On the Ramanujan's Fundamental Formula for obtain a highly precise Golden Ratio: mathematical connections with Black Holes Entropies and Like-Particle Solutions

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Abstract

In the present research thesis, we have obtained various and interesting new mathematical connections concerning the fundamental Ramanujan's formula to obtain a highly precise golden ratio, some sectors of Particle Physics and Black Holes entropies.

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http://discovermagazine.com/2015/jan-feb/15-a-beautiful-find

https://twitter.com/pickover/status/1167248857958420480



https://www.sharanagati.org/the-golden-section-of-bhagavad-gita/



http://wallpaperswide.com/snail_shell_spiral-wallpapers.html

Ramanujan and Phi

From:

https://blog.wolfram.com/2013/05/01/after-100-years-ramanujan-gap-filled/



This is the Ramanujan fundamental formula for obtain a beautiful and highly precise golden ratio:

$$\sqrt[5]{\left(\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}-\frac{11\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}-\frac{5\sqrt{5}\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}\right)}$$

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

Input:

 $\frac{1}{\frac{1}{\frac{1}{32} \left(-1 + \sqrt{5}\right)^5 + 5 e^{\left(-\sqrt{5} \pi\right)^5}}_{\text{Open code}}$

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$$\frac{1}{\frac{1}{32}(\sqrt{5}-1)^5 + 5 e^{-25\sqrt{5}\pi^5}}$$
Decimal approximation:

More digits

11.09016994374947424102293417182819058860154589902881431067... Open code

11.09016994374947424102293417182819058860154589902881431067

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

Input:

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

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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:

More digits 9.99290225070718723070536304129457122742436976265255... $\times 10^{-7428}$ Open code

 $9.99290225070718723070536304129457122742436976265255 \times 10^{-7428}$

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

Input:

$$\frac{5\sqrt{5}\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive Exact result:

$$25\sqrt{5} e^{-25\sqrt{5}\pi^5}$$

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

More digits

 $1.01567312386781438874777576295646917898823529098784... \times 10^{-7427}$ Open code

 $1.01567312386781438874777576295646917898823529098784 \times 10^{-7427}$

Input interpretation:

$$\begin{pmatrix} 1 / \left(\left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5} \right) - \\ \frac{9.99290225070718723070536304129457122742436976265255}{10^{7428}} - \\ \frac{1.01567312386781438874777576295646917898823529098784}{10^{7427}} \right) \right) \land (1/5)$$

Open code

Enlarge Data Customize A Plaintext Interactive Result: More digits 1.618033988749894848204586834365638117720309179805762862135...

Or:

.

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

Input interpretation:

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

Open code

Enlarge Data Customize A Plaintext Interactive Result: More digits

1.618033988749894848204586834365638117720309179805762862135... The result, thence, is:

1.6180339887498948482045868343656381177203091798057628

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

Continued fraction: Linear form



Now, we take the three results and calculate the following interesting expressions:

(1.01567312386781438874777576295646917898823529098784 × 10^-7427) / (9.99290225070718723070536304129457122742436976265255 × 10^-7428)

Input interpretation: 1.01567312386781438874777576295646917898823529098784 10⁷⁴²⁷ 9.99290225070718723070536304129457122742436976265255 10⁷⁴²⁸ Open code

Enlarge Data Customize A Plaintext Interactive Result:

More digits

1.016394535227177134731442576696034652473008345277961510888... The result is:

1.016394535227177134731442576696034652473008345277961510888

Rational approximation:

$\frac{84\,753\,381\,552\,557\,490\,451\,770\,790\,712}{83\,386\,301\,888\,777\,894\,022\,056\,258\,371} \\ = 1 + \frac{1\,367\,079\,663\,779\,596\,429\,714\,532\,341}{83\,386\,301\,888\,777\,894\,022\,056\,258\,371} \\ \text{Open code}$

Enlarge Data Customize A Plaintext Interactive Continued fraction:



 $\frac{5\sqrt{5}}{11} \approx 1.0163945352271771347314425766960346524730083452779662383$ Enlarge Data Customize A Plaintext Interactive $\frac{5}{11} (2\Phi + 1) \approx 1.0163945352271771347314425766960346524730083452779662383$ $\frac{10}{11\Phi} - \frac{5}{11} \approx 1.0163945352271771347314425766960346524730083452779662383$ • Φ is the golden ratio conjugate

[(1.01567312386781438874777576295646917898823529098784 × 10^-7427) / (9.99290225070718723070536304129457122742436976265255 × 10^-7428)]^31

1.0156/31	2386/814388/4///5/629564691/898823529	098784
	107427	
9.9929022	5070718723070536304129457122742436970	6265255
	107428	

Enlarge Data Customize A Plaintext Interactive Result: More digits

1.655510584358883198709997446159741616946175065249919104301...

The result is:

1.655510584358883198709997446159741616946175065249919104301

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 \begin{array}{l} \label{eq:rational approximation:} \\ \hline 69\,673\,893\,686\,116\,680\,947\,888\,837\,251 \\ \hline 42\,086\,045\,443\,858\,489\,000\,117\,795\,970 \\ = 1 + \frac{27\,587\,848\,242\,258\,191\,947\,771\,041\,281}{42\,086\,045\,443\,858\,489\,000\,117\,795\,970} \\ \hline Open \ code \end{array}
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Continued fraction:

We note that 1,65551058... is very near to the fourteenth root of following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164,2696$

$$\left(\sqrt{\frac{113 + 5\sqrt{505}}{8}} + \sqrt{\frac{105 + 5\sqrt{505}}{8}}\right)^3 = 1164,269601267364$$

Indeed:

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

11.09016994374947424102293417182819058860154589902881431067 + (1.01567312386781438874777576295646917898823529098784 × 10^-7427) / (9.99290225070718723070536304129457122742436976265255 × 10^-7428)

Input interpretation:

```
11.09016994374947424102293417182819058860154589902881431067 + \underbrace{\frac{1.01567312386781438874777576295646917898823529098784}{10^{7427}} \\ \underbrace{9.99290225070718723070536304129457122742436976265255}_{10^{7428}} \\ \end{array}
```

Open code

Enlarge Data Customize A Plaintext Interactive Result: More digits 12.10656447897665137575437674852422524107455424430677582155...

The result is:

12.10656447897665137575437674852422524107455424430677582155 and is very near to the black hole entropy value <u>12.1904</u> (that is equal to the ln of 196883)

Rational approximation: $\frac{308\,989\,299\,311\,928\,902\,774\,738\,082\,929}{25\,522\,459\,311\,103\,200\,467\,827\,553\,378} = 12 + \frac{2\,719\,787\,578\,690\,497\,160\,807\,442\,393}{25\,522\,459\,311\,103\,200\,467\,827\,553\,378}$ Open code

Continued fraction: Linear form



((11.09016994374947424102293417182819058860154589902881431067+(1.01567 312386781438874777576295646917898823529098784 × 10^-7427)/(9.99290225070718723070536304129457122742436976265255 × 10^-7428))^3

Input interpretation: $\begin{pmatrix}
11.09016994374947424102293417182819058860154589902881431067 + \\
\frac{1.01567312386781438874777576295646917898823529098784}{10^{7427}} \\
9.99290225070718723070536304129457122742436976265255} \\
10^{7428}
\end{pmatrix}^{3}$ Open code

Result:

More digits 1774.445880637341360929898137888437610498796703478649700555... The result is: 1774.445880637341360929898137888437610498796703478649700555

 $\frac{2\,497\,836\,262\,005\,287\,330\,445\,683\,785\,493}{1\,407\,671\,143\,573\,068\,730\,650\,200\,572} = 1774 + \frac{627\,653\,306\,663\,402\,272\,227\,970\,765}{1\,407\,671\,143\,573\,068\,730\,650\,200\,572}$ Open code



From:

= 1726.445880637341360929898137888437610498796703478649700554

Result that is very near to the range of the mass of $f_0(1710)$ candidate glueball.

 $[\exp(11.090169943749474241 + (1.015673123867814388747 \times 10^{-7427})/(9.9929022507071872307 \times 10^{-7428}))]^{1/8}$



Enlarge Data Customize A Plaintext Interactive Result: More digits 4.5417870587209305302...

This value 4,541787... is practically equal to the value of mass of the dark atom ≈ 5 GeV = 4.5 * 10¹⁷

and

 $[exp(11.090169943749474241+(1.015673123867814388747 \times 10^{-7427})/(9.9929022507071872307 \times 10^{-7428}))]^{1/8} * 0.92434086$



The result is: 4.19815935579... and is a very near to the range of the mass of hypothetical dark matter particles.

$((((([exp(11.090169943749474241+(1.015673123867814388747 \times 10^{-7427})/(9.9929022507071872307 \times 10^{-7428}))]^{1/8} * (1.0061571663-0.081816+0.0814135-0.07609064)))))^{1/3}$



Result: More digits

1.616283718780967119038391999282118987049390234042755292944...

The result is: 1.6162837187809671190383919992821189870493902340427552



From:

= 4.8488511563429013571151759978463569611481707021282656

and

= 4.17793178467692190600233947894434936962396881597711791648 where 2.5849 is a Hausdorff dimension.

The results 4,8488 and 4,1779 are very near to the values of the first of upper bound dark photon energy range $(4.95 * 10^{16} - 5.4 * 10^{16})$ and of the range of the mass of hypothetical dark matter particles.

Note that:

 $\frac{1}{[(5sqrt(5)*5*(e^{(-sqrt(5)*Pi)})^5)))} / (((2*(((1/32(-1+sqrt(5))^5+5*(e^{(-sqrt(5)*Pi)})^5))))]$

Input: $\frac{1}{\frac{5\sqrt{5}\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}}$ Open code

Enlarge Data Customize A Plaintext Interactive Exact result: $\frac{2 e^{25\sqrt{5} \pi^5} \left(\frac{1}{32} \left(\sqrt{5} - 1\right)^5 + 5 e^{-25\sqrt{5} \pi^5}\right)}{25\sqrt{5}}$

Decimal approximation:

More digits

 $9.845687323022498522853504497386406211369747193708929...\times 10^{7426}$

Alternate forms: More $\frac{10 - 11 e^{25\sqrt{5} \pi^{5}} + 5\sqrt{5} e^{25\sqrt{5} \pi^{5}}}{25\sqrt{5}}$ Open code

Enlarge Data Customize A Plaintext Interactive $\frac{1}{125} \left(10 - 11 e^{25\sqrt{5} \pi^5} \right) \sqrt{5} + \frac{1}{5} e^{25\sqrt{5} \pi^5}$ $\frac{e^{25\sqrt{5} \pi^5} \left((\sqrt{5} - 1)^5 + 160 e^{-25\sqrt{5} \pi^5} \right)}{400\sqrt{5}}$



log(x) is the natural logarithm

Exact result:

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

Decimal approximation:

More digits 17101.28393409786327530804780300529221259899171561940725254... Open code

Alternate forms:

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$$\frac{\log(10 - 11 e^{25\sqrt{5} \pi^5} + 5\sqrt{5} e^{25\sqrt{5} \pi^5}) - \frac{5\log(5)}{2}}{\exp(10 - 11 e^{25\sqrt{5} \pi^5} + 5\sqrt{5} e^{25\sqrt{5} \pi^5}) - 5\log(5)}$$

Enlarge Data Customize A Plaintext Interactive
$$\frac{1}{2} \left(2\log(10 - 11 e^{25\sqrt{5} \pi^5} + 5\sqrt{5} e^{25\sqrt{5} \pi^5}) - 5\log(5) \right)$$
$$\log\left(\frac{2 e^{25\sqrt{5} \pi^5} \left(\frac{1}{2} (5\sqrt{5} - 11) + 5 e^{-25\sqrt{5} \pi^5}\right)}{25\sqrt{5}}\right)$$

and:

$\frac{1}{Pi^2} + \ln \left(\left(\left(\left(\frac{1}{(5sqrt(5)*5*(e^{(-sqrt(5)*Pi)})^5)} \right) + \left(\left(\frac{2*((1)/32(-1)+sqrt(5))^{-5}+5*(e^{(-sqrt(5)*Pi)})^{-5})} \right) \right) \right) \right)$

Input:

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

log(x) is the natural logarithm

Enlarge Data Customize A Plaintext Interactive Exact result:



- Decimal approximation: More digits
- •

1732.722330006490155883907217809676768207629974194791390849...

1732.7223...

