On some Ramanujan formulas: new possible mathematical connections with various parameters of Particle Physics, Dark Matter, Dark Energy and Cosmology I.

Michele Nardelli[1], **Antonio Nardelli**

Abstract

In this research thesis, we have analyzed further Ramanujan formulas and described new possible mathematical connections with various parameters of Particle Physics, Dark Matter, Dark Energy and Cosmology

[1] M.Nardelli have studied by Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

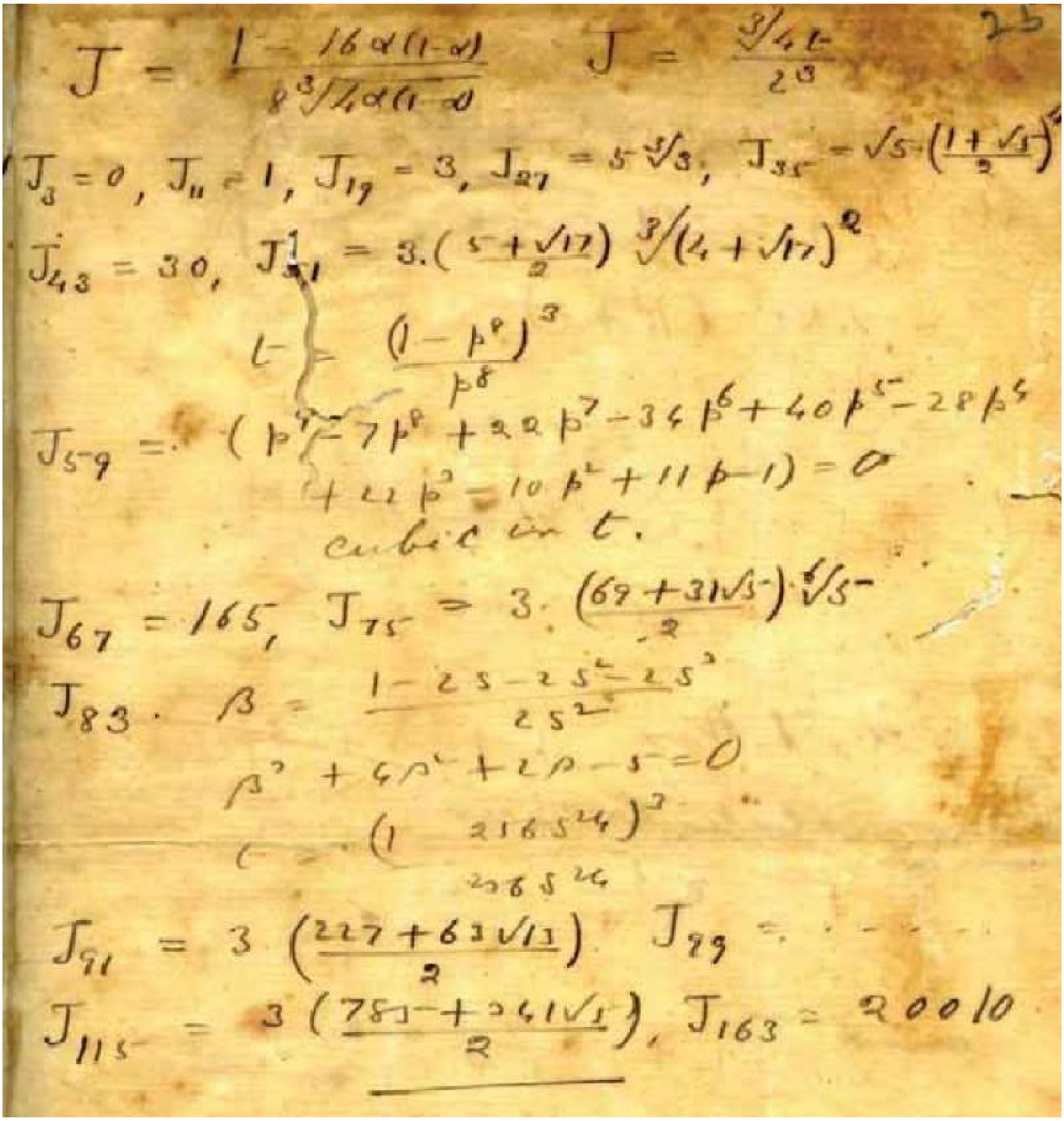
https://in.mashable.com/science/6742/black-holes-might-be-hiding-cores-of-dark-energy-thats-expanding-the-universe-claim-scientists

https://matesenelinsti.wordpress.com/2010/03/02/peliculas-y-matematicas-el-indomable-will-hunting/

