(\frac{1}{2}\right)^4+8\gamma\pi^3\zeta\left(\frac{1}{2}\right)^4+\pi^4\zeta\left(\frac{1}{2}\right)^4+16\zeta\left(\frac{1}{2}\right)^4\log^4(8\pi)+64\gamma\zeta\left(\frac{1}{2}\right)^4\log^3(8\pi)+32\pi\zeta\left(\frac{1}{2}\right)^4\log^3(8\pi)+96\gamma^2\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+96\gamma\pi\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+24\pi^2\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+64\gamma^3\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+96\gamma^2\pi\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+48\gamma\pi^2\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+8\pi^3\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+3456+128\sqrt{5}\right)$$

Alternative representations:

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log_e(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$
$$13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

Series representations:

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$
$$13+\phi+\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4\left(\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$
$$13+\phi+\frac{\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4\left(\sum_{n=0}^{\infty}2^{-1-n}\sum_{k=0}^{n}\frac{(-1)^k\binom{n}{k}}{\sqrt{1+k}}\right)^4}{16\left(1-\sqrt{2}\right)^4}$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$
$$13+\phi+\frac{1}{16}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4\left(\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}\right)^4 \quad \text{for } s_0\neq 1$$

Now, we have that:

VII.3. Wormhole (WH8) with $b(r) = \alpha r_0 (1 - r_0/r) + r_0$:

We consider wormhole with the following shape function $b(r) = \alpha r_0 (1 - r_0/r) + r_0$. Thus, the conformal factor becomes

$$\psi = c_3 \sqrt{1 - \frac{\alpha r_0 (1 - r_0/r) + r_0}{r}}, \quad (80)$$

Using Eqs. (80) and (36)-(38), we can obtain the energy density and pressure components as

$$\rho = \frac{1}{16\pi r^8} \Big[B r^8 - 12a(r - r_0) \Big\{ 3r^3 - 3r^2(2\alpha r_0 + r_0) + \alpha(3\alpha + 4) r r_0^2 - \alpha^2 r_0^3 \Big\} \Big], \quad (81)$$

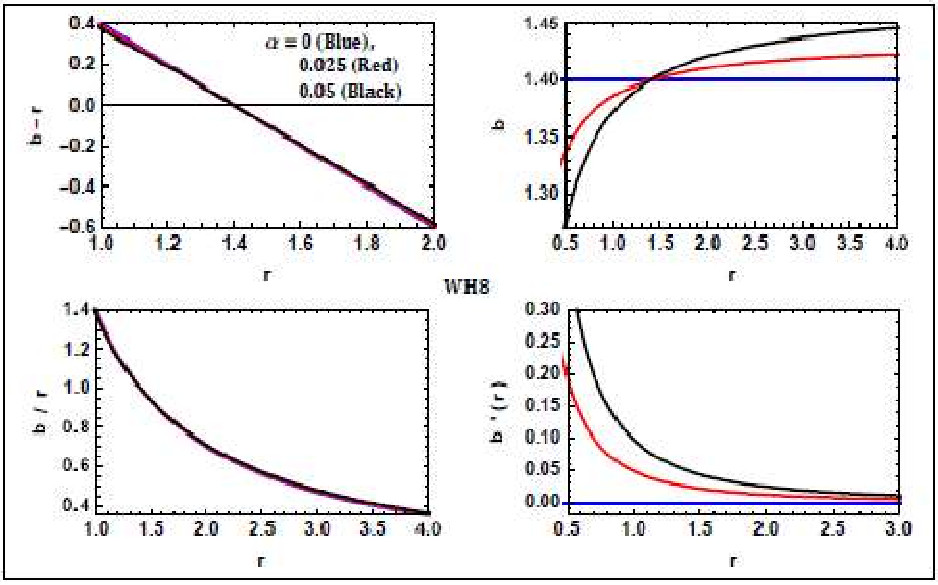


FIG. 20. Characteristics of shape function for WH8 with $a = 0.5, R = 1.4, c_3 = 1.165, B = 0.2$.