Continued fraction:



Enlarge Data Customize A Plaintext Interactive





Integral representations:



Enlarge Data Customize A Plaintext Interactive

$$\frac{\log \left(\frac{1}{\frac{5\sqrt{5} 5 e^{\left(-\sqrt{5} \pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5 e^{\left(-\sqrt{5} \pi\right)^{5}}\right)}\right)}{\pi^{2}} = \frac{\pi^{2}}{-\frac{i}{2 \pi^{3}} \int_{-i \infty+\gamma}^{i \infty+\gamma} \left(-1+\frac{2 e^{25\sqrt{5} \pi^{5}}\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5 e^{-25\sqrt{5} \pi^{5}}\right)}{25\sqrt{5}}\right)^{-s} \Gamma(-s)^{2} \Gamma(1+s)}{\Gamma(1-s)} ds \text{ for } -1 < \gamma < 0$$

We have that:

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

Enlarge Data Customize A Plaintext Interactive Exact result:

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

Decimal approximation: More digits

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$1.000710279067556221617981291357761768984865098218399...\times 10^{7427}$

Alternate forms: More $\frac{1}{55} \left(10 - 11 e^{25\sqrt{5} \pi^5} + 5\sqrt{5} e^{25\sqrt{5} \pi^5} \right)$ Open code

Enlarge Data Customize A Plaintext Interactive $\frac{2}{11} - \frac{1}{5} e^{25\sqrt{5}\pi^5} + \frac{1}{11}\sqrt{5} e^{25\sqrt{5}\pi^5}$ Open code

$$\frac{1}{880} e^{25\sqrt{5}\pi^5} \left(\left(\sqrt{5}-1\right)^5 + 160 e^{-25\sqrt{5}\pi^5} \right)$$

 $\ln \left(\left(\left(\left(1/[(11*5*(e^{((-sqrt(5)*Pi))^5))} \right) / (((2*(((1/32(-1+sqrt(5))^5+5*(e^{((-sqrt(5)*Pi))^5))})))) \right) \right) \right) \right) = 0.5$



log(x) is the natural logarithm

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

Decimal approximation:

More digits
17101.30019569371605532588699842716636475845841079687261194...

Alternate forms:
More

$$log\left(\frac{1}{55}\left(10 - 11 \ e^{25\sqrt{5} \ \pi^{5}} + 5 \ \sqrt{5} \ e^{25\sqrt{5} \ \pi^{5}}\right)\right)$$
Enlarge Data Customize A Plaintext Interactive

$$log\left(\frac{2}{55} \ e^{25\sqrt{5} \ \pi^{5}} \left(\frac{1}{2} \left(5 \ \sqrt{5} \ -11\right) + 5 \ e^{-25 \ \sqrt{5} \ \pi^{5}}\right)\right)$$
Open code

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

•

 $\frac{1}{Pi^2} \ln \left(\left(\left(\frac{1}{1(1+5*(e^{(-sqrt(5)*Pi))^5)}) / \left(\left(\frac{2*((1)^2(-1+sqrt(5))^5+5*(e^{(-sqrt(5)*Pi))^5)}) \right) \right) \right) \right) \right)$



log(x) is the natural logarithm

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

Decimal approximation:

More digits

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1732.723977650629872886393641942839475932747804889887454392...

Alternate forms: More

$$\frac{\log\left(\frac{1}{55}\left(10 - 11\ e^{25\ \sqrt{5}\ \pi^{5}} + 5\ \sqrt{5}\ e^{25\ \sqrt{5}\ \pi^{5}}\right)\right)}{\pi^{2}}$$

Enlarge Data Customize A Plaintext Interactive
$$\frac{\log\left(\frac{2}{55}\ e^{25\ \sqrt{5}\ \pi^{5}}\left(\frac{1}{2}\ (5\ \sqrt{5}\ -11) + 5\ e^{-25\ \sqrt{5}\ \pi^{5}}\right)\right)}{\pi^{2}}$$

Open code

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

Open code

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Continued fraction:



Series representations: More







Open code

$$\frac{\log\left(\frac{1}{\frac{11\times 5\ e^{\left(-\sqrt{5}\ \pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5\ e^{\left(-\sqrt{5}\ \pi\right)^{5}}\right)}\right)}{\pi^{2}} = \frac{2\ i\left[\frac{\arg\left(10+\left(-11+5\sqrt{5}\right)e^{25\sqrt{5}\ \pi^{5}\ -55\ x}\right)}{2\pi}\right]}{\pi^{2}} + \frac{\log(x)}{\pi^{2}} - \frac{\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{55}\right)^{k}\left(10+\left(-11+5\sqrt{5}\right)e^{25\sqrt{5}\ \pi^{5}\ -55\ x}\right)^{k}x^{-k}}{\pi^{2}}}{\pi^{2}} \quad \text{for } x < 0$$

Integral representations:

$$\frac{\log \left(\frac{1}{\frac{1}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}}\right)}{\frac{1}{\pi^{2}} = \frac{1}{\pi^{2}}\int_{1}^{\frac{1}{55}\left(10+\left(-11+5\sqrt{5}\right)e^{25\sqrt{5}\pi^{5}}\right)\frac{1}{t}\,dt$$

Open code

Enlarge Data Customize A Plaintext Interactive

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$$\frac{\log \left(\frac{1}{\frac{11 \times 5 e^{\left(-\sqrt{5} \pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5 e^{\left(-\sqrt{5} \pi\right)^{5}}\right)}\right)}}{\pi^{2}} = \frac{\pi^{2}}{-\frac{i}{2 \pi^{3}} \int_{-i \infty+\gamma}^{i \infty+\gamma} \left(\frac{55}{\frac{-45+\left(-11+5 \sqrt{5}\right) e^{25 \sqrt{5} \pi^{5}}}}{\Gamma(1-s)}\right)^{s} \Gamma(-s)^{2} \Gamma(1+s)} ds \text{ for } -1 < \gamma < 0$$

The two results 1732,72233 and 1732,72397 are very similar and are very near to the range of the mass of $f_0(1710)$ candidate glueball.

Now, we have that:

Input:



Open code

Exact result:

$$\frac{1}{2} \frac{2296}{\sqrt{\frac{1}{32} (\sqrt{5} - 1)^5 + 5 e^{-25\sqrt{5}\pi^5}}}$$
81 + 1000 $e^{\frac{1}{2}} \frac{2296}{\sqrt{\frac{1}{32} (\sqrt{5} - 1)^5 + 5 e^{-25\sqrt{5}\pi^5}}}$
Enlarge Data Customize A Plaintext Interactive Decimal approximation:
More digits

1728.858072736919434280617815816864915168670165258188187538...

Alternate forms: More $\frac{1}{2} 2296 \sqrt{-\frac{11}{2} + \frac{5\sqrt{5}}{2} + 5e^{-25\sqrt{5}\pi^5}}$



$$81 + 1000 e^{\frac{2296 \sqrt{(\sqrt{5} - 1)^5 + 160 e^{-25 \sqrt{5} \pi^5}}}{2 \times 2^{5/2296}}}$$

Continued fraction:



We have that:



$$e^{\left(25\sqrt{5}\pi^{5}\right)/2296}\sqrt{\frac{2}{55}\left(\frac{1}{32}\left(\sqrt{5}-1\right)^{5}+5e^{-25\sqrt{5}\pi^{5}}\right)}$$

Enlarge Data Customize A Plaintext Interactive Decimal approximation: More digits

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1716.944401114722818821471990021882723351969991809758315223...

Alternate forms: More $\frac{1}{55}$ $(10 + (5\sqrt{5} - 11)e^{25\sqrt{5}\pi^5})$ 2296 V Open code

Enlarge Data Customize A Plaintext Interactive 1

$$\frac{1}{2296\sqrt{\frac{55}{10-11\,e^{25\,\sqrt{5}\,\pi^5}+5\,\sqrt{5}\,e^{25\,\sqrt{5}\,\pi^5}}}}_{\text{Open code}}$$

$$e^{\left(25\sqrt{5}\pi^{5}\right)/2296}\sqrt{\frac{2}{55}\left(\frac{1}{2}\left(5\sqrt{5}-11\right)+5e^{-25\sqrt{5}\pi^{5}}\right)}$$

Continued fraction:

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Series representations:

More

$$\begin{array}{r} \displaystyle \frac{1}{2 \times 1164 - 32 \sqrt{\frac{11 \left(5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}}}{2296 \sqrt{\frac{2}{55}}} \\ \\ \displaystyle \frac{2296 \sqrt{\frac{2}{55}}}{2296 \sqrt{\frac{2}{55}}} \\ \\ \displaystyle \frac{11 \left(5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{2296 \sqrt{\frac{2}{55}}} \\ \\ \displaystyle \frac{11 \left(5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{32 \sqrt{\pi^5}} \\ \\ \displaystyle \frac{11 \left(5 e^{\left(-\sqrt{5} \pi \right)^5} \right)}{32 \sqrt{\pi^5}} + \frac{1}{32} \left(-1 + \frac{\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2} + j} 4^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2 \sqrt{\pi}} \right)^5}{32 \sqrt{\pi^5}} \\ \end{array}$$

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$$\frac{1}{2 \times 1164 - 32} = \frac{11 \left(5 e^{\left(-\sqrt{5} \pi\right)^{5}}\right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5}\right)^{5} + 5 e^{\left(-\sqrt{5} \pi\right)^{5}}\right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5}\right)^{5} + 5 e^{\left(-\sqrt{5} \pi\right)^{5}}\right)}{2296 \sqrt{\frac{2}{55}}}$$

$$\frac{2296 \sqrt{\frac{2}{55}}}{\left(\frac{exp \left(-\pi^{5} \sqrt{z_{0}} \left(-\frac{1}{2}\right)_{k} \left(5 - z_{0}\right)^{k} z_{0}^{-k}}{k!}\right)^{5}\right)}{5 \exp \left(-\pi^{5} \sqrt{z_{0}} \left(\sum_{k=0}^{\infty} \frac{\left(-1\right)^{k} \left(-\frac{1}{2}\right)_{k} \left(5 - z_{0}\right)^{k} z_{0}^{-k}}{k!}\right)^{5}\right)}{5 \exp \left(-\pi^{5} \sqrt{z_{0}} \left(\sum_{k=0}^{\infty} \frac{\left(-1\right)^{k} \left(-\frac{1}{2}\right)_{k} \left(5 - z_{0}\right)^{k} z_{0}^{-k}}{k!}\right)^{5}\right)}{5 \exp \left(-\pi^{5} \sqrt{z_{0}} \left(\sum_{k=0}^{\infty} \frac{\left(-1\right)^{k} \left(-\frac{1}{2}\right)_{k} \left(5 - z_{0}\right)^{k} z_{0}^{-k}}{k!}\right)^{5}\right)}$$
for not (($z_{0} \in \mathbb{R}$ and $-\infty < z_{0} \le 0$))

$$\frac{1}{2 \times 1164 - 32} \sqrt{\frac{11 \left(5 e^{\left(-\sqrt{5} \pi \right)^{5}} \right)}{2 \left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^{5} + 5 e^{\left(-\sqrt{5} \pi \right)^{5}} \right)}}}{\left(\frac{2296 \sqrt{2}}{55} \right) / \left(\left(\exp \left(-\pi^{5} \exp^{5} \left(i \pi \left\lfloor \frac{\arg(5 - x)}{2 \pi} \right\rfloor \right) \sqrt{x}^{5} \left(\sum_{k=0}^{\infty} \frac{(-1)^{k} (5 - x)^{k} x^{-k} \left(-\frac{1}{2} \right)_{k}}{k!} \right)^{5} \right) / \right)} \right) \left(\frac{5 \exp \left(-\pi^{5} \exp^{5} \left(i \pi \left\lfloor \frac{\arg(5 - x)}{2 \pi} \right\rfloor \right) \sqrt{x}^{5} \left(\sum_{k=0}^{\infty} \frac{(-1)^{k} (5 - x)^{k} x^{-k} \left(-\frac{1}{2} \right)_{k}}{k!} \right)^{5} \right) + \frac{1}{32} \left(-1 + \exp \left(i \pi \left\lfloor \frac{\arg(5 - x)}{2 \pi} \right\rfloor \right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^{k} (5 - x)^{k} x^{-k} \left(-\frac{1}{2} \right)_{k}}{k!} \right)^{5} \right) \right)$$

We have that:



Exact result: $\frac{e^{\left(25\sqrt{5}\pi^{5}\right)/2296} 2296 \sqrt{2\left(\frac{1}{32}\left(\sqrt{5}-1\right)^{5}+5e^{-25\sqrt{5}\pi^{5}}\right)}}{5^{5/4592}}$

Decimal approximation: More digits

1716.932240767562897713904103115924197988364844525361104020...

Alternate forms:

$$\frac{2296\sqrt{10 - 11 e^{25\sqrt{5} \pi^5} + 5\sqrt{5} e^{25\sqrt{5} \pi^5}}}{5^{5/4592}}$$

Open code

.