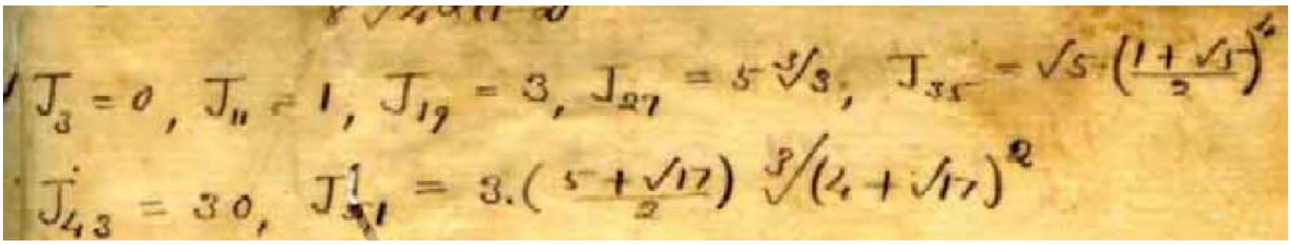
From:

Manuscript Book Of Srinivasa Ramanujan Volume 3

Page 26


25
$J = \frac{1-16\alpha(1-\alpha)}{8\sqrt[3]{4\alpha(1-\alpha)}}$ $J = \frac{\sqrt[3]{4t}}{2^3}$
$J_3 = 0,\ J_{11} = 1,\ J_{19} = 3,\ J_{27} = 5\sqrt[3]{3},\ J_{35} = \sqrt{5}\left(\frac{1+\sqrt{5}}{2}\right)^4$
$J_{43} = 30,\ J_{51} = 3\left(\frac{5+\sqrt{17}}{2}\right)\sqrt[3]{(4+\sqrt{17})^2}$
$t = \frac{(1-p^8)^3}{p^8}$
$J_{59} = (p^9 - 7p^8 + 22p^7 - 34p^6 + 40p^5 - 28p^4 + 22p^3 - 10p^2 + 11p - 1) = 0$
cubic in t.
$J_{67} = 165,\ J_{75} = 3\left(\frac{69+31\sqrt{5}}{2}\right)\sqrt[3]{5}$
$J_{83}.\ \beta = \frac{1-2s-2s^2-2s^3}{2s^2}$
$\beta^3 + 4\beta^2 + 2\beta - 5 = 0$
$t = \frac{(1-256s^{24})^3}{256s^{24}}$
$J_{91} = 3\left(\frac{227+63\sqrt{13}}{2}\right)$ $J_{99} = \cdots$
$J_{115} = 3\left(\frac{785+351\sqrt{5}}{2}\right),\ J_{163} = 20010$

From:


$J_3 = 0,\ J_{11} = 1,\ J_{19} = 3,\ J_{27} = 5\sqrt[3]{3},\ J_{35} = \sqrt{5}\left(\frac{1+\sqrt{5}}{2}\right)^4$
$J_{43} = 30,\ J_{51} = 3\left(\frac{5+\sqrt{17}}{2}\right)\sqrt[3]{(4+\sqrt{17})^2}$

We have:

1+3+5(3)^1/3+(((sqrt(5))))*(((1+sqrt(5))/2))^4+30+3*(((5+sqrt(17))/2))*(((4+sqrt(17))^2))^1/3

Input:

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+3\left(\frac{1}{2}\left(5+\sqrt{17}\right)\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}$$

Result:

$$34+5\sqrt[3]{3}+\frac{1}{16}\sqrt{5}\left(1+\sqrt{5}\right)^4+\frac{3}{2}\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)$$

Decimal approximation:

111.8362418869012553877880617241709770600068173983378501203...