For $\alpha = 0.025$, $c_3 = 1.165$, $r = 1.94973e{+}13$, $R = r_0 = 1.4$ and $B = 0.2$ and $a = 0.5$

$$\psi = c_3\sqrt{1 - \frac{\alpha r_0\left(1 - r_0/r\right) + r_0}{r}},$$

1.165 * (1-(((((0.025*1.4*((((1-(1.4/1.94973e+13)))))))+1.4 * 1/((1.94973e+13))))))^1/2

Input interpretation:

$$1.165\sqrt{1 - \left(0.025 \times 1.4\left(1 - \frac{1.4}{1.94973 \times 10^{13}}\right) + 1.4 \times \frac{1}{1.94973 \times 10^{13}}\right)}$$

Result:

1.14443...

1.14443…

From:

$$\rho = \frac{1}{16\pi r^8}\Big[Br^8 - 12a(r - r_0)\Big\{3r^3 - 3r^2(2\alpha r_0 + r_0) + \alpha(3\alpha + 4)rr_0^2 - \alpha^2 r_0^3\Big\}\Big], \qquad (81)$$

For $\alpha = 0.025$, $c_3 = 1.165$, $r = 1.94973e+13$, $R = r_0 = 1.4$ and $B = 0.2$ and $a = 0.5$

1/((16Pi*(1.94973e+13)^8))

Input interpretation:

$$\frac{1}{16\pi\left(1.94973 \times 10^{13}\right)^8}$$

Result:

$9.52652... \times 10^{-109}$

$9.52652..*10^{-109}$

9.52652e-109*(((((([0.2*(1.94973e+13)^8-12*0.5(1.94973e+13-1.4)*(((3*(1.94973e+13)^3-3*(1.94973e+13)^2*((2*0.025*1.4+1.4))+0.025((3*0.025+4))*(1.94973e+13)*(1.4^2)-0.025^2*1.4^3)))]))))

Input interpretation:

$$\frac{9.52652}{10^{109}}\left(0.2\left(1.94973\times10^{13}\right)^8-12\times0.5\left(\left(1.94973\times10^{13}-1.4\right)\left(3\left(1.94973\times10^{13}\right)^3-3\left(1.94973\times10^{13}\right)^2(2\times0.025\times1.4+1.4)+0.025\,(3\times0.025+4)\times1.94973\times10^{13}\times1.4^2-0.025^2\times1.4^3\right)\right)\right)$$

Result:

0.003978872952840082299525811768909804855090384675223997521...

0.00397887295284…… final result

1/((((9.52652e-109*(((([0.2*(1.94973e+13)^8-12*0.5(1.94973e+13-1.4)*(((3*(1.94973e+13)^3-3*(1.94973e+13)^2*((2*0.025*1.4+1.4))+0.025((3*0.025+4))*(1.94973e+13)*(1.4^2)-0.025^2*1.4^3)))])))))))

Input interpretation:

$$1\left/\left(\frac{9.52652}{10^{109}}\left(0.2\left(1.94973\times10^{13}\right)^8-12\times0.5\left(\left(1.94973\times10^{13}-1.4\right)\left(3\left(1.94973\times10^{13}\right)^3-3\left(1.94973\times10^{13}\right)^2(2\times0.025\times1.4+1.4)+0.025\,(3\times0.025+4)\times1.94973\times10^{13}\times1.4^2-0.025^2\times1.4^3\right)\right)\right)\right)\right.$$

Result:

251.3274517313274234988903450101572144079537011131153911067...

251.327451731…

1/2*1/((((9.52652e-109*(((([0.2*(1.94973e+13)^8-12*0.5(1.94973e+13-1.4)*(((3*(1.94973e+13)^3-3*(1.94973e+13)^2*((2*0.025*1.4+1.4))+0.025((3*0.025+4))*(1.94973e+13)*(1.4^2)-0.025^2*1.4^3)))])))))))

Input interpretation:

$$\frac{1}{2}\times1\left/\left(\frac{9.52652}{10^{109}}\left(0.2\left(1.94973\times10^{13}\right)^8-12\times0.5\left(\left(1.94973\times10^{13}-1.4\right)\left(3\left(1.94973\times10^{13}\right)^3-3\left(1.94973\times10^{13}\right)^2(2\times0.025\times1.4+1.4)+0.025\,(3\times0.025+4)\times1.94973\times10^{13}\times1.4^2-0.025^2\times1.4^3\right)\right)\right)\right)\right.$$

Result:

125.66372586566371174944517250507860720397685055655576955533...