Enlarge Data Customize A Plaintext Interactive

$$\frac{e^{\left(25\sqrt{5}\pi^{5}\right)/2296}2296}{\sqrt[5]{574}\sqrt{2}5^{5/4592}}$$

•



Series representations: More •

$$\begin{split} \frac{1}{2 \cdot 1164 - 33} \frac{1}{2\left(\frac{1}{32}\left(-1 \cdot \sqrt{5}\right)^{5} + 5 \cdot e^{\left(-\sqrt{5} \cdot \pi\right)^{5}}\right)}}{2\left(\frac{1}{32}\left(-1 \cdot \sqrt{5}\right)^{5} + 5 \cdot e^{\left(-\sqrt{5} \cdot \pi\right)^{5}}\right)} \\ & \left(2^{206}\sqrt{2}\right) / \left(1148\sqrt{5} \left(\left|\exp\left(-\pi^{5}\left(\frac{1}{z_{0}}\right)^{5/2}\left[\arg(5 - z_{0})^{k} z_{0}^{k}\right)^{5}\right)\right] \left(\frac{1}{z_{0}}\right)^{1/2}\left[\arg(5 - z_{0})^{k} (2\pi)\right]} \\ & \left(\sum_{k=0}^{5} \left(\frac{-1}{k}^{k}\left(-\frac{1}{2}\right)_{k}\left(5 - z_{0}\right)^{k} z_{0}^{k}\right)^{5}\right) \left(\frac{1}{z_{0}}\right)^{1/2}\left[\arg(5 - z_{0})^{k} (2\pi)\right]} \\ & z_{0}^{1/2}(1 \cdot |\arg(5 - z_{0})^{k} (2\pi)]} \sum_{k=0}^{5} \left(\frac{-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(5 - z_{0}\right)^{k} z_{0}^{k}}{k!}\right) \right) / \\ & \left(5 \exp\left(-\pi^{5}\left(\frac{1}{z_{0}}\right)^{5/2}\left[\arg(5 - z_{0})^{k} z_{0}^{k}\right]^{5}\right) \\ & \left(\sum_{k=0}^{5} \left(\frac{-1}{k}^{k}\left(-\frac{1}{2}\right)_{k}\left(5 - z_{0}\right)^{k} z_{0}^{k}\right)^{5}\right) + \\ & \frac{1}{32}\left(-1 + \left(\frac{1}{z_{0}}\right)^{1/2}\left[\arg(5 - z_{0})^{k} z_{0}^{k}\right]^{5}\right) + \\ & \frac{1}{32}\left(-1 + \left(\frac{1}{z_{0}}\right)^{1/2}\left[\arg(5 - z_{0})^{k} z_{0}^{k}\right]^{5}\right) \right) \wedge (1/2296) \right) \\ \hline \\ \frac{1}{2 \cdot 1164 - 33}\left(\frac{1}{2\left(\frac{1}{2}\left(-1 \cdot \sqrt{5}\right)^{5} + 5 \cdot e^{\left(-\sqrt{5} \cdot \pi\right)^{5}\right)}}{2\left(\frac{1}{2}\left(-1 \cdot \sqrt{5}\right)^{5} + 5 \cdot e^{\left(-\sqrt{5} \cdot \pi\right)^{5}\right)}}\right) \\ 1 / \left(\frac{5^{74}\sqrt{2}}{1148\sqrt{5}}\left(\left(\sqrt{4} \sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{2}{\frac{1}{k}}\right)\right) / \left(160 - e^{\pi^{5}\sqrt{4^{-5}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}\right)\right)^{2}} + 5 \cdot e^{\pi^{5}\sqrt{4^{-5}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}\right)^{5}} \sqrt{4^{-2}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}{\frac{1}{k}}\right)^{2}} + 10 \cdot e^{\pi^{5}\sqrt{4^{-5}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}\right)^{5}}\right)^{5} \sqrt{4^{-2}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}{\frac{1}{k}}\right)^{2}} - 10 \cdot e^{\pi^{5}\sqrt{4^{-5}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}\right)^{5}}\right)^{5}} \sqrt{4^{-2}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}{\frac{1}{k}}\right)^{2}} - 10 \cdot e^{\pi^{5}\sqrt{4^{-5}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}{\frac{1}{k}}\right)^{5}}\right)^{5}} \sqrt{4^{-2}}\left(\sum_{k=0}^{\infty} 4^{-k}\left(\frac{1}{k}{\frac{1}{k}}$$

 $e^{\pi^{5}\sqrt{4}\cdot 5\left(\sum_{k=0}^{\infty}4^{-k}\binom{1/2}{k}\right)^{5}}\sqrt{4}\cdot 5\left(\sum_{k=0}^{\infty}4^{-k}\left(\frac{1}{2}\atop k\right)\right)^{5}\right) \left(1/2296\right)$

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

$$\begin{split} \frac{1}{2 \times 1164 - 32} & = \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})}{2\left(\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}}\right)} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})}{2\left(\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}}\right)} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi\right)^{5}})} \\ \frac{1}{2 (\frac{1}{32} (-1 + \sqrt{5})^{5} + 5e^{\left(-\sqrt{5} \pi$$

We have that:

Input interpretation:

•

1.08185+1.087534+1.006157-0.07609064

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

Enlarge Data Customize A Plaintext Interactive Result: More digits 1732.74... And

where 29.7668 is a value of the Black Hole entropy (see Table)

3

Input interpretation:

$$\left(\frac{1}{\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5\ e^{\left(-\sqrt{5}\ \pi\right)^{5}}}}\right)^{\sqrt[3]{29.7668}}$$
Open code

Enlarge Data Customize A Plaintext Interactive

- Result: Fewer digits More digits

1731.534151150132597646379570111950361166250299421249406794 ...

Series representations:



Enlarge Data Customize A Plaintext Interactive

$$\begin{pmatrix} \frac{1}{\frac{1}{32} \left(-1 + \sqrt{5}\right)^5 + 5 e^{\left(-\sqrt{5} \pi\right)^5}} \\ \frac{1}{\sqrt{5} \exp\left(-\pi^5 \sqrt{4} 5 \left(\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)^5\right) + \frac{1}{32} \left(-1 + \sqrt{4} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{4}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)^5}{k!} \right)^{3.09916}$$
Open code

$$\left(\frac{1}{\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5}} \right)^{\sqrt[3]{29.7668}} = \\ \left(\frac{1}{\left(\int 5 \exp \left(-\frac{\pi^5 \left(\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)\right)^5}{32 \sqrt{\pi^5}} \right)^+ \\ \frac{1}{32} \left(-1 + \frac{\sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2 \sqrt{\pi}} \right)^5 \right) \right)^{3.09916}$$

Integral representation:

 $(1+z)^a = \frac{\int_{-i \ \infty + \gamma}^{i \ \infty + \gamma} \frac{\Gamma(s) \Gamma(-a-s)}{z^s} \, ds}{(2 \pi i) \Gamma(-a)} \quad \text{for } (0 < \gamma < -\text{Re}(a) \text{ and } |\text{arg}(z)| < \pi)$

All the results: 1728,858 1716,944 1716,932 1732,74 and 1731,53 are very near to the range of the mass of $f_0(1710)$ candidate glueball.

Note that:



Enlarge Data Customize A Plaintext Interactive Result: More digits 4.236067977499789696409173668731276235440618359611525724270...

The result is a very near to the range of the mass of hypothetical dark matter particles.

We have that:



Enlarge Data Customize A Plaintext Interactive

Result: More digits

 $4.5347571611551792889915884948567915637887680293971326\ldots \times 10^{17}$

Or

(1.618033988749894848204586834365638117720309179805762862135)^Pi * 10^17

Input interpretation: 1.618033988749894848204586834365638117720309179805762862135 $^{\pi} \times 10^{17}$ Open code

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Enlarge Data Customize A Plaintext Interactive

Result:

More digits

4.5347571611551792889915884948567915637887680293971326... × 10<sup>17</sup>
```

This value is very near to the value of mass of the dark atom $\approx 5 \text{ GeV} = 4.5 * 10^{17}$

We have also that:

Input interpretation:



Enlarge Data Customize A Plaintext Interactive Result: More digits $4.93170504... \times 10^{16}$

Or:

(1.618033988749894848204586834365638117720309179805762862135)^Pi * 1.08753454 * 10^16

Input interpretation: 1.618033988749894848204586834365638117720309179805762862135 $^{\pi}\times 1.08753454\times 10^{16}$ Open code Enlarge Data Customize A Plaintext Interactive Result: More digits $4.93170504... \times 10^{16}$

This result is very near to the first value of upper bound dark photon energy range $(4.95 * 10^{16} - 5.4 * 10^{16})$

We have that:



Enlarge Data Customize A Plaintext Interactive Result:

More digits

1726.999546896146215177927205518884822189945160468287944927...



This result is very near to the range of the mass of $f_0(1710)$ candidate glueball.

We have that:

Input interpretation:

$$\sqrt[5]{\frac{1}{\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)-\frac{1.6382898797095665677239458827012056245798314722584}{10^{7429}}} + (12^{2}+8^{2}) \\ Open code }$$

Enlarge Data Customize A Plaintext Interactive Result: More digits 729.0019193787254996316687324071936814288320388947427468775...

This value is very near to the Ramanujan expression $6^3 + 8^3 = 9^3 - 1 = 728$

Among Ramanujan's formulas, there is a beautiful relationship that links, through a wonderful continuous fraction, two fundamental numbers: Φ , the golden section and the famous π :

(https://www.matematicamente.it/storia/Ramanujan-genio-matematico.pdf)

Now let's analyze this expression and see if we can get new and interesting mathematical connections with some sectors of particle physics and black holes

$$(((sqrt((sqrt(5)+1)/2+2))) - ((sqrt(5)+1)/2))$$

$$\sqrt{\frac{1}{2}(\sqrt{5}+1)+2} - \frac{1}{2}(\sqrt{5}+1)$$

Result:

$$\frac{1}{2}\left(-1-\sqrt{5}\right)+\sqrt{2+\frac{1}{2}\left(1+\sqrt{5}\right)}$$

Decimal approximation:

0.284079043840412296028291832393126169091088088445737582759...

Alternate forms:

$$\frac{1}{2} \left(\sqrt{2 \left(5 + \sqrt{5} \right)} - \sqrt{5} - 1 \right)$$
$$-\frac{1}{2} - \frac{\sqrt{5}}{2} + \sqrt{\frac{1}{2} \left(5 + \sqrt{5} \right)}$$
$$1 - \sqrt{5} - \sqrt{-1} \left(- \sqrt{5} \right)$$

$$-\frac{1}{2} - \frac{\sqrt{5}}{2} + \sqrt{2} + \frac{1}{2} \left(1 + \sqrt{5}\right)$$

Minimal polynomial: $x^4 + 2x^3 - 6x^2 - 2x + 1$

Continued fraction:


$$-5/2 \ln \left[\left(\left((\operatorname{sqrt}((\operatorname{sqrt}(5)+1)/2+2)) \right) - \left((\operatorname{sqrt}(5)+1)/2 \right) \right) \right]$$

$$-\frac{5}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)$$

log(x) is the natural logarithm

Exact result:

$$-\frac{5}{2} \log \left(\frac{1}{2} \left(-1 - \sqrt{5}\right) + \sqrt{2 + \frac{1}{2} \left(1 + \sqrt{5}\right)}\right)$$

Decimal approximation:

3.146256890409912031962983108617580961172288121414743463855...

3.146256890409912031962983108617580961172288121414743463855

Property: $-\frac{5}{2} \log \left(\frac{1}{2} \left(-1 - \sqrt{5}\right) + \sqrt{2 + \frac{1}{2} \left(1 + \sqrt{5}\right)}\right) \text{ is a transcendental number}$

Continued fraction:



Series representations:

$$\frac{1}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2} - \frac{1}{2}\left(\sqrt{5}+1\right)\right)(-5) = \frac{5}{2}\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-3-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)^{k}}{k}$$

$$\frac{1}{2} \log \left(\sqrt{\frac{1}{2} \left(\sqrt{5} + 1 \right) + 2} - \frac{1}{2} \left(\sqrt{5} + 1 \right) \right) (-5) = -5i\pi \left[\frac{\arg \left(-1 - \sqrt{5} + \sqrt{2(5 + \sqrt{5})} - 2x \right)}{2\pi} \right] - \frac{5\log(x)}{2} + \frac{5}{2} \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{2} \right)^k \left(-1 - \sqrt{5} + \sqrt{2(5 + \sqrt{5})} - 2x \right)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\frac{1}{2} \log \left(\sqrt{\frac{1}{2} \left(\sqrt{5} + 1 \right) + 2} - \frac{1}{2} \left(\sqrt{5} + 1 \right) \right) (-5) = -5 i \pi \left[\frac{\pi - \arg \left(\frac{1}{z_0} \right) - \arg (z_0)}{2 \pi} \right] - \frac{5 \log (z_0)}{2} + \frac{5}{2} \sum_{k=1}^{\infty} \frac{\left(-\frac{1}{2} \right)^k \left(-1 - \sqrt{5} + \sqrt{2 \left(5 + \sqrt{5} \right)} - 2 z_0 \right)^k z_0^{-k}}{k}$$

Integral representation:

$$\frac{1}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2} - \frac{1}{2}\left(\sqrt{5}+1\right)\right)(-5) = -\frac{5}{2}\int_{1}^{\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)}\frac{1}{t} dt$$

We note that:

 $1/1.7712 * (((-5/2 \ln [(((sqrt((5)+1)/2+2))) - ((sqrt((5)+1)/2))])))^7$

Where 1,7712 is a Hausdorff dimension

Input interpretation:

$$\frac{1}{1.7712} \left(-\frac{5}{2} \log \left(\sqrt{\frac{1}{2} \left(\sqrt{5} + 1 \right) + 2} - \frac{1}{2} \left(\sqrt{5} + 1 \right) \right) \right)^7$$
Open code

Enlarge Data Customize A Plaintext Interactive

log(x) is the natural logarithm •

Result: More digits

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• 1723.03...

Series representations:

$$\frac{\left(-\frac{5}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^{7}}{1.7712} = \frac{1}{344.598}\left(\sum_{k=1}^{\infty}\frac{\left(-1\right)^{k}\left(-\frac{3}{2}-\frac{\sqrt{5}}{2}+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}\right)^{k}}{k}\right)^{7}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{\left(-\frac{5}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^{7}}{1.7712} = -344.598\log^{7}\left(-\frac{1}{2}+\sum_{k=0}^{\infty}\left(\frac{1}{2}\right)\left(-2^{-1-2k}\sqrt{4}+2^{k}\left(3+\sqrt{5}\right)^{-k}\sqrt{\frac{1}{2}\left(3+\sqrt{5}\right)}\right)\right)$$

Ор

$$\frac{\left(-\frac{5}{2}\log\left(\sqrt{\frac{1}{2}(\sqrt{5}+1)+2}-\frac{1}{2}(\sqrt{5}+1)\right)\right)^{7}}{1.7712} = \frac{1.7712}{-344.598\left(2i\pi\left(\frac{\arg\left(-\frac{1}{2}-x-\frac{\sqrt{5}}{2}+\sqrt{\frac{1}{2}(5+\sqrt{5})}\right)}{2\pi}\right)+\log(x)-\frac{2\pi}{2\pi}\right)}{\frac{2\pi}{k}+\log(x)-\frac{1}{2}\left(-\frac{1}{2}-x-\frac{\sqrt{5}}{2}+\sqrt{\frac{1}{2}(5+\sqrt{5})}\right)^{k}}{k}\right)^{7}}{\sum_{k=1}^{\infty}\frac{(-1)^{k}x^{-k}\left(-\frac{1}{2}-x-\frac{\sqrt{5}}{2}+\sqrt{\frac{1}{2}(5+\sqrt{5})}\right)^{k}}{k}\right)}{k} \text{ for } x < 0$$

Integral representation:

$$\frac{\left(-\frac{5}{2}\log\left(\sqrt{\frac{1}{2}\left(\sqrt{5}+1\right)+2}-\frac{1}{2}\left(\sqrt{5}+1\right)\right)\right)^{7}}{1.7712} = -344.598\left(\int_{1}^{-\frac{1}{2}-\frac{\sqrt{5}}{2}+\sqrt{\frac{1}{2}\left(5+\sqrt{5}\right)}}\frac{1}{t}\,dt\right)^{7}$$

 $(((((1/1.7712 * (((-5/2 \ln [(((sqrt((sqrt(5)+1)/2+2))) - ((sqrt(5)+1)/2))])))^{1/3}))))^{1/3}$

Input interpretation:

$$\sqrt[3]{\frac{1}{1.7712} \left(-\frac{5}{2} \log \left(\sqrt{\frac{1}{2} \left(\sqrt{5} + 1\right) + 2} - \frac{1}{2} \left(\sqrt{5} + 1\right)\right)\right)^{7}}$$
Open code

log(x) is the natural logarithm

Enlarge Data Customize A Plaintext Interactive Result: More digits 11.9885...

This result is very near to the two values of black hole entropies 11,8458 and 12,1904

We have that:

((((((((1/1.7712 * (((-5/2 ln [(((sqrt((sqrt(5)+1)/2+2))) - ((sqrt(5)+1)/2))])))^7)))))^1/15

Input interpretation:

$$\frac{15}{\sqrt{\frac{1}{1.7712} \left(-\frac{5}{2} \log \left(\sqrt{\frac{1}{2} \left(\sqrt{5} + 1\right) + 2} - \frac{1}{2} \left(\sqrt{5} + 1\right)\right)\right)^7}}{\text{Open code}}$$

log(x) is the natural logarithm

Enlarge Data Customize A Plaintext Interactive Result: Fewer digits 1.643435927508493987136581463417090709645425557040873758714... 1.6434359275...... $\approx \zeta(2)$

Now:

exp(-2Pi/5)

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

Exact result: $e^{-(2\pi)/5}$ Decimal approximation:

0.284609543336029280115568598422534831907047843012062136097...

Property:

 $e^{-(2\pi)/5}$ is a transcendental number

Note that:

	$e^{-2 imes \pi/5}$
1+	$e^{-2 \times \pi/5}$
	$1 + \frac{e^{-2 \times \pi/3}}{e^{-2 \times \pi/5}}$
	$1 + e^{-2 \times \pi/5}$

Exa	e ^{-(2 π)/5}
1+	$\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}}}$
-	

Decimal approximation:

 $0.231234066267623019735059502654595755412999544181351871272\ldots$

Property:

 $\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{1 + e^{-(2\pi)/5}}}}$ is a transcendental number

Alternate forms:

$$\begin{aligned} &\frac{3+2\cosh\left(\frac{2\pi}{5}\right)}{3+4\;e^{(2\pi)/5}\;+\;e^{(4\pi)/5}}\\ &\frac{3+e^{-(2\pi)/5}\;+\;e^{(2\pi)/5}}{3+4\;e^{(2\pi)/5}\;+\;e^{(4\pi)/5}}\\ &\frac{1}{3}\;e^{-(2\pi)/5}\;+\;\frac{1}{2\left(1+e^{(2\pi)/5}\right)}\;+\;\frac{1}{6\left(3+e^{(2\pi)/5}\right)}\end{aligned}$$

Continued fraction:



Series representations:

$$\begin{split} \frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}}} &= \frac{\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{-(2\pi)/5} \left(1+3\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{(2\pi)/5} + \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{(2\pi)/5}\right)}{\left(1+\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{(2\pi)/5}\right) \left(3+\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)^{(2\pi)/5}\right)} \\ \frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}} &= \\ \frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}} \\ \frac{e^{-8/5\sum_{k=0}^{\infty} e^{i\,k\pi}/(1+2\,k)} \left(1+3\,e^{8/5\sum_{k=0}^{\infty} e^{i\,k\pi}/(1+2\,k)} + e^{16/5\sum_{k=0}^{\infty} e^{i\,k\pi}/(1+2\,k)}\right)}{\left(1+e^{8/5\sum_{k=0}^{\infty} e^{i\,k\pi}/(1+2\,k)}\right) \left(3+e^{8/5\sum_{k=0}^{\infty} e^{i\,k\pi}/(1+2\,k)}\right)} \\ \frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}} &= \frac{\left(1+3\left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{(2\pi)/5} + \left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{(4\pi)/5}\right) \left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{-(2\pi)/5}} \\ \frac{\left(1+\left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{(2\pi)/5} + \left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{(2\pi)/5}\right)}{\left(1+\left(\frac{1}{\sum_{k=0}^{\infty} \frac{e^{i\,k\pi}}{k!}}\right)^{(2\pi)/5}\right)} \end{split}$$

Integral representations:

$$\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}}} = \frac{e^{-4/5\int_0^{\infty} 1/(1+t^2)dt} \left(1+3e^{4/5\int_0^{\infty} 1/(1+t^2)dt} + e^{8/5\int_0^{\infty} 1/(1+t^2)dt}\right)}{\left(1+e^{4/5\int_0^{\infty} 1/(1+t^2)dt}\right) \left(3+e^{4/5\int_0^{\infty} 1/(1+t^2)dt}\right)}$$
$$\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5$$

$$\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+\frac{e^{-(2\pi)/5}}{1+e^{-(2\pi)/5}}}} = \frac{e^{-8/5\int_0^1\sqrt{1-t^2}\ dt} \left(1+3\ e^{8/5\int_0^1\sqrt{1-t^2}\ dt} + e^{16/5\int_0^1\sqrt{1-t^2}\ dt}\right)}{\left(1+e^{8/5\int_0^1\sqrt{1-t^2}\ dt}\right) \left(3+e^{8/5\int_0^1\sqrt{1-t^2}\ dt}\right)}$$

And

2Pi/5))))/((144+(((e^(-2Pi/5)))



 $1+e^{-(2\pi)/5}$

Exact result:

$$\frac{e^{-(2\,\pi)/5}}{1+\frac{e^{-(2\,\pi)/5}}{142+\frac{e^{-(2\,\pi)/5}}{143+\frac{e^{-(2\,\pi)/5}}{144+e^{-(2\,\pi)/5}}}}$$

Decimal approximation:

0.284040251552571646790195087181918299434906557227779317801...

Property:

$$\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{143 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}}$$
 is a transcendental number

Alternate forms:

$$\frac{e^{-(2\,\pi)/5}}{1+\frac{1}{143}+142\,e^{(2\,\pi)/5}-\frac{1}{20\,592\left(1+143\,e^{(2\,\pi)/5}\right)}}$$

$$\frac{1}{145} e^{-(2\pi)/5} + \frac{20592 (143 + 20448 e^{(2\pi)/5})}{145 (145 + 41184 e^{(2\pi)/5} + 2924064 e^{(4\pi)/5})}$$

$$\frac{e^{-(2\pi)/5} \left(1+20592 \, e^{(2\pi)/5}+2924064 \, e^{(4\pi)/5}\right)}{145+41184 \, e^{(2\pi)/5}+2924064 \, e^{(4\pi)/5}}$$

Continued fraction:



Series representations:

$$\begin{array}{l} \displaystyle \frac{e^{-(2\pi)/5}}{1+\displaystyle \frac{e^{-(2\pi)/5}}{142+\displaystyle \frac{e^{-(2\pi)/5}}{143+\displaystyle \frac{e^{-(2\pi)/5}}{144+e^{-(2\pi)/5}}}} \\ \displaystyle \frac{e^{-8/5\sum_{k=0}^{\infty}(-1)^{k}/(1+2\,k)}\left(1+20\,592\,e^{8/5\sum_{k=0}^{\infty}(-1)^{k}/(1+2\,k)}+2\,924\,064\,e^{16/5\sum_{k=0}^{\infty}(-1)^{k}/(1+2\,k)}\right)}{145+41\,184\,e^{8/5\sum_{k=0}^{\infty}(-1)^{k}/(1+2\,k)}+2\,924\,064\,e^{16/5\sum_{k=0}^{\infty}(-1)^{k}/(1+2\,k)}}{1+\displaystyle \frac{e^{-(2\pi)/5}}{142+\displaystyle \frac{e^{-(2\pi)/5}}{144+e^{-(2\pi)/5}}}} \\ \displaystyle = \\ \displaystyle \frac{\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{-(2\pi)/5}\left(1+20\,592\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{(2\pi)/5}+2\,924\,064\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{(4\pi)/5}}\right)}{145+41\,184\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{(2\pi)/5}+2\,924\,064\left(\sum_{k=0}^{\infty}\frac{1}{k!}\right)^{(4\pi)/5}} \end{array}$$



Integral representations:

$$\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{143 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}}{e^{-4/5 \int_0^\infty 1/(1+t^2)dt} \left(1 + 20592 \ e^{4/5 \int_0^\infty 1/(1+t^2)dt} + 2924\ 064 \ e^{8/5 \int_0^\infty 1/(1+t^2)dt}}{145 + 41\ 184 \ e^{4/5 \int_0^\infty 1/(1+t^2)dt} + 2924\ 064 \ e^{8/5 \int_0^\infty 1/(1+t^2)dt}}$$

$$\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{143 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}}{e^{-4/5 \int_0^\infty \sin(t)/t \, dt} \left(1 + 20592 \, e^{4/5 \int_0^\infty \sin(t)/t \, dt} + 2924\,064 \, e^{8/5 \int_0^\infty \sin(t)/t \, dt}\right)}$$

$$e^{-4/5 \int_0^{\infty} \sin(t)/t \, dt} \left(1 + 20592 \, e^{4/5 \int_0^{\infty} \sin(t)/t \, dt} + 2924064 \, e^{8/5 \int_0^{\infty} \sin(t)/t \, dt} \right.$$

145 + 41 184 $e^{4/5 \int_0^{\infty} \sin(t)/t \, dt} + 2924064 \, e^{8/5 \int_0^{\infty} \sin(t)/t \, dt}$

$$\begin{aligned} \frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{143 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}} &= \\ \frac{e^{-8/5 \int_0^1 \sqrt{1 - t^2} dt} \left(1 + 20592 e^{8/5 \int_0^1 \sqrt{1 - t^2} dt} + 2924064 e^{16/5 \int_0^1 \sqrt{1 - t^2} dt}\right)}{145 + 41184 e^{8/5 \int_0^1 \sqrt{1 - t^2} dt} + 2924064 e^{16/5 \int_0^1 \sqrt{1 - t^2} dt}} \end{aligned}$$

Now:

2Pi/5))))/((144+(((e^(-2Pi/5)))]



log(x) is the natural logarithm

Exact result:

 $-\frac{5}{2} \log \left| \frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{143 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}} \right|$

Decimal approximation:

3.146598300112200916747192118432400793481083699330260737149





Series representations:



$$\frac{1}{2} \log \left(\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}} \right) (-5) = \frac{5}{2} \sum_{k=1}^{\infty} \frac{(-1)^k \left(-1 + \frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}} \right)^k}{k} \right)^{k}}{k}$$

$$\frac{1}{2} \log \left(\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}}{(-1)^k} \right) (-5) = -5 i \pi \left\lfloor \frac{\pi - \arg\left(\frac{1}{z_0}\right) - \arg(z_0)}{2\pi} \right\rfloor - \frac{1}{2\pi} \left[\frac{1}{2\pi} + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}} - \frac{1}{2\pi} \right] \left[\frac{e^{-(2\pi)/5}}{1 + \frac{144(1+143 e^{(2\pi)/5})}{1+2924064 e^{(4\pi)/5}}} - \frac{1}{2\pi} \right] \left[\frac{5 \log(z_0)}{2} + \frac{5}{2} \sum_{k=1}^{\infty} \frac{1}{k} \frac{1}{1 + \frac{1}{20} \frac{1}{592 e^{(2\pi)/5} + 2924064 e^{(4\pi)/5}}}{k} - \frac{1}{2\pi} \right] \left[\frac{1}{2\pi} + \frac{1}{2\pi} + \frac{1}{2\pi} \frac{1}{2\pi} + \frac$$

Integral representation:

$$\frac{1}{2} \log \left(\frac{e^{-(2\pi)/5}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}}{1 + \frac{e^{-(2\pi)/5}}{142 + \frac{e^{-(2\pi)/5}}{144 + e^{-(2\pi)/5}}}} \right) (-5) = -\frac{5}{2} \int_{1}^{1 + \frac{e^{-(2\pi)/5}}{1 + 2924\,064\,e^{(4\pi)/5}}} \frac{1}{t} \, dt$$

1/1.7712 * (3.146598300112200916747192118432400793481083699330260737149)^7

Where 1,7712 is a Hausdorff dimension