111.8362418…

Alternate forms:

$$\frac{1}{2}\left(3\sqrt{17}\sqrt[3]{33+8\sqrt{17}}+15\sqrt[3]{33+8\sqrt{17}}+7\sqrt{5}+10\sqrt[3]{3}+83\right)$$

$$\frac{1}{16}\left(544+80\sqrt[3]{3}+\sqrt{5}\left(1+\sqrt{5}\right)^4+24\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)\right)$$

$$\frac{1}{2}\left(83+10\sqrt[3]{3}+7\sqrt{5}+15\left(4+\sqrt{17}\right)^{2/3}+3\sqrt{17}\left(4+\sqrt{17}\right)^{2/3}\right)$$

1+3+5(3)^1/3+(((sqrt(5))))*(((1+sqrt(5))/2))^4+30+3*(((5+sqrt(17))/2))*(((4+sqrt(17))^2))^1/3 + 13 + 1/golden ratio

Input:

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+3\left(\frac{1}{2}\left(5+\sqrt{17}\right)\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}+13+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+47+5\sqrt[3]{3}+\frac{1}{16}\sqrt{5}\left(1+\sqrt{5}\right)^4+\frac{3}{2}\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)$$

Decimal approximation:

125.4542758756511502359926485585366151777271265781436129825...

125.45427587…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{2}\left(3\sqrt{17}\sqrt[3]{33+8\sqrt{17}}+15\sqrt[3]{33+8\sqrt{17}}+8\sqrt{5}+10\sqrt[3]{3}+108\right)$$

$$\frac{\left(752+80\sqrt[3]{3}+\sqrt{5}\,(1+\sqrt{5})^4+24(4+\sqrt{17})^{2/3}(5+\sqrt{17})\right)\phi+16}{16\,\phi}$$

$$\frac{109}{2}+5\sqrt[3]{3}+\frac{7\sqrt{5}}{2}+\frac{2}{1+\sqrt{5}}+\frac{15}{2}\left(4+\sqrt{17}\right)^{2/3}+\frac{3}{2}\sqrt{17}\left(4+\sqrt{17}\right)^{2/3}$$

And:

1+3+5(3)^1/3+(((sqrt(5))))*(((1+sqrt(5))/2))^4+30+3*(((5+sqrt(17))/2))*(((4+sqrt(17))^2))^1/3 + 29 - golden ratio

Input:

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+3\left(\frac{1}{2}\left(5+\sqrt{17}\right)\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}+29-\phi$$

ϕ is the golden ratio

Result:

$$-\phi+63+5\sqrt[3]{3}+\frac{1}{16}\sqrt{5}\left(1+\sqrt{5}\right)^4+\frac{3}{2}\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)$$

Decimal approximation:

139.21820789815136053958347488980533894228650821853208725 82...

139.21820789…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{2}\left(3\sqrt{17}\sqrt[3]{33+8\sqrt{17}}+15\sqrt[3]{33+8\sqrt{17}}+6\sqrt{5}+10\sqrt[3]{3}+140\right)$$

$$70+5\sqrt[3]{3}+3\sqrt{5}+\frac{15}{2}\left(4+\sqrt{17}\right)^{2/3}+\frac{3}{2}\sqrt{17}\left(4+\sqrt{17}\right)^{2/3}$$

$$\frac{1}{2}\left(140+10\sqrt[3]{3}+6\sqrt{5}+15\left(4+\sqrt{17}\right)^{2/3}+3\sqrt{17}\left(4+\sqrt{17}\right)^{2/3}\right)$$

Series representations:

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{1}{2}\left(3\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)\left(5+\sqrt{17}\right)+29-\phi=$$

$$\frac{1}{16}\left(1008+80\sqrt[3]{3}-16\phi+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+4\sqrt{4}^2\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^2+\right.$$
$$6\sqrt{4}^3\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^3+4\sqrt{4}^4\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^4+$$
$$\sqrt{4}^5\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^5+120\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)^2}+$$
$$\left.24\sqrt{16}\left(\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)^2}\right)$$

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{1}{2}\left(3\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)\left(5+\sqrt{17}\right)+29-\phi=$$

$$\frac{1}{16}\left(1008+80\sqrt[3]{3}-16\phi+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+4\sqrt{4}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+\right.$$
$$6\sqrt{4}^3\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^3+4\sqrt{4}^4\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^4+$$
$$\sqrt{4}^5\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^5+120\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2}+$$
$$\left.24\sqrt{16}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2}\right)$$

$$1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{1}{2}\left(3\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)\left(5+\sqrt{17}\right)+29-\phi=$$

$$\frac{1}{16}\left(1008+80\sqrt[3]{3}-16\phi+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.$$
$$4\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^2+$$
$$6\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^3+4\sqrt{z_0}^4$$
$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^4+\sqrt{z_0}^5\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^5+$$
$$120\sqrt[3]{\left(4+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)^2}+$$
$$24\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)$$
$$\left.\sqrt[3]{\left(4+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)^2}\right)$$