125.663725865… result 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

13+0.618034+0.5/((9.52652e-109*[0.2*(1.94973e+13)^8-12*0.5(1.94973e+13-1.4)*(((3*(1.94973e+13)^3-3*(1.94973e+13)^2*((2*0.025*1.4+1.4))+0.025((3*0.025+4))*(1.94973e+13)*(1.4^2)-0.025^2*1.4^3)))]))

Input interpretation:

$$13 + 0.618034 + 0.5 \Big/ \left(\frac{9.52652}{10^{109}} \left(0.2 \left(1.94973 \times 10^{13}\right)^8 - 12 \times 0.5 \left(\left(1.94973 \times 10^{13} - 1.4\right) \left(3 \left(1.94973 \times 10^{13}\right)^3 - 3 \left(1.94973 \times 10^{13}\right)^2 (2 \times 0.025 \times 1.4 + 1.4) + 0.025 (3 \times 0.025 + 4) \times 1.94973 \times 10^{13} \times 1.4^2 - 0.025^2 \times 1.4^3\right)\right)\right)\right)$$

Result:

139.28175986566371174944517250507860720397685055655576955533...

139.2817598… result practically equal to the rest mass of Pion meson 139.57 MeV

From the Ramanujan expression, we obtain:

(((((-1/2 zeta (1/2) (euler-mascheroni constant+ Pi/2 + ln(8Pi)))))))^4+13+golden ratio

Input:

$$\left(-\frac{1}{2}\,\zeta\left(\frac{1}{2}\right)\left(\gamma + \frac{\pi}{2} + \log(8\,\pi)\right)\right)^4 + 13 + \phi$$

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

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

ϕ is the golden ratio

Exact result:

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4+\phi+13$$

Decimal approximation:

251.38250323134352190011159514810528762185383154829762269 64...

251.3825032...

Alternate forms:

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4+\frac{1}{2}\left(27+\sqrt{5}\right)$$

$$\frac{1}{16}\zeta\left(\frac{1}{2}\right)^4\left(\gamma+\frac{\pi}{2}+\log(8)+\log(\pi)\right)^4+13+\frac{1}{2}\left(1+\sqrt{5}\right)$$

$$\frac{1}{256}\left(16\gamma^4\zeta\left(\frac{1}{2}\right)^4+32\gamma^3\pi\zeta\left(\frac{1}{2}\right)^4+24\gamma^2\pi^2\zeta\left(\frac{1}{2}\right)^4+8\gamma\pi^3\zeta\left(\frac{1}{2}\right)^4+\pi^4\zeta\left(\frac{1}{2}\right)^4+16\zeta\left(\frac{1}{2}\right)^4\log^4(8\pi)+64\gamma\zeta\left(\frac{1}{2}\right)^4\log^3(8\pi)+32\pi\zeta\left(\frac{1}{2}\right)^4\log^3(8\pi)+96\gamma^2\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+96\gamma\pi\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+24\pi^2\zeta\left(\frac{1}{2}\right)^4\log^2(8\pi)+64\gamma^3\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+96\gamma^2\pi\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+48\gamma\pi^2\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+8\pi^3\zeta\left(\frac{1}{2}\right)^4\log(8\pi)+3456+128\sqrt{5}\right)$$

Alternative representations:

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)(-1)\right)^4+13+\phi=13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)(-1)\right)^4+13+\phi=13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log_e(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)(-1)\right)^4+13+\phi=13+\phi+\left(-\frac{1}{2}\left(\gamma+\frac{\pi}{2}+\log(a)\log_a(8\pi)\right)\zeta\left(\frac{1}{2},1\right)\right)^4$$

Series representations:

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)(-1)\right)^4+13+\phi=13+\phi+\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4\left(\sum_{n=0}^{\infty}\frac{\sum_{k=0}^{n}(-1)^k\sqrt{1+k}\binom{n}{k}}{1+n}\right)^4$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$

$$13+\phi+\frac{(2\gamma+\pi+2\log(8\pi))^4\left(\sum_{n=0}^{\infty}2^{-1-n}\sum_{k=0}^{n}\frac{(-1)^k\binom{n}{k}}{\sqrt{1+k}}\right)^4}{256\left(-1+\sqrt{2}\right)^4}$$

$$\left(\frac{1}{2}\left(\zeta\left(\frac{1}{2}\right)\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)\right)(-1)\right)^4+13+\phi=$$

$$13+\phi+\frac{1}{16}\left(\gamma+\frac{\pi}{2}+\log(8\pi)\right)^4\left(\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}-s_0\right)^k\zeta^{(k)}(s_0)}{k!}\right)^4 \quad \text{for } s_0\neq 1$$