```
\frac{1}{1.7712} \times 3.146598300112200916747192118432400793481083699330260737149^7}_{\text{Open code}}
```

Enlarge Data Customize A Plaintext Interactive Result: More digits 1724.334519417215011072155751426792246560495211390772263712...

(((((1/1.7712 * (3.146598300112200916747192118432400793481083699330260737149)^7)))))^1/3

Input interpretation: $\left(\frac{1}{1.7712} \times 3.146598300112200916747192118432400793481083699330260737149^7\right)^{10}$

(1/3) Open code

Enlarge Data Customize A Plaintext Interactive Result: More digits 11.9915...

This result is very near to the two values of black hole entropies 11,8458 and 12,1904

We have also that:

(((((1/1.7712 * (3.1465983001122009167471921)^7)))))^1/15

Input interpretation: $15\sqrt{\frac{1}{1.7712}} \times 3.1465983001122009167471921^7}$ Open code

Enlarge Data Customize A Plaintext Interactive Result: Fewer digits 1.643519147692272025085077393491643800794801127145485544947... 1.64351914769...... $\approx \zeta(2)$

We note that, from the above expression, we obtain the following results, that are very good approximation to π :

$3.146256890409912031962983108617580961172288121414743463855 \approx$

 $\approx 3.146598300112200916747192118432400793481083699330260737149$

This is a Ramanujan approximation to π :

(https://www.matematicamente.it/storia/Ramanujan-genio-matematico.pdf)

$$\pi \stackrel{\simeq}{=} \frac{-2}{\sqrt{210}} \log \left[\frac{\left(\sqrt{2} - 1\right)^{5} \left(2 - \sqrt{3}\right) \left(\sqrt{7} - \sqrt{6}\right)^{5} \left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right)^{5} \left(\sqrt{15} - \sqrt{14}\right) \left(4 - \sqrt{15}\right)^{5} \left(6 - \sqrt{35}\right)}{4} \right]$$

We have that:

(((-2/((sqrt(210)))

$$-\frac{2}{\sqrt{210}}$$

Result:



-0.13801311186847084355922537292542639736323936071199021989...

-0.13801311186847084355922537292542639736323936071199021989

[ln(1/4*((sqrt(2)-1))^3.94 ((2-sqrt(3)) ((7-sqrt(6))^3.94 ((8-3sqrt(7)) ((sqrt(10)-3))^3.94 ((sqrt(15)-sqrt(14)) ((4-sqrt(15))^3.94 ((6-sqrt(35))]

$$\log \left(\frac{1}{4} \left(\sqrt{2} - 1\right)^{3.94} \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right)^{3.94} - \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right)^{3.94} \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right)^{3.94} \left(6 - \sqrt{35}\right)\right)\right)\right)\right) \right) \right)$$

log(x) is the natural logarithm

Result:

-22.7771... -22.7771...

$$-0.1380131118 \\ log \left(\frac{1}{4}\left(\sqrt{2} - 1\right)^{3.94} \left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)^{3.94} \left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)^{3.94} \left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)^{3.94} \left(6 - \sqrt{35}\right)\right)\right)\right)\right) \right)$$

log(x) is the natural logarithm

Result:

3.143533354646032799338907981653340236072708428876664893982...

3.1435333546460327993389079816533402360727084288766648

Series representations:

$$\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^{3.94}\left(\left(2-\sqrt{3}\right)\left(\left(7-\sqrt{6}\right)^{3.94}\left(\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^{3.94}\right)\left(\left(\sqrt{15}-\sqrt{14}\right)\left(\left(4-\sqrt{15}\right)^{3.94}\left(6-\sqrt{35}\right)\right)\right)\right)\right)\right)(-1)\ 0.138013 = 0.138013\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1-\frac{1}{4}\left(-1+\sqrt{2}\right)^{3.94}\left(-2+\sqrt{3}\right)\left(7-\sqrt{6}\right)^{3.94}\left(-8+3\sqrt{7}\right)\left(-3+\sqrt{10}\right)^{3.94}\left(4-\sqrt{15}\right)^{3.94}\left(-\sqrt{14}+\sqrt{15}\right)\left(-6+\sqrt{35}\right)\right)^{k}$$

$$\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)^{3.94}\left(\left(2-\sqrt{3}\right)\left(\left(7-\sqrt{6}\right)^{3.94}\left(\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^{3.94}\right)\left(\left(\sqrt{15}-\sqrt{14}\right)\left(\left(4-\sqrt{15}\right)^{3.94}\left(6-\sqrt{35}\right)\right)\right)\right)\right)\right)(-1)\ 0.138013 = 0.138013\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1+\frac{1}{4}\left(-1+\sqrt{2}\right)^{3.94}\left(2-\sqrt{3}\right)\left(7-\sqrt{6}\right)^{3.94}\left(8-3\sqrt{7}\right)\left(-3+\sqrt{10}\right)^{3.94}\left(4-\sqrt{15}\right)^{3.94}\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)^{k}$$

$$\begin{split} \log & \left(\frac{1}{4} \left(\sqrt{2} - 1\right)^{3.94} \\ & \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right)^{3.94} \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right)^{3.94} \left(\left(\sqrt{15} - \sqrt{14}\right) \right) \\ & \left(\left(4 - \sqrt{15}\right)^{3.94} \left(6 - \sqrt{35}\right)\right)\right)\right)\right) (-1) \ 0.138013 = \\ & -0.276026 \ i \ \pi \left\lfloor \frac{1}{2 \pi} \arg \left(-x + \frac{1}{4} \left(-1 + \sqrt{2}\right)^{3.94} \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right)^{3.94} \left(8 - 3\sqrt{7}\right) \\ & \left(-3 + \sqrt{10}\right)^{3.94} \left(4 - \sqrt{15}\right)^{3.94} \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right] - \\ & 0.138013 \ \log(x) + 0.138013 \ \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \ x^{-k} \\ & \left(-x + \frac{1}{4} \left(-1 + \sqrt{2}\right)^{3.94} \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right)^{3.94} \left(8 - 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right)^{3.94} \\ & \left(4 - \sqrt{15}\right)^{3.94} \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)^k \ \text{ for } x < 0 \end{split}$$

Integral representation:

$$\begin{split} \log & \left(\frac{1}{4} \left(\sqrt{2} - 1\right)^{3.94} \\ & \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right)^{3.94} \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right)^{3.94} \left(\left(\sqrt{15} - \sqrt{14}\right)\right) \\ & \left(\left(4 - \sqrt{15}\right)^{3.94} \left(6 - \sqrt{35}\right)\right)\right)\right) \right) (-1) \ 0.138013 = -0.138013 \\ & \int_{1}^{-\frac{1}{4} \left(-1 + \sqrt{2}\right)^{3.94} \left(-2 + \sqrt{3}\right) \left(7 - \sqrt{6}\right)^{3.94} \left(-8 + 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right)^{3.94} \left(4 - \sqrt{15}\right)^{3.94} \left(-\sqrt{14} + \sqrt{15}\right) \left(-6 + \sqrt{35}\right) \\ & \frac{1}{t} \ dt \end{split}$$

$1/1.7712*(3.1435333546460327993389079816533402360727084288766648)^{7}$

 $\frac{1}{1.7712} \times 3.1435333546460327993389079816533402360727084288766648^7 \\ \text{Open code}$

Enlarge Data Customize A Plaintext Interactive Result: More digits 1712.611698175792834398526977124345116854997211081796928611...

1712.61169817579...

((((1/1.7712 * (3.1435333546460327993389079816533402360727084288766648)^7))))^1/3

Input interpretation:

 $\sqrt[3]{\frac{1}{1.7712}} \times 3.1435333546460327993389079816533402360727084288766648^7}_{Open \ code}$

Enlarge Data Customize A Plaintext Interactive Result: More digits 11.9643...

This result is very near to the two values of black hole entropies 11,8458 and 12,1904

With 4 as exponent, we obtain the original Ramanujan approximation to Pi:

-0.1380131118 * ln [1/4*(((((sqrt(2)-1))^4 ((2-sqrt(3)) ((7-sqrt(6))^4 ((8-3sqrt(7)) ((sqrt(10)-3))^4 ((sqrt(15)-sqrt(14)) ((4-sqrt(15))^4 ((6-sqrt(35))]

$$\frac{-0.1380131118}{\log\left(\frac{1}{4}\left(\left(\sqrt{2}-1\right)^{4}\left(\left(2-\sqrt{3}\right)\left(\left(7-\sqrt{6}\right)^{4}\left(\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)^{4}\left(\left(\sqrt{15}-\sqrt{14}\right)\right)\left(\left(4-\sqrt{15}\right)^{4}\left(6-\sqrt{35}\right)\right)\right)\right)\right)\right)} \right)$$

log(x) is the natural logarithm

Result:

 $\begin{array}{l} 3.170429496808134399061223668881523703860885705131826135241...\\ 3.1704294968081343990612236688815237038608857051318261\end{array}$

((((1/1.8617 * (3.1704294968081343990612236688815237038608857051318261)^7))))

Where 1,8617 is a Hausdorff dimension

 $\frac{1}{1.8617}\times 3.1704294968081343990612236688815237038608857051318261^7 \\ \underbrace{0pen \ code}$

Enlarge Data Customize A Plaintext Interactive Result: More digits

 $1729.485799950796752328700245893329149548729229367577364614\ldots$

1729.48579995....

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

((((1/1.8617 * (3.1704294968081343990612236688815237038608857051318261)^7))))^1/3

Input interpretation:

 $\sqrt[3]{\frac{1}{1.8617}}\times 3.1704294968081343990612236688815237038608857051318261^7}_{\text{Open code}}$

Enlarge Data Customize A Plaintext Interactive Result: More digits 12.0034...

This result is very near to the value of black hole entropy 12,1904

2 * ((((1/1.8617 * (3.1704294968081343990612236688815237038608857051318261)^7))))^1/3

Input interpretation: $2\sqrt[3]{\frac{1}{1.8617}} \times 3.1704294968081343990612236688815237038608857051318261^7}_{Open \ code}$