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

1/7(((1+3+5(3)^1/3+(((sqrt(5))))*(((1+sqrt(5))/2))^4+30+3*(((5+sqrt(17))/2))*(((4+sqrt(17))^2))^1/3)))+1/golden ratio

Input:

$$\frac{1}{7}\left(1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+3\left(\frac{1}{2}\left(5+\sqrt{17}\right)\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+\frac{1}{7}\left(34+5\sqrt[3]{3}+\frac{1}{16}\sqrt{5}\left(1+\sqrt{5}\right)^4+\frac{3}{2}\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)\right)$$

Decimal approximation:

16.594639972592931332174309937818634840578425950996884307 90...

16.5946399… result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternate forms:

$$\frac{1}{14}\left(3\sqrt{17}\sqrt[3]{33+8\sqrt{17}}+15\sqrt[3]{33+8\sqrt{17}}+14\sqrt{5}+10\sqrt[3]{3}+76\right)$$

$$\frac{1}{\phi}+\frac{1}{112}\left(544+80\sqrt[3]{3}+\sqrt{5}\left(1+\sqrt{5}\right)^4+24\left(4+\sqrt{17}\right)^{2/3}\left(5+\sqrt{17}\right)\right)$$

$$\frac{\left(544+80\sqrt[3]{3}+\sqrt{5}\,(1+\sqrt{5})^4+24\,(4+\sqrt{17})^{2/3}\,(5+\sqrt{17})\right)\phi+112}{112\,\phi}$$

Series representations:

$$\frac{1}{7}\left(1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{3}{2}\left(5+\sqrt{17}\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)+\frac{1}{\phi}=$$
$$\frac{1}{112\,\phi}\left(112+544\,\phi+80\sqrt[3]{3}\,\phi+\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+4\,\phi\sqrt{4}^2\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^2+\right.$$
$$6\,\phi\sqrt{4}^3\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^3+4\,\phi\sqrt{4}^4\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^4+$$
$$\phi\sqrt{4}^5\left(\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)^5+120\,\phi\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)^2}+$$
$$\left.24\,\phi\sqrt{16}\left(\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}16^{-k}\binom{\frac{1}{2}}{k}\right)^2}\right)$$

$$\frac{1}{7}\left(1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{3}{2}\left(5+\sqrt{17}\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)+\frac{1}{\phi}=$$
$$\frac{1}{112\,\phi}\left(112+544\,\phi+80\sqrt[3]{3}\,\phi+\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+4\,\phi\sqrt{4}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+\right.$$
$$6\,\phi\sqrt{4}^3\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^3+4\,\phi\sqrt{4}^4\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^4+$$
$$\phi\sqrt{4}^5\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^5+120\,\phi\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2}+$$
$$\left.24\,\phi\sqrt{16}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\sqrt[3]{\left(4+\sqrt{16}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{16}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2}\right)$$

$$\frac{1}{7}\left(1+3+5\sqrt[3]{3}+\sqrt{5}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4+30+\frac{3}{2}\left(5+\sqrt{17}\right)\sqrt[3]{\left(4+\sqrt{17}\right)^2}\right)+\frac{1}{\phi}=$$

$$\frac{1}{112\,\phi}\left(112+544\,\phi+80\sqrt[3]{3}\,\phi+\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.$$

$$4\,\phi\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^2+$$

$$6\,\phi\sqrt{z_0}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^3+4\,\phi\sqrt{z_0}^{\,4}$$

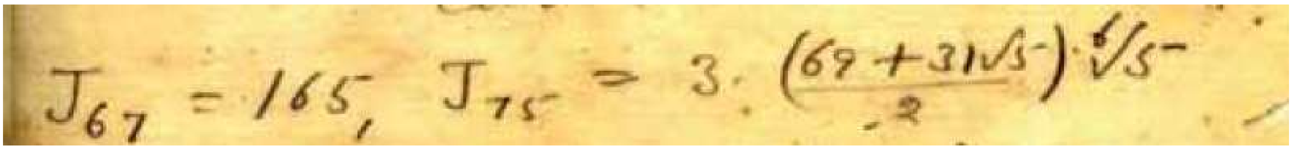
$$\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^4+\phi\sqrt{z_0}^{\,5}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)^5+$$

$$120\,\phi\sqrt[3]{\left(4+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)^2}+$$

$$24\,\phi\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)$$

$$\left.\sqrt[3]{\left(4+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(17-z_0)^k z_0^{-k}}{k!}\right)^2}\right)$$

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



3*(1/2*(69+31sqrt5))*(5)^1/6

Input:

$$3\left(\frac{1}{2}\left(69+31\sqrt{5}\right)\right)\sqrt[6]{5}$$

Result:

$$\frac{3}{2}\sqrt[6]{5}\left(69+31\sqrt{5}\right)$$

Decimal approximation:

271.3096851291227382382910926106244326559128873871894423724...