Summing (80) and (81), we obtain:

1.14443 + 9.52652e-109*((([0.2*(1.94973e+13)^8-12*0.5(1.94973e+13-1.4)*(((3*(1.94973e+13)^3-3*(1.94973e+13)^2*((2*0.025*1.4+1.4))+0.025((3*0.025+4))*(1.94973e+13)*(1.4^2)-0.025^2*1.4^3)))]))

Input interpretation:

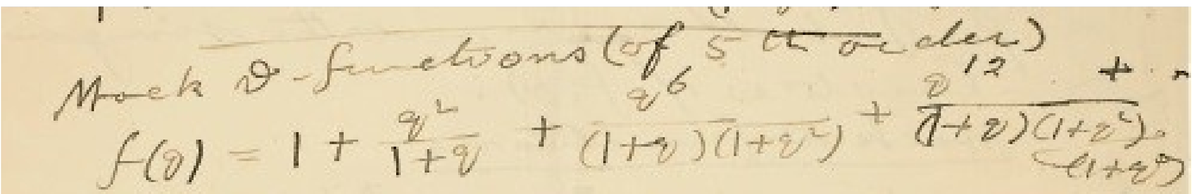
$$1.14443+\frac{9.52652}{10^{109}}\left(0.2\left(1.94973\times10^{13}\right)^8-12\times0.5\left(\left(1.94973\times10^{13}-1.4\right)\left(3\left(1.94973\times10^{13}\right)^3-3\left(1.94973\times10^{13}\right)^2(2\times0.025\times1.4+1.4)+0.025(3\times0.025+4)\times1.94973\times10^{13}\times1.4^2-0.025^2\times1.4^3\right)\right)\right)$$

Result:

1.148408872952840082299525811768909804855090384675223997521...

1.1484088729…

From the following 5th order Ramanujan mock theta function of his last letter


Mock ϑ-functions (of 5th order)

$$f(q) = 1 + \frac{q^2}{1+q} + \frac{q^6}{(1+q)(1+q^2)} + \frac{q^{12}}{(1+q)(1+q^2)(1+q^3)} + \cdots$$

we obtain:

$$\left(1+\frac{0.449329^2}{1+0.449329}+\frac{0.449329^6}{(1+0.449329)+(1+0.449329^2)}\right)+\frac{0.449329^{12}}{(1+0.449329)(1+0.449329^2)(1+0.449329^3)}$$

1.142443242201380904097917635488946328383797361320962332093...

f(q) = 1.1424432422...

Now, from:

$$\rho=\frac{1}{16\pi r^6}\Big[Br^6-36a\alpha^2 r_0^6\log^2\left(\frac{r_0}{r}\right)-12a(r-r_0)(3r+2\alpha r_0^3-3r_0)+24a\alpha r_0^3\left(3r+\alpha r_0^3-3r_0\right)\log\left(\frac{r_0}{r}\right)\Big] \quad (76)$$

0.00397887295284……

And

(see: **Traversable wormholes in *f*(R, T) gravity with conformal motions -** *Ayan Banerjee, Ksh. Newton Singh, M. K. Jasim,4 and Farook Rahaman -* arXiv:1908.04754v1 [gr-qc] 10 Aug 2019)

$$I_V(WH2) = \left[a\left(1-\frac{b(a)}{a}\right)\ln\left(\frac{e^{\nu(a)}}{1-b/a}\right)\right] - \\ \left[\left\{\frac{2(n-1)(\chi+4\pi)e^{4B\Omega}r^{\Sigma}}{(3n\chi+8\pi n+\chi)[(n+3)\chi+8\pi]^{-\Sigma}}\right. \\ -2C_3^2 nr(\chi+2\pi)[(n+3)\chi+8\pi]+ \\ \left(e^{4B\Omega}[(n+3)\chi+8\pi]^{\Lambda}r^{\tau}+C_3^2 n(\chi+2\pi)\right) \\ \left.\log\left[\frac{2C_2^2C_3^2r^2\{n\chi+\pi(3n-1)\}}{e^{4B\Omega}r^{\Lambda}[(n+3)\chi+8\pi]^{\Lambda}+C_3^2n(\chi+2\pi)}\right]\right\} \\ \left[\frac{2C_3^2\{n\chi+\pi(3n-1)\}}{\{(n+3)\chi+8\pi\}^{-1}}\right]^{-1}\Bigg]_{r_0}^{a}, \qquad (54)$$