```
Enlarge Data Customize A Plaintext Interactive
Result:
More digits
24.0069...
```

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

A new approximation to Pi can be obtained also multiplying the above Ramanujan expression (without exponents) by the Hausdorff dimension 1,7227:

1.7227 * -2/(sqrt(210)) * ln [1/4*(((((sqrt(2)-1)) ((2-sqrt(3)) ((7-sqrt(6)) ((8-3sqrt(7)) ((sqrt(10)-3)) ((sqrt(15)-sqrt(14)) ((4-sqrt(15)) ((6-sqrt(35))])

$$1.7227 \left(-\frac{2}{\sqrt{210}}\right) \log \left(\frac{1}{4} \left(\left(\sqrt{2} - 1\right)\left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)\right)\right) \left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)\left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right)\right)$$

log(x) is the natural logarithm

Result:

3.144999690579044036176475089121164161207446575918317499717...

Series representations:

$$\begin{aligned} \frac{1}{\sqrt{210}} \\ \left(1.7227 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right)\right) (-2) = \\ \left(3.4454 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-1 + \frac{1}{4} \left(-1 + \sqrt{2}\right) \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right) \left(8 - 3\sqrt{7}\right) \right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)^k\right) / \left(\sqrt{209} \sum_{k=0}^{\infty} 209^{-k} \left(\frac{1}{2} \atop k\right)\right) \end{aligned}$$

$$\frac{1}{\sqrt{210}} \frac{1}{\left(1.7227 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) (-2) = \left(3.4454 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-1 + \frac{1}{4} \left(-1 + \sqrt{2}\right) \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right) \left(8 - 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)^k\right) / \left(\sqrt{209} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{209}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\begin{aligned} \frac{1}{\sqrt{210}} \Big(1.7227 \log \Big(\frac{1}{4} \Big(\sqrt{2} - 1 \Big) \Big(\Big(2 - \sqrt{3} \Big) \Big((7 - \sqrt{6} \Big) \Big(\Big(8 - 3\sqrt{7} \Big) \Big(\sqrt{10} - 3 \Big) \\ & \left(\Big(\sqrt{15} - \sqrt{14} \Big) \Big(\Big(4 - \sqrt{15} \Big) \Big(6 - \sqrt{35} \Big) \Big) \Big) \Big) \Big) \Big) \Big) (-2) = \\ & \left(3.4454 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \Big(-1 + \frac{1}{4} \Big(-1 + \sqrt{2} \Big) \Big(2 - \sqrt{3} \Big) \Big(7 - \sqrt{6} \Big) \Big(8 - 3\sqrt{7} \Big) \\ & \left(-3 + \sqrt{10} \Big) \Big(4 - \sqrt{15} \Big) \Big(-\sqrt{14} + \sqrt{15} \Big) \Big(6 - \sqrt{35} \Big) \Big)^k \Big) \Big/ \\ & \left(\exp \Big(i \pi \Big[\frac{\arg(210 - x)}{2\pi} \Big] \Big) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k (210 - x)^k x^{-k} \Big(-\frac{1}{2} \Big)_k}{k!} \Big) \right) \\ & \text{for } (x \in \mathbb{R} \text{ and } x < 0) \end{aligned}$$

Integral representation:

$$\begin{aligned} \frac{1}{\sqrt{210}} \\ & \left(1.7227 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right)\right) \left(-2\right) &= -\frac{3.4454}{\sqrt{210}} \\ & \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right) \right) \left(-2\right) &= -\frac{3.4454}{\sqrt{210}} \\ & \int_{1}^{-\frac{1}{4} \left(-1 + \sqrt{2}\right) \left(-2 + \sqrt{3}\right) \left(-7 + \sqrt{6}\right) \left(-8 + 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(-4 + \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-6 + \sqrt{35}\right) \frac{1}{t} dt \end{aligned}$$

$1/1.7712*(3.1449996905790440361764750891211641612074465759183174)^{7}$

 $\frac{1}{1.7712} \times 3.1449996905790440361764750891211641612074465759183174^7 \\ \underbrace{0pen \ code}{}$

```
Enlarge Data Customize A Plaintext Interactive

Result:

More digits

1718.211596506515216555784793643310055691013226699210595777...

1718.2115965...
```

This result is very near to the mass of candidate glueball $f_0(1710)$ meson.

((((1/1.7712 * (3.1449996905790440361764750891211641612074465759183174)^7))))^1/3

Input interpretation:

```
\sqrt[3]{\frac{1}{1.7712}}\times 3.1449996905790440361764750891211641612074465759183174^7}_{\text{Open code}}
```

```
Enlarge Data Customize A Plaintext Interactive
Result:
More digits
11.9773...
```

This result is very near to the two values of black hole entropies 11,8458 and 12,1904

We note that, from the three results that we have obtained, we have the following interesting expression:

(((((1712.61169817579+1729.48579995+1718.2115965)/3))))^1/15

```
Input interpretation:

15\sqrt{\frac{1}{3}} (1712.61169817579 + 1729.48579995 + 1718.2115965)

Open code
```

```
Enlarge Data Customize A Plaintext Interactive
Result:
More digits
1.643249961400...
1.643249961400000495779... \approx \zeta(2)
```

Now, we can to obtain a similar result, thence a good approximation to π , also multiplying the above expression by the value in GeV of $f_0(1710)$ scalar meson (candidate glueball). Indeed:

1.723 * -2/(sqrt(210)) * ln [1/4*(((((sqrt(2)-1)) ((2-sqrt(3)) ((7-sqrt(6)) ((8-3sqrt(7)) ((sqrt(10)-3)) ((sqrt(15)-sqrt(14)) ((4-sqrt(15)) ((6-sqrt(35))])

$$1.723 \left(-\frac{2}{\sqrt{210}}\right) \log \left(\frac{1}{4} \left(\left(\sqrt{2} - 1\right)\left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)\right)\right) \left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)\left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right)$$

log(x) is the natural logarithm

Result:

3.145547377295926669955341370265145324061316799388901754230...

3.1455473772959266699553413702651453240613167993889017

Continued fraction:



Series representations:

$$\frac{1}{\sqrt{210}} \frac{1}{\left(1.723\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)\left(\left(2-\sqrt{3}\right)\left(\left(7-\sqrt{6}\right)\left(\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)\left(\left(\sqrt{15}-\sqrt{14}\right)\right)\right)\left(\left(4-\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)\right)\right)(-2) = \left(3.446\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1+\frac{1}{4}\left(-1+\sqrt{2}\right)\left(2-\sqrt{3}\right)\left(7-\sqrt{6}\right)\left(8-3\sqrt{7}\right)\right)\left(-3+\sqrt{10}\right)\left(4-\sqrt{15}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)^{k}\right)/\left(\sqrt{209}\sum_{k=0}^{\infty}209^{-k}\left(\frac{1}{2}\right)\right)$$

$$\frac{1}{\sqrt{210}} \frac{1}{\left(1.723 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) (-2) = \left(3.446 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-1 + \frac{1}{4} \left(-1 + \sqrt{2}\right) \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right) \left(8 - 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)^k \right) / \left(\sqrt{209} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{209}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{1}{\sqrt{210}} \Big(1.723 \log \Big(\frac{1}{4} \Big(\sqrt{2} - 1 \Big) \Big(\Big(2 - \sqrt{3} \Big) \Big(\Big(7 - \sqrt{6} \Big) \Big(\Big(8 - 3\sqrt{7} \Big) \Big(\sqrt{10} - 3 \Big) \\ \Big(\Big(\sqrt{15} - \sqrt{14} \Big) \Big(\Big(4 - \sqrt{15} \Big) \Big(6 - \sqrt{35} \Big) \Big) \Big) \Big) \Big) \Big) (-2) = \\ \Big(3.446 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \Big(-1 + \frac{1}{4} \Big(-1 + \sqrt{2} \Big) \Big(2 - \sqrt{3} \Big) \Big(7 - \sqrt{6} \Big) \Big(8 - 3\sqrt{7} \Big) \\ \Big(-3 + \sqrt{10} \Big) \Big(4 - \sqrt{15} \Big) \Big(-\sqrt{14} + \sqrt{15} \Big) \Big(6 - \sqrt{35} \Big) \Big)^k \Big) \Big/ \\ \Big(\exp \Big(i \pi \Big[\frac{\arg(210 - x)}{2\pi} \Big] \Big) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k (210 - x)^k x^{-k} \Big(-\frac{1}{2} \Big)_k}{k!} \Big) \\ \text{for } (x \in \mathbb{R} \text{ and } x < 0)$$

Integral representation:

$$\begin{aligned} \frac{1}{\sqrt{210}} \\ & \left(1.723 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right)\right) \\ & \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right) \\ & \left(\int_{1}^{-\frac{1}{4} \left(-1 + \sqrt{2}\right) \left(-2 + \sqrt{3}\right) \left(-7 + \sqrt{6}\right) \left(-8 + 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(-4 + \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-6 + \sqrt{35}\right) \frac{1}{t} dt \end{aligned} \end{aligned}$$

We note that, multiplying by 2:

 $\begin{array}{l} 2*1.723*-2/(\text{sqrt}(210))*\ln\left[1/4*(((((\text{sqrt}(2)-1))((2-\text{sqrt}(3))((7-\text{sqrt}(6))((8-3))((10)-3))(((10)-3))(((10)-3))(((10)-3))(((10)-3))((10)-3))((10)-3))((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3))((10)-3)((10)-3))((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3)((10)-3))((10)-3))((10)-3)((10)-3))((10)-3))((10)-3))((10)-3)((10)-3))((10)-3))((10)-3))((10)-3))((10)-3)((10)-3))(($

$$2 \times 1.723 \left(-\frac{2}{\sqrt{210}}\right) \log \left(\frac{1}{4} \left(\left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right) \right) \right) \right) \right) \right) \right)$$

 $\log(x)$ is the natural logarithm

Result:

6.29109...

 $6.2910947545918533399106827405302906481226335987778035 \approx 2\pi$

Continued fraction:



Series representations:

$$\frac{1}{\sqrt{210}} 2(-2) 1.723 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) = \left(6.892 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-1 + \frac{1}{4} \left(-1 + \sqrt{2}\right) \left(2 - \sqrt{3}\right) \left(7 - \sqrt{6}\right) \left(8 - 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-3 + \sqrt{10}\right) \left(4 - \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(6 - \sqrt{35}\right)^k\right) / \left(\sqrt{209} \sum_{k=0}^{\infty} 209^{-k} \left(\frac{1}{2} \atop k\right)\right)$$

$$\begin{aligned} \frac{1}{\sqrt{210}} 2 (-2) & 1.723 \log \left(\frac{1}{4} \left(\sqrt{2} - 1 \right) \left(\left(2 - \sqrt{3} \right) \left(\left(7 - \sqrt{6} \right) \right) \left(\left(8 - 3\sqrt{7} \right) \left(\sqrt{10} - 3 \right) \left(\left(\sqrt{15} - \sqrt{14} \right) \left(\left(4 - \sqrt{15} \right) \left(6 - \sqrt{35} \right) \right) \right) \right) \right) \right) = \\ & \left(6.892 \sum_{k=1}^{\infty} \frac{1}{k} (-1)^k \left(-1 + \frac{1}{4} \left(-1 + \sqrt{2} \right) \left(2 - \sqrt{3} \right) \left(7 - \sqrt{6} \right) \left(8 - 3\sqrt{7} \right) \right) \\ & \left(-3 + \sqrt{10} \right) \left(4 - \sqrt{15} \right) \left(-\sqrt{14} + \sqrt{15} \right) \\ & \left(6 - \sqrt{35} \right) \right)^k \right) / \left(\sqrt{209} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{209} \right)^k \left(-\frac{1}{2} \right)_k}{k!} \right) \end{aligned}$$

$$\frac{1}{\sqrt{210}} 2(-2) 1.723$$

$$\log\left(\frac{1}{4}\left(\sqrt{2}-1\right)\left(\left(2-\sqrt{3}\right)\left(\left(7-\sqrt{6}\right)\left(\left(8-3\sqrt{7}\right)\left(\sqrt{10}-3\right)\left(\left(\sqrt{15}-\sqrt{14}\right)\right)\right)\left(\left(4-\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)\right)\right)\right)\right) = \left(6.892\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1+\frac{1}{4}\left(-1+\sqrt{2}\right)\left(2-\sqrt{3}\right)\left(7-\sqrt{6}\right)\left(8-3\sqrt{7}\right)\right)\left(-3+\sqrt{10}\right)\left(4-\sqrt{15}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)^{k}\right) / \left(2x\sqrt{10}-x\sqrt{10}\right)\left(4-\sqrt{15}\right)\left(-\sqrt{14}+\sqrt{15}\right)\left(6-\sqrt{35}\right)\right)^{k}\right) / \left(\exp\left(i\pi\left\lfloor\frac{\arg(210-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^{k}(210-x)^{k}x^{-k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)\right)$$
for $(x \in \mathbb{R} \text{ and } x < 0)$

Integral representation:

$$\begin{aligned} \frac{1}{\sqrt{210}} 2 (-2) & 1.723 \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right)\right) \\ & \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) = \\ & - \frac{6.892}{\sqrt{210}} \int_{1}^{-\frac{1}{4} \left(-1 + \sqrt{2}\right) \left(-2 + \sqrt{3}\right) \left(-7 + \sqrt{6}\right) \left(-8 + 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(-4 + \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-6 + \sqrt{35}\right) \frac{1}{t}}{dt} \end{aligned}$$

The result 6.291094754... is a very good approximation to the length of a circle with radius equal to 1: 2π .

This is a further confirmation of the dual nature of the particles (wave-particle), in this case represented by small closed-loop curves. In the present case, the glueball - the Particle Made of Pure Force-, is a particle composed only of gluons which are bosons, therefore, energy particles, which can be described as closed strings.

We have also that:

2*(6.2910947545918533399106827405302906481226335987778035)

Input interpretation: $2\times 6.2910947545918533399106827405302906481226335987778035$ Open code

Enlarge Data Customize A Plaintext Interactive Result: 12.582189509183706679821365481060581296245267197555607 Open code

This result 12,5821 is very near to the value of black hole entropy 12,5664

Furthermorer:

(((((2*(6.291094754591853)))^1/5

Input interpretation: $\sqrt[5]{2 \times 6.291094754591853}$ Open code

Enlarge Data Customize A Plaintext Interactive Result:

More digits

1.6594006062528121...

1.6594006062528121 is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164,2696$ i.e. 1,65578...

We have also:

(1.4649+0.6309) * 1.723 * -2/(sqrt(210)) * ln [1/4*(((((sqrt(2)-1)) ((2-sqrt(3)) ((7-sqrt(6)) ((8-3sqrt(7)) ((sqrt(10)-3)) ((sqrt(15)-sqrt(14)) ((4-sqrt(15)) ((6-sqrt(35)))])

Input interpretation:

$$\begin{array}{l} \text{(1.4649 + 0.6309)} \times 1.723 \left(-\frac{2}{\sqrt{210}} \right) \\ \log \left(\frac{1}{4} \left(\left(\sqrt{2} - 1 \right) \left(\left(2 - \sqrt{3} \right) \left(\left(7 - \sqrt{6} \right) \left(\left(8 - 3 \sqrt{7} \right) \left(\sqrt{10} - 3 \right) \right) \left(\left(\sqrt{15} - \sqrt{14} \right) \left(\left(4 - \sqrt{15} \right) \left(6 - \sqrt{35} \right) \right) \right) \right) \right) \right) \end{array} \right)$$

Open code

log(x) is the natural logarithm

Enlarge Data Customize A Plaintext Interactive Result: More digits 6.59244...

Series representations: More

$$\frac{1}{\sqrt{210}} (1.4649 + 0.6309) (-2) 1.723$$

$$\log\left(\frac{1}{4}\left(\sqrt{2} - 1\right)\left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)\left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)\right)\left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) = \left(7.22213\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1 + \frac{1}{4}\left(-1 + \sqrt{2}\right)\left(2 - \sqrt{3}\right)\left(7 - \sqrt{6}\right)\left(8 - 3\sqrt{7}\right)\right)\right)\left(-3 + \sqrt{10}\right)\left(4 - \sqrt{15}\right)\left(-\sqrt{14} + \sqrt{15}\right)\left(-3 + \sqrt{10}\right)\left(4 - \sqrt{15}\right)\left(-\sqrt{14} + \sqrt{15}\right)\right)\left(6 - \sqrt{35}\right)^{k}\right)/\left(\sqrt{209}\sum_{k=0}^{\infty} 209^{-k}\left(\frac{1}{2}\right)\right)$$

Open code

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$$\frac{1}{\sqrt{210}} (1.4649 + 0.6309) (-2) 1.723$$

$$\log\left(\frac{1}{4}\left(\sqrt{2} - 1\right)\left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)\left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)\right)\left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) = \left(7.22213\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1 + \frac{1}{4}\left(-1 + \sqrt{2}\right)\left(2 - \sqrt{3}\right)\left(7 - \sqrt{6}\right)\left(8 - 3\sqrt{7}\right)\right)\left(-3 + \sqrt{10}\right)\left(4 - \sqrt{15}\right)\left(-\sqrt{14} + \sqrt{15}\right)\right)\left(-3 + \sqrt{10}\right)\left(4 - \sqrt{15}\right)\left(-\sqrt{14} + \sqrt{15}\right)\left(6 - \sqrt{35}\right)^{k}\right)/\left(\sqrt{209}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{209}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

Open code

$$\frac{1}{\sqrt{210}} (1.4649 + 0.6309) (-2) 1.723$$

$$\log\left(\frac{1}{4}\left(\sqrt{2} - 1\right)\left(\left(2 - \sqrt{3}\right)\left(\left(7 - \sqrt{6}\right)\left(\left(8 - 3\sqrt{7}\right)\left(\sqrt{10} - 3\right)\right)\left(\left(\sqrt{15} - \sqrt{14}\right)\left(\left(4 - \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)\right)\right)\right)\right) = \left(7.22213\sum_{k=1}^{\infty}\frac{1}{k}(-1)^{k}\left(-1 + \frac{1}{4}\left(-1 + \sqrt{2}\right)\left(2 - \sqrt{3}\right)\left(7 - \sqrt{6}\right)\left(8 - 3\sqrt{7}\right)\right)\left(-3 + \sqrt{10}\right)\left(4 - \sqrt{15}\right)\left(-\sqrt{14} + \sqrt{15}\right)\left(6 - \sqrt{35}\right)\right)^{k}\right) / \left(\exp\left(i\pi\left\lfloor\frac{\arg(210 - x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^{k}(210 - x)^{k}x^{-k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)\right)$$
for $(x \in \mathbb{R} \text{ and } x < 0)$

Integral representation:

$$\begin{aligned} \frac{1}{\sqrt{210}} & (1.4649 + 0.6309) (-2) \ 1.723 \\ & \log \left(\frac{1}{4} \left(\sqrt{2} - 1\right) \left(\left(2 - \sqrt{3}\right) \left(\left(7 - \sqrt{6}\right) \left(\left(8 - 3\sqrt{7}\right) \left(\sqrt{10} - 3\right) \right) \left(\left(\sqrt{15} - \sqrt{14}\right) \left(\left(4 - \sqrt{15}\right) \left(6 - \sqrt{35}\right)\right)\right)\right)\right) = -\frac{7.22213}{\sqrt{210}} \\ & \int_{1}^{-\frac{1}{4} \left(-1 + \sqrt{2}\right) \left(-2 + \sqrt{3}\right) \left(-7 + \sqrt{6}\right) \left(-8 + 3\sqrt{7}\right) \left(-3 + \sqrt{10}\right) \left(-4 + \sqrt{15}\right) \left(-\sqrt{14} + \sqrt{15}\right) \left(-6 + \sqrt{35}\right) \frac{1}{t} \ dt \end{aligned}$$

This result 6,59244 is a very good approximation to the value of reduced Planck's constant 6,5821 * 10^{-16} eV * s

We have that:

(((sqrt(5)+5))/2)))* 6.5924381933368031148924044438016915701677077481592602

Input interpretation: $\left(\frac{1}{2}\left(\sqrt{5}+5\right)\right) \times 6.5924381933368031148924044438016915701677077481592602$ Open code

Enlarge Data Customize A Plaintext Interactive Result: More digits 23.851665452225504239235410886090825336655367196541473...

This result 23,8516 is very near to the value of black hole entropy 23,9078

(1.8617 * 2) * 6.5924381933368031148924044438016915701677077481592602

Where 1,8617 is a Hausdorff dimension