271.309685129…

Alternate forms:

$$\frac{3}{2}\left(69\sqrt[6]{5}+31\times 5^{2/3}\right)$$

$$3\sqrt[3]{369\,830+165\,393\sqrt{5}}$$

$$\sqrt[6]{5}\left(\frac{207}{2}+\frac{93\sqrt{5}}{2}\right)$$

Minimal polynomial:

$$x^6-19\,970\,820\,x^3+4\,851\,495$$

1/2(((3*(1/2*(69+31sqrt5))*(5)^1/6)))+4

Input:

$$\frac{1}{2}\left(3\left(\frac{1}{2}\left(69+31\sqrt{5}\right)\right)\sqrt[6]{5}\right)+4$$

Result:

$$4+\frac{3}{4}\sqrt[6]{5}\left(69+31\sqrt{5}\right)$$

Decimal approximation:

139.65484256456136911914554630531221632795644369359472118 62…

139.654842…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{4}\left(207\sqrt[6]{5}+93\times 5^{2/3}+16\right)$$

$$4+\frac{207\sqrt[6]{5}}{4}+\frac{93\times 5^{2/3}}{4}$$

$$4+\frac{3}{2}\sqrt[3]{369\,830+165\,393\sqrt{5}}$$

Minimal polynomial:

$$64\,x^6-1536\,x^5+15\,360\,x^4-159\,848\,480\,x^3+1\,917\,444\,480\,x^2-7\,669\,188\,096\,x+10\,230\,173\,479$$

1/2(((3*(1/2*(69+31sqrt5))*(5)^1/6)))-11+1/golden ratio

Input:

$$\frac{1}{2}\left(3\left(\frac{1}{2}\left(69+31\sqrt{5}\right)\right)\sqrt[6]{5}\right)-11+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}-11+\frac{3}{4}\sqrt[6]{5}\left(69+31\sqrt{5}\right)$$

Decimal approximation:

125.2728765533112639673501331396778544456767528734004840483...

125.272876…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{4}\left(-46+207\sqrt[6]{5}+2\sqrt{5}+93\times 5^{2/3}\right)$$

$$\frac{1}{\phi}-11+\sqrt[6]{5}\left(\frac{207}{4}+\frac{93\sqrt{5}}{4}\right)$$

$$\frac{\left(3\sqrt[6]{5}\left(69+31\sqrt{5}\right)-44\right)\phi+4}{4\phi}$$

Minimal polynomial:

$$64x^6+4416x^5+126720x^4-157830880x^3-6031219320x^2-76235810664x-320818697641$$

Series representations:

$$\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\frac{1}{\phi}=-11+\frac{207\sqrt[6]{5}}{4}+\frac{1}{\phi}+\frac{93}{4}\sqrt[6]{5}\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\frac{1}{\phi}=-11+\frac{207\sqrt[6]{5}}{4}+\frac{1}{\phi}+\frac{93}{4}\sqrt[6]{5}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\frac{1}{\phi}=$$
$$-11+\frac{207\sqrt[6]{5}}{4}+\frac{1}{\phi}+\frac{93\sqrt[6]{5}\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{8\sqrt{\pi}}$$

1/8* (((1/2(((3*(1/2*(69+31sqrt5))*(5)^1/6)))-11+Pi+4*golden ratio)))

Input:

$$\frac{1}{8}\left(\frac{1}{2}\left(3\left(\frac{1}{2}\left(69+31\sqrt{5}\right)\right)\sqrt[6]{5}\right)-11+\pi+4\phi\right)$$

ϕ is the golden ratio

Result:

$$\frac{1}{8}\left(4\phi-11+\frac{3}{4}\sqrt[6]{5}\left(69+31\sqrt{5}\right)+\pi\right)$$

Decimal approximation:

16.78357139664384271880331712825678396037935622652410980696...