$-7.97774999\ldots*10^{16}$ or, considering a = 2 and $r_0 = 1.8$: $-1.595549998\times10^{16}$

We obtain:

0.00397887295284 * (-7.97774999*10^16)

Input interpretation:

$0.00397887295284\left(-7.97774999\times10^{16}\right)$

Result:

$-3.1742453659730580471 6\times10^{14}$

$-3.17424536597305804716 * 10^{14}$

Or:

(0.00397887295284 *-15955499980000000)

Input interpretation:

0.00397887295284 × (-15 955 499 980 000 000)

Result:

$-6.34849073194611609432\times10^{13}$

-6.34849073194611609432e+13 dg

convert $-6.34849073194611609432\times10^{13}$ dg (decigrams) to kilograms

$-6.3484907319461160943\times10^{9}$ kg (kilograms)

If we consider -3.17424536597305804716 * 10^{14} centigrams, we obtain:

-3.1742453659730580472×10^14 cg = kg

Input interpretation:

convert − 3.1742453659730580472 × 10^{14} cg (centigrams) to kilograms

Result:

− 3.174245365973058047 × 10^{9} kg (kilograms)

3.174245365973058047 × 10^{9}

3174245365.973058047

3.171.245.365,973058047 Kg

And we have:

from:

https://wiki.eveuniversity.org/Wormhole_attributes

Wormhole Type	Leads to	Total Mass Allowed (Kg)	Max Individual Mass (Kg)	Mass Regeneration (Kg/day)	Wormhole Classification	Max Stable Time (Hours)
N944	Lowsec	3,000,000,000	1,350,000,000	0	8	24

We note that the total mass allowed, i.e. 3 * 10^{9} Kg is practically equal to the obtained value 3.174245365973058047 * 10^{9} Kg

Now, we insert this value in the Hawking radiation calculator and obtain:

Mass = 3.17425e+9

Radius = 4.71429e-18

Temperature = 3.86534e+13

from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(3.17425e+9)* sqrt[[-((((3.86534e+13* 4*Pi*(4.71429e-18)^3-(4.71429e-18)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{3.17425\times 10^9}\sqrt{-\frac{3.86534\times 10^{13}\times 4\pi(4.71429\times 10^{-18})^3-(4.71429\times 10^{-18})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.618077600233690212431806433686813027855857859634099201538...

1.618077600233...

Note that, for the same values, but with minus sign, we obtain:

Input interpretation:

$$\sqrt{1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\left(-\frac{1}{3.17425\times 10^9}\right)\sqrt{-\frac{-3.86534\times 10^{13}\times 4\pi(-4.71429\times 10^{-18})^3-(-4.71429\times 10^{-18})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.61808... i

1.61808...i

Or, for the following values:

Mass = 6.34849e+9

Radius = 9.42856e-18

Temperature = 1.93267e+13

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(6.34849e+9)* sqrt[[-((((1.93267e+13* 4*Pi*(9.42856e-18)^3-(9.42856e-18)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times \frac{1}{6.34849\times 10^9}\sqrt{-\frac{1.93267\times 10^{13}\times 4\pi(9.42856\times 10^{-18})^3-(9.42856\times 10^{-18})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618078040028637235753875420249904157807003397584534705529...

1.61807804….

and, for the same values, but with minus sign, we obtain:

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\left(-\frac{1}{6.34849\times 10^9}\right)\sqrt{-\frac{-1.93267\times 10^{13}\times 4\pi(-9.42856\times 10^{-18})^3-(-9.42856\times 10^{-18})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.61808... i

1.61808…i

Now, we have that:

$$\rho(r) = \frac{1}{2r^2[\chi + \pi(\omega+3)]}\left\{\frac{3C_3^{-2}}{\chi(3\omega-1)+8\pi\omega} + \frac{\chi+2\pi}{\chi+4\pi}\right.$$
$$\left.\exp\left[4[\chi+\pi(\omega+3)]\left(A + \frac{2\log r}{\chi - 3\chi\omega - 8\pi\omega}\right)\right]\right\}, (38)$$