```
Input interpretation: (1.8617 \times 2) \times 6.5924381933368031148924044438016915701677077481592602 Open code
```

Enlarge Data Customize A Plaintext Interactive

Result:
 More digits

24.54628436907025271799037870605121839236244302949618942868...

This result 24,5462 is very near to the value of black hole entropy 24,4233

And:

(1.8272*2) * 6.5924381933368031148924044438016915701677077481592602

Where 1,8272 is a Hausdorff dimension

```
Input interpretation: (1.8272 \times 2) \times 6.5924381933368031148924044438016915701677077481592602 
 Open code
```

Enlarge Data Customize A Plaintext Interactive Result: More digits 24.09140613373001330306280279942890167402087119487320047488...

This value is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a <u>bosonic</u> string.

We note that:

((((6.5924381933368031148924044438016915701677077481592602))))^1/4

Input interpretation:

```
\sqrt[4]{6.5924381933368031148924044438016915701677077481592602} 
 _{\rm Open\ code}
```

Enlarge Data Customize A Plaintext Interactive Result: More digits 1.60236524529187269353214298684401309300506587345068458... 1.602365245291872693..... result that is a golden number and is very near to the elementary charge

We note that with the last two results, we obtain:

(1.6594006062528121+1.602365245291872693)/2.015

With regard the fractal dimension of the Rössler attractor is slightly above 2. For a=0.1, b=0.1 and c=14 it has been estimated between 2.01 and 2.02. thence 2.015 is a very good value.

Input interpretation: 1.6594006062528121 + 1.602365245291872693

2.015

Open code

Result:

More digits

1.618742358086692204962779156327543424317617866004962779156... Open code 1.618742358086692204962779156327543424317617866004962779156



Open code

Enlarge Data Customize A Plaintext Interactive Possible closed forms: $\frac{7}{6}\pi \operatorname{sech}^{2} \left(\frac{4474282}{4628671}\right) \approx 1.6187423580866922061642$ $\frac{-55995 + 25645\pi - 73\pi^{2}}{4690\pi} \approx 1.61874235808669220486885$ $\frac{-428\pi\pi! + 1227 - 304\pi + 961\pi^{2}}{18\pi} \approx 1.6187423580866922026812$ $\frac{1198262411\pi}{2325541411} \approx 1.6187423580866922050745$ $\frac{851}{13085} C_{PTP} + \frac{9064}{13085} \approx 1.61874235808669217609$ $root of 2750x^{3} - 53841x^{2} + 31358x + 78656 \text{ near } x = 1.61874 \approx 1.618742358086692204956408$ $root of 435x^{5} - 213x^{4} - 335x^{3} - 620x^{2} - 158x - 71 \text{ near } x = 1.61874 \approx 1.618742358086692204941618$

-			

	e .
root of $78656x^3 + 31358x^2 - 53841x + 2750$ near $x = 0.617764$	~
1.618742358086692204956408	
root of $1025 x^5 + 876 x^4 - 681 x^3 + 882 x^2 - 97 x - 190$ near $x = 0$.	515262
1.6187423580866922049631750	
1	
root of $71 x^5 + 158 x^4 + 620 x^3 + 335 x^2 + 213 x - 435$ near $x = 0.612$	7764
1.618742358086692204941618	
$\frac{1}{2(-13 - 441 \pi + 142 \pi^2)} \approx 1.61874235808669219697$ root of 3690 x ⁴ - 4563 x ³ - 6831 x ² + 9277 x - 3099 pear x = 1.61874235808669219697	74 ≈
1.6187423580866922049613096	~
root of $8717 x^4 - 123 x^3 + 1333 x^2 + 1637 x - 1795$ near $x = 0.515$	262 ≈
1.618742358086692204949498	
$\frac{4229}{749} + \frac{5809}{963 e} + \frac{4171 e}{2247} \approx 1.61874235808669220488088$	
1	
root of $3099 x^4 - 9277 x^3 + 6831 x^2 + 4563 x - 3690$ near $x = 0.6177$	764 ≈
1.6187423580866922049613096	

This result 1.61874235808669220496.... is a good approximation to the value of the golden ratio.

http://sciencevibe.com/2015/10/14/new-discovery-particle-made-of-pure-force/



"GLUEBALL" – The Particle Made of Pure Force

Appendix A

This is the Ramanujan fundamental formula for obtain a beautiful and highly precise golden ratio:

$$\sqrt[5]{\left(\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}-\frac{11\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}-\frac{5\sqrt{5}\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}\right)}$$

(11.09016994374947424102293417182819058860154589902881431067 + - 9.99290225070718723070536304129457122742436976265255 × 10^-7428 + - 1.01567312386781438874777576295646917898823529098784 × 10^-7427)^1/5 =

Input interpretation:

$$\left(\frac{11.09016994374947424102293417182819058860154589902881431067 + 9.99290225070718723070536304129457122742436976265255 + 10^{7428} + 10^{7428} + 10^{7428} + 10^{7428} + 10^{10^{7428}} + 10^{10^{7427}} \right)^{-10^{7427}} (1/5)$$

= 1.6180339887498948482045868343656381177203091798057628

1,61803398.....

Possible closed forms: Less

 $\phi \approx 1.618033988749894848204586834365638117720309179805762862135$ Enlarge Data Customize A Plaintext Interactive $\Phi + 1 \approx 1.618033988749894848204586834365638117720309179805762862135$ $\frac{1}{\Phi} \approx 1.618033988749894848204586834365638117720309179805762862135$ $\frac{151837964 \pi}{294810267} \approx 1.61803398874989484850313$ $\frac{11\left(-70+23\,\pi+40\,\pi^2\right)}{-185-659\,\pi+502\,\pi^2} \approx 1.61803398874989484854941$ π root of 11208 x³ + 103781 x² − 49442 x − 3596 near x = 0.515036 ≈ 1.6180339887498948482068128 π root of 4704 x^4 + 358 x^3 - 4422 x^2 - 3386 x + 2537 near x = 0.515036 ≈ 1.61803398874989484818899 $\frac{1}{42} \left(-1 + 34 \, e - 56 \, e^2 + 7 \, \sqrt{1 + e} \right. \\ \left. -5 \, \sqrt{1 + e^2} \right. \\ \left. + 50 \, \pi + 22 \, \pi^2 - 5 \, \sqrt{1 + e^2} \right) = 5 \, \pi + 22 \, \pi^2 - 5 \, \pi + 5$ $24\sqrt{1+\pi} + 20\sqrt{1+\pi^2} \approx 1.6180339887498948482008510$ $\frac{-487 - 906 \ e + 711 \ e^2}{283 - 56 \ e + 175 \ e^2} \approx 1.61803398874989484835044$ $\frac{-13 + \sqrt{2} - 3e + 175e}{7\sqrt{2} + 7\sqrt{3} - e - \pi - 3\pi^2 - \log(2) - \log(3)} \approx 1.61803398874989484867509$ $\frac{7778742049}{4807526976} \approx 1.618033988749894848223936$

φ is the golden ratio
 Φ is the golden ratio conjugate

Developing this formula, we obtain the extended value of golden ratio as the following image:

1.61803398874989484820458683436563811772030917980576286213544862270	
5260462818902449707207204189391137484754088075386891752126633862223	
5369317931800607667263544333890865959395829056383226613199282902678	
8067520876680250171160620703222104321626054862620631361443814075870	
100073200700092301711090207032221043210209340020290313014430149730707	
122034060567954454749240185095304864449241044320771344947049565846	
/885098/43394422125448//0664/80915884607499887124007652170575179788	
3416625624940758906970400028121042762177111777805315317141011704666	
5991466979873176135600670874807101317952368942752194843530567830022%	
8785699782977834784587822891109762500302696156170025046433824377648	
6102838312683303724292675263116533924731671112115881863851331620384	
0052221657012866752046540068113171500343235073404085000400476213222	
0032221037912600732940349006113171399343233973494963090409470213222	
9810172610705961164562990981629055520852479035240602017279974717534	
2777592778625619432082750513121815628551222480939471234145170223735	
8057727861600868838295230459264787801788992199027077690389532196819	
8615143780314997411069260886742962267575605231727775203536139362107	
6738937645560606059216589466759551900400555908950229530942312482355	
2122124154440064703405657347976639723949499465845788730396230903750	
3300385621024236002513868041457700560812244574717803417312645322041	
620722212424044440487202215000041457797600272210206972728802441700020E4400627	
05772521540444494075025154170706957521050007578605441700959544409027	
9558980787232095124208935573097045095950844017555198819218020640529	
0551893494759260073485228210108819464454422231889131929468962200230	
1443770269923007803085261180754519288770502109684249362713592518760	
7778846658361502389134933331223105339232136243192637289106705033992	
8226526355620902979864247275977256550861548754357482647181414512700	
0602389016207773224499435308899909501680328112194320481964387675863	
3147985719113978153978074761507722117508269458639320456520989698555	
679141060692729940E974610227910E444200042692E92E912911211690029EEE7	
607549100700372004030740103370103444530745003363301301100773033377	
09/54841491445341509129540/00501947/54861630/5422641/2939468036/319	
8058618339183285991303960720144559504497792120761247856459161608370	
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8809287570345050780814545881990633612982798141174533927312080928972	
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7844328474700817651800778726841611763250386121120143683437670235037	
11160007050600005071000070720041011705250500121129145005457070255057	
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9731286301625448761148520217064404111660766950597757832570395110878	
2308271064789390211156910392768384538633332156582965977310343603232	
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4722707890122087287361707348649998156255472811373479871656952748900·.	
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7046461610991002442323271072190169334390376006767326701739339303013	
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6931733448234356453185058135310854973335075996677871244905836367541·	
3289086240632456395357212524261170278028656043234942837301725574405	
8372782679960317393640132876277012436798311446436947670531272492410	
4716700138247831286565064934341803900410178053395058772458665575522	
9391582397084177298337282311525692609299594224000056062667867435792	
3072454084817651073436265268044888552720274778747335083536727761407	
5917120513269344837529916499809360246178442675727767900191919070380	
E220461222482201226104227101684E1220602627002E4E42246176007E7E26800	
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0535666342817812865256460842033465381044104571426668227183940183 22700855486206566039897440652105503064000508171126598741936552238 160045722888109207782427720363664448153256172841175699792666655238 468831137185299192163190520156645481532561728411756997746842355205925235 5780756560503677313075191223973887224625805715974574064423550059252 5221594426576625780770820194304005425501583125030175340941171910192 9800344725032988025401345708441647975964305430511151161218704567	
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From:

Exact Renormalization Group Equations. An Introductory Review. C. Bagnuls•and C. Bervillier† C. E. Saclay, F91191 Gif-sur-Yvette Cedex, France February 1, 2008

For d = 3 and k = 1, the first order of the derivative expansion yields (after a long but straightforward computation) the following two coupled equations for U and Z [22]:

$$\dot{U} = -\frac{1-\eta/4}{\sqrt{Z}\sqrt{U''+2\sqrt{Z}}} + 3U - \frac{1}{2}(1+\eta)\varphi U'$$

$$\dot{Z} - -\frac{1}{2}(1+\eta)\varphi Z' - \eta Z + \left(1-\frac{\eta}{4}\right) \left\{ \frac{1}{48} \frac{24ZZ''-19(Z')^2}{Z^{3/2}(U''+2\sqrt{Z})^{3/2}} - \frac{1}{28} \frac{58U'''Z'\sqrt{Z}+57(Z')^2 + (Z''')^2Z}{48} + \frac{5}{12} \frac{(U''')^2Z+2U'''Z'\sqrt{Z}+(Z')^2}{\sqrt{Z}(U''+2\sqrt{Z})^{7/2}} \right\} (87)$$

As expected, the search for a non trivial fixed point solution for these equations (a solution which is nonsingular up to $\varphi \to \infty$) produces a unique solution with an unambiguously defined η [22]:

$$\eta = 0.05393$$
 (88)

The linearization about this fixed point yields the eigenvalues:

$$\nu = 0.6181$$
 (89)

$$\omega = 0.8975 \tag{90}$$

and also a zero eigenvalue $\lambda = 0$ [22] which corresponds to the redundant operator \mathcal{O}_1 [eq. (24)] responsible for the moving along the line of equivalent fixed points. This is, of course, an expected confirmation of the preservation of the reparametrization invariance.

and from:

Polchinski equation, reparameterization invariance and the derivative expansion

Jordi Comellas - Departament d'Estructura i Constituents de la Materia - Facultat de Fisica, Universitat de Barcelona - Diagonal, 647, 08028 Barcelona, Spain
	LPA	Polchinski	eff. action	best known
η	0	0.042	0.054	0.035(3)
ν	0.650	0.622	0.618	0.631(2)
ω	0.656	0.754	0.897	0.80(4)

Table 1: The critical exponents η , ν and ω for (1) the LPA of Polchinski equation; (2) derivative expansion at second order of Polchinski equation; (3) derivative expansion at second order of the effective action RG equation [1]; (4) combination of best known estimates taken from Ref. [1].

The partition function is then

$$Z = \int \mathcal{D}\phi \, e^{-S^* - j_\alpha \mathcal{O}_\alpha},\tag{52}$$

and we define the thermodynamic densities

$$M_{\alpha} \equiv \frac{1}{V} \frac{\partial}{\partial j_{\alpha}} \ln Z, \tag{53}$$

with V the volume of the system (needed in order M_{α} to be an intensive quantity and, thus, defined in the thermodynamic limit).

From Wikipedia:

In mathematics, in particular in linear algebra, an eigenvector of a function between vector spaces is a non-zero vector whose image is the vector itself multiplied by a number (real or complex) called **eigenvalue**. If the function is linear, the eigenvectors having in common the same eigenvalue, together with the null vector, form a vector space, called autospace. The notion of eigenvector is generalized by the concept of root vector or generalized eigenvector.

Eigenvectors and eigenvalues are defined and used in mathematics and physics in the context of more complex and abstract vector spaces than the three-dimensional one of classical physics. These spaces can have dimensions greater than 3 or even infinite (an example is given by the Hilbert space). Also the possible positions of a vibrating string form a space of this type: a vibration of the string is then interpreted as a transformation of this space and its eigenvectors (more precisely, its eigenfunctions) are stationary waves.

We note that the values of v, 0.6181 or 0.618, are practically equals to the reciprocal of the golden ratio:

From Wikipedia:

$$arphi = rac{1+\sqrt{5}}{2} = 1.61803\,39887\ldots$$

The conjugate root to the minimal polynomial $x^2 - x - 1$ is

$$-rac{1}{arphi} = 1 - arphi = rac{1 - \sqrt{5}}{2} = -0.61803\,39887\ldots$$

The absolute value of this quantity (≈ 0.618) corresponds to the length ratio taken in reverse order (shorter segment length over longer segment length, b/a), and is sometimes referred to as the *golden ratio conjugate*. It is denoted here by the capital Phi (Φ)

$$\Phi = rac{1}{arphi} = arphi^{-1} = 0.61803\,39887\ldots.$$

Alternatively, Φ can be expressed as

 $\Phi = arphi - 1 = 1.61803\,39887\ldots - 1 = 0.61803\,39887\ldots$

This illustrates the unique property of the golden ratio among positive numbers, that

$$rac{1}{arphi}=arphi-1,$$

or its inverse:

$$\frac{1}{\Phi} = \Phi + 1.$$

This means 0.61803...:1 = 1:1.61803....

Thence, we can to obtain the following mathematical connection between the value of the eigenvalue v = 0.618... and the fundamental Ramanujan's formula:

$$\sqrt[5]{\left(\frac{1}{\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}-\frac{11\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}-\frac{5\sqrt{5}\times5e^{\left(-\sqrt{5}\pi\right)^{5}}}{2\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)}\right)}$$
(a)

Input interpretation:

$$\begin{pmatrix} 1 / \left(\left(\frac{1}{32} \left(-1 + \sqrt{5} \right)^5 + 5 e^{\left(-\sqrt{5} \pi \right)^5} \right) - \\ 9.99290225070718723070536304129457122742436976265255 \\ - \frac{10^{7428}}{10^{7428}} - \\ \frac{1.01567312386781438874777576295646917898823529098784}{10^{7427}} \right) \right) \land (1/5)$$
Open code
$$(b)$$

Enlarge Data Customize A Plaintext Interactive Result: More digits

1.618033988749894848204586834365638117720309179805762862135...

Or:



Enlarge Data Customize A Plaintext Interactive Result: More digits 1.618033988749894848204586834365638117720309179805762862135... The result, thence, is:

1.6180339887498948482045868343656381177203091798057628

Indeed, we obtain from (c):

1/ ((((1/(((1/32(-1+sqrt(5))^5+5*(e^((-sqrt(5)*Pi))^5)))-(- $1.6382898797095665677239458827012056245798314722584 \times 10^{-7429}))^{1/5}$ Input interpretation:

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

Open code

Enlarge Data Customize A Plaintext Interactive

• Result: • More digits

•

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0.618033988749894848204586834365638117720309179805762862135...
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0.61803398...

Series representations: More

$$\frac{1}{\sqrt[5]{\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)-\frac{1.63828987970956656772394588270120562457983147225840000}{10^{7429}}} = \frac{1}{\sqrt[5]{\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)-\frac{1.63828987970956656772394588270120562457983147225840000}{10^{7429}}} \times \frac{1}{\sqrt{\left(\frac{1}{2}\left(\frac{1}{2}\right)^{5}+5e^{-\pi^{5}\sqrt{4}\cdot5}\left(\sum_{k=0}^{\infty}4^{-k}\binom{1/2}{k}\right)^{5}}{10^{-7429}+5e^{-\pi^{5}\sqrt{4}\cdot5}\left(\sum_{k=0}^{\infty}4^{-k}\binom{1/2}{k}\right)^{5}} + \frac{1}{32}\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^{5}}\right) \cap (1/5)\right)}$$

Open code

Enlarge Data Customize A Plaintext Interactive

$$\frac{1}{\sqrt[5]{\left(\frac{1}{32}\left(-1+\sqrt{5}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)^{-1.63828987970956656772394588270120562457983147225840000}}{10^{7429}}} = \frac{1}{\sqrt[5]{\left(\frac{1}{2}\left(\frac{1}{2}\left(\frac{1}{2}\right)^{5}+5e^{\left(-\sqrt{5}\pi\right)^{5}}\right)^{-1.63828987970956656772394588270120562457983147225840000\times 10^{7429}}}{10^{-7429}+5\exp\left(-\pi^{5}\sqrt{4}^{5}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)^{5}\right)}{\frac{1}{32}\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)^{5}\right)^{-1}(1/5)\right)}$$

Open code



Enlarge Data Customize A Plaintext Interactive

The result 0.61803398... is practically equal to the value of eigenvalue v, that is 0.6181 or 0.618, practically equals to the reciprocal of the golden ratio.

Conclusion

Translating the formula from the cosmological point of view, the two infinitesimal values with exponents -7427 and -7428 could represent the slightest ripples of the so-called supersymmetric vacuum which, therefore, like any vacuum, is not really "empty". The golden ratio represents then the very first symmetry break, even before the Big Bang, from which it emerged and was formalized the infinite-dimensional Hilbert space that is of a fractal nature, as is the golden ratio whose value is also a Hausdorff dimension. So ϕ represents the thought-information that becomes a creative act and from which the formal phase begins with the infinite representations of the absolute reality that corresponds to the two infinitesimal values mentioned above.



From the picture we can see the Hilbert space, (in green) represented by an infinitedimensional torus on which lie infinity open strings, the infinite 1-branes from whose collision of a pair of them, emerges a multiverse-brane as ours that contains an immeasurable but finite number of bubbles, which probably coincides with the size number of the Monster Group $8.1 * 10^{53}$ which, in turn, is related to Ramanaujan's mathematics through the j-invariants of the Monstrous Moonshine.

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