FIG. 4: Variation of $b'(r)$ with $A = 1.23$, $\chi = -2$, $\omega = -2$, $c_3 = 7.74$ (WH1) and $B = -0.44$, $\chi = -2$, $n = -0.4$, $c_3 = -10$ (WH2).

r = 1.94973e+13

(3*7.74^-2)/(((-2(3*(-2)-1))+8Pi(-2)))+((-2+2Pi))/((-2+4Pi))

$$\rho(r) = \frac{1}{2r^2[\chi + \pi(\omega+3)]}\left\{\frac{3C_3^{-2}}{\chi(3\omega-1)+8\pi\omega} + \frac{\chi+2\pi}{\chi+4\pi}\right.$$
$$\left.\exp\left[4[\chi+\pi(\omega+3)]\left(A + \frac{2\log r}{\chi - 3\chi\omega - 8\pi\omega}\right)\right]\right\}, (38)$$

1/(2*(1.94973e+13)^2*(-2+Pi))

Input interpretation:

$$\frac{1}{2\,(1.94973\times 10^{13})^2\,(-2+\pi)}$$

Result:

$1.15215\ldots \times 10^{-27}$

1.15215e-27

(3*7.74^-2)/(((-2(3*(-2)-1))+8Pi(-2)))+((-2+2Pi))/((-2+4Pi))

Input:

$$\frac{\frac{3}{7.74^2}}{-2\,(3\times(-2)-1)+8\,\pi\times(-2)} + \frac{-2+2\,\pi}{-2+4\,\pi}$$

Result:

0.40397928...

0.40397928

Alternative representations:

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{3}{7.74^2\,(14-2880\,°)}+\frac{-2+360\,°}{-2+720\,°}$$

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{-2-2\,i\log(-1)}{-2-4\,i\log(-1)}+\frac{3}{7.74^2\,(14+16\,i\log(-1))}$$

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{3}{7.74^2\left(14-16\cos^{-1}(-1)\right)}+\frac{-2+2\cos^{-1}(-1)}{-2+4\cos^{-1}(-1)}$$

Series representations:

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{0.5\left(-0.255551+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)\left(-0.214763+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)}{\left(-0.21875+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)\left(-0.125+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)}$$

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{0.5\left(-1.5111+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)\left(-1.42953+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}{\left(-1.4375+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)\left(-1.25+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}$$

$$\frac{3}{(-2(3(-2)-1)+8\pi(-2))\,7.74^2}+\frac{-2+2\pi}{-2+4\pi}=\frac{0.5\left(-0.255551+\sum_{k=1}^{\infty}\tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)\left(-0.214763+\sum_{k=1}^{\infty}\tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)}{\left(-0.21875+\sum_{k=1}^{\infty}\tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)\left(-0.125+\sum_{k=1}^{\infty}\tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)}$$

exp[(((4(-2+Pi)*(1.23+(((((((2 ln (1.94973e+13)))))))/(((-2-3*(-2)(-2)-8(Pi)(-2))))))))]

Input interpretation:

$$\exp\left(4(-2+\pi)\left(1.23+\frac{2\log(1.94973\times10^{13})}{-2-3\times(-2)\times(-2)-8\pi\times(-2)}\right)\right)$$

log(x) is the natural logarithm

Result:

$6.11069... \times 10^5$

6.11069e+5

In conclusion:

1.15215e-27 * (0.40397928 * 6.11069e+5)

Input interpretation:

$1.15215\times10^{-27}\,(0.40397928\times6.11069\times10^5)$

Result:

$2.84418844159366188\times10^{-22}$

2.84418844159366188e-22

(-7.97774999*10^16 * 2.84418844159366188e-22)

Input interpretation:

$-7.97774999\times10^{16}\times2.84418844159366188\times10^{-22}$

Result:

$-0.0000226902243114819516472333812$

Result:

$-2.26902243114819516472333812\times10^{-5}$

$-2.269022431148…*10^{-5}$

From the Hawking radiation calculator, we have that:

Mass = -0.0000226902

Radius = -3.36987e-32

Temperature = -5.40742e+27

Applying the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(-0.0000226902)* sqrt[[-((((-5.40742e+27* 4*Pi*(-3.36987e-32)^3-(-3.36987e-32)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\left(-\frac{1}{0.0000226902}\right)\sqrt{-\frac{-5.40742\times 10^{27}\times 4\pi(-3.36987\times 10^{-32})^3-(-3.36987\times 10^{-32})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618078237615978882495733696741693345912420994730648867675... i

1.61807823761597…i

Now, from:

$$\rho=\frac{1}{16\pi r^6}\left[Br^6-36a\alpha^2r_0^6\log^2\left(\frac{r_0}{r}\right)-12a(r-r_0)(3r\right.$$
$$\left.+2\alpha r_0^3-3r_0)+24a\alpha r_0^3\left(3r+\alpha r_0^3-3r_0\right)\log\left(\frac{r_0}{r}\right)\right] (76)$$

0.00397887295284……

And

$$I_V(WH1) = \left[a\left(1-\frac{b(a)}{a}\right)\ln\left(\frac{e^{\nu(a)}}{1-b/a}\right)\right] -$$
$$\left[\frac{r(\chi+2\pi)(\omega+1)}{\zeta} - \frac{(\chi+4\pi)(\omega+1)e^{4A\zeta}}{C_3^2\zeta[8\pi-\chi(\omega-3)]}\right.$$
$$r^{q/p} - \frac{r\left[e^{4A\zeta}r^{-\sigma}+C_3^2(\chi+2\pi)(\omega+1)\right]}{2C_3^2\zeta}$$
$$\left.\log\left(\frac{2C_2^2C_3^2\zeta r^2}{e^{4A\zeta}r^{-\sigma}+C_3^2(\chi+2\pi)(\omega+1)}\right)\right]_{r_0}^{a} \quad (53)$$

Input interpretation:

$$\frac{1.94973\times 10^{13}\,(-2+2\pi)\times(-1)}{1.14159265} - \left((-2+4\pi)(-2+1)\exp(4\times 1.23\times 1.14159265)\right.$$
$$\left.\left(\frac{1}{7.74^2\times 1.14159265\,(8\pi - -2(-2-3))}\left(4.33666\times 10^{16}\times 65.2548\right)\right)\right)$$

Result:

$7.94425\ldots\times 10^{18}$

$7.94425...*10^{18}$

$$I_V(WH2) = \left[a\left(1-\frac{b(a)}{a}\right)\ln\left(\frac{e^{\nu(a)}}{1-b/a}\right)\right] -$$
$$\left[\left\{\frac{2(n-1)(\chi+4\pi)e^{4B\Omega}r^{\Sigma}}{(3n\chi+8\pi n+\chi)[(n+3)\chi+8\pi]^{-\Sigma}}\right.\right.$$
$$-2C_3^2nr(\chi+2\pi)[(n+3)\chi+8\pi]+$$
$$\left(e^{4B\Omega}[(n+3)\chi+8\pi]^{\Lambda}r^{\tau}+C_3^2n(\chi+2\pi)\right)$$
$$\left.\log\left[\frac{2C_2^2C_3^2r^2\{n\chi+\pi(3n-1)\}}{e^{4B\Omega}r^{\Lambda}[(n+3)\chi+8\pi]^{\Lambda}+C_3^2n(\chi+2\pi)}\right]\right\}$$
$$\left.\left[\frac{2C_3^2\{n\chi+\pi(3n-1)\}}{\{(n+3)\chi+8\pi\}^{-1}}\right]^{-1}\right]_{r_0}^{a}, \quad (54)$$

$-7.97774999\ldots*10^{16}$ (or, considering $a = 2$ and $r_0 = 1.8$: $-1.595549998\times 10^{16}$)

We have also:

(7.94425*10^18 *-7.97774999*10^16 * 2.84418844159366188e-22)

$$7.94425 \times 10^{18} \left(-7.97774999 \times 10^{16} \times 2.84418844159366188 \times 10^{-22}\right)$$

$-1.8025681448649049437353378859 81 \times 10^{14}$

$-1.802568144864904943735337885981 \times 10^{14}$

Input interpretation:

convert $-1.80256814486490494373533788598 \times 10^{14}$ cg (centigrams) to kilograms

Result:

$-1.80256814486490494373533788598 \times 10^{9}$ kg (kilograms)

-1.8025681448649e+9

-1802568144.864904...

From the Hawking radiation calculator, we obtain:

Mass = -1.80257e+9

Radius = -2.67711E-18

Temperature = -6.80671e+13

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(-1.80257e+9)* sqrt[[-((((-6.80671e+13* 4*Pi*(-2.67711e-18)^3-(-2.67711e-18)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2}\left(-\frac{1}{1.80257 \times 10^9}\right) \sqrt{-\frac{-6.80671 \times 10^{13} \times 4\pi\left(-2.67711 \times 10^{-18}\right)^3-\left(-2.67711 \times 10^{-18}\right)^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618079627715805337982304367924745325339831676176097012074... i

1.6180796277158….i

Observations

Ramanujan formula for obtain the golden ratio

1/(((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))

Input:

$$\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\,e^{\left(-\sqrt{5}\,\pi\right)^5}}$$

Exact result:

$$\frac{1}{\frac{1}{32}\left(\sqrt{5}-1\right)^5+5\,e^{-25\sqrt{5}\,\pi^5}}$$

Decimal approximation:

11.09016994374947424102293417182819058860154589902881431067...

(11*5*(e^((-sqrt(5)*Pi))^5))) / (((2*(((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))

Input:

$$\frac{11\times 5\,e^{\left(-\sqrt{5}\,\pi\right)^5}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\,e^{\left(-\sqrt{5}\,\pi\right)^5}\right)}$$

Exact result:

$$\frac{55\,e^{-25\sqrt{5}\,\pi^5}}{2\left(\frac{1}{32}\left(\sqrt{5}-1\right)^5+5\,e^{-25\sqrt{5}\,\pi^5}\right)}$$

Decimal approximation:

$9.992902250707187230705363041294571227424369762652555... \times 10^{-7428}$

(5sqrt(5)*5*(e^((-sqrt(5)*Pi))^5))) / (((2*(((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))

Input:

$$\frac{5\sqrt{5}\times 5\,e^{\left(-\sqrt{5}\,\pi\right)^5}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\,e^{\left(-\sqrt{5}\,\pi\right)^5}\right)}$$

Exact result:

$$\frac{25\sqrt{5}\, e^{-25\sqrt{5}\,\pi^5}}{2\left(\frac{1}{32}\left(\sqrt{5}-1\right)^5+5\, e^{-25\sqrt{5}\,\pi^5}\right)}$$

Decimal approximation:

$1.0156731238678143887477757629564691789882352909878 4\ldots \times 10^{-7427}$

From which:

Input interpretation:

$$\left(1\Big/\left(\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\, e^{\left(-\sqrt{5}\,\pi\right)^5}\right)-\frac{9.9929022507071872307053630412945712274243697626525 5}{10^{7428}}-\frac{1.0156731238678143887477757629564691789882352909878 4}{10^{7427}}\right)\right)\hat{}\,(1/5)$$

Result:

1.6180339887498948482045868343656381177203091798057628 62135...

Or:

((((1/(((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))-(-
1.6382898797095665677239458827012056245798314722584 × 10^-7429)))^1/5

Input interpretation:

$$\sqrt[5]{\frac{1}{\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^5+5\, e^{\left(-\sqrt{5}\,\pi\right)^5}\right)--\frac{1.6382898797095665677239458827012056245798314722584}{10^{7429}}}}$$

Result:

1.6180339887498948482045868343656381177203091798057628 62135...

The result, thence, is:

1.6180339887498948482045868343656381177203091798057628

This is a wonderful golden ratio, fundamental constant of various fields of mathematics and physics

Continued fraction:

$$1+\cfrac{1}{\cdots}}}}}}}}}}}}}}}}}}}}}}}$$

Possible closed forms:

$\phi \approx 1.618033988749894848204586834365638117720309179805762862135$

$\Phi + 1 \approx 1.618033988749894848204586834365638117720309179805762862135$

$\frac{1}{\Phi} \approx 1.618033988749894848204586834365638117720309179805762862135$

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 *n*th Fibonacci number in terms of *n* and the golden ratio, and implies that the ratio of two consecutive Fibonacci numbers tends to the golden ratio as *n* increases.
Fibonacci numbers are also closely related to Lucas numbers ,in that the Fibonacci and Lucas numbers form a complementary pair of Lucas sequences

The beginning of the sequence is thus:

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

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

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

The sequence of Lucas numbers is:

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

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

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

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

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

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Conformally symmetric traversable wormholes in modified teleparallel gravity
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