16.783571…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$\frac{1}{8}\left(-11+\frac{3}{4}\sqrt[6]{5}\left(69+31\sqrt{5}\right)+4\phi+\pi\right)$ is a transcendental number

Alternate forms:

$$\frac{1}{32}\left(-36+207\sqrt[6]{5}+8\sqrt{5}+93\times 5^{2/3}+4\pi\right)$$

$$\frac{1}{32}\left(16\phi-44+3\sqrt[6]{5}\left(69+31\sqrt{5}\right)+4\pi\right)$$

$$\frac{\phi}{2}-\frac{11}{8}+\sqrt[6]{5}\left(\frac{207}{32}+\frac{93\sqrt{5}}{32}\right)+\frac{\pi}{8}$$

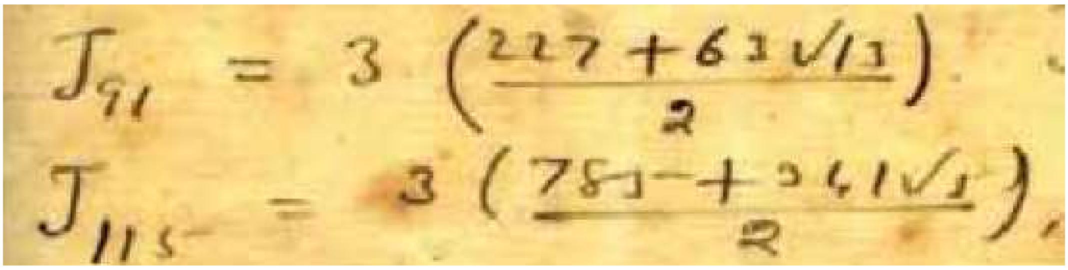
Series representations:

$$\frac{1}{8}\left(\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\pi+4\phi\right)=$$
$$-\frac{11}{8}+\frac{207\sqrt[6]{5}}{32}+\frac{\phi}{2}+\frac{\pi}{8}+\frac{93}{32}\sqrt[6]{5}\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{1}{8}\left(\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\pi+4\phi\right)=$$
$$-\frac{11}{8}+\frac{207\sqrt[6]{5}}{32}+\frac{\phi}{2}+\frac{\pi}{8}+\frac{93}{32}\sqrt[6]{5}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{1}{8}\left(\frac{3\left(69+31\sqrt{5}\right)\sqrt[6]{5}}{2\times 2}-11+\pi+4\phi\right)=$$
$$-\frac{11}{8}+\frac{207\sqrt[6]{5}}{32}+\frac{\phi}{2}+\frac{\pi}{8}+\frac{93\sqrt[6]{5}\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{64\sqrt{\pi}}$$

From:



$$J_{91}=3\left(\frac{227+63\sqrt{13}}{2}\right)$$
$$J_{115}=3\left(\frac{785+341\sqrt{5}}{2}\right),$$

We obtain:

3*((1/2(227+63*sqrt13))) + 3*((1/2(785+341*sqrt5)))

Input:

$$3\left(\frac{1}{2}\left(227+63\sqrt{13}\right)\right)+3\left(\frac{1}{2}\left(785+341\sqrt{5}\right)\right)$$

Result:

$$\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)$$

Decimal approximation:

3002.473366022489417913058741332009661348623817169671175065...

3002.473366…

Alternate forms:

$$\frac{1}{2}\left(3036+1023\sqrt{5}+189\sqrt{13}\right)$$

$$1518+\frac{1023\sqrt{5}}{2}+\frac{189\sqrt{13}}{2}$$

$$\frac{3}{2}\left(1012+341\sqrt{5}+63\sqrt{13}\right)$$

Minimal polynomial:

$$x^4-6072x^3+10977435x^2-5343782004x+167047560684$$

3*((1/2(227+63*sqrt13))) + 3*((1/2(785+341*sqrt5))) - 21 + golden ratio

Input:

$$3\left(\frac{1}{2}\left(227+63\sqrt{13}\right)\right)+3\left(\frac{1}{2}\left(785+341\sqrt{5}\right)\right)-21+\phi$$

ϕ is the golden ratio

Result:

$$\phi-21+\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)$$

Decimal approximation:

2983.091400011239312761263328166375299466344126349476937927...

2983.09140001123…. result very near to the rest mass of Charmed eta meson 2983.6

Alternate forms:

$$\frac{1}{2}\left(2995+1024\sqrt{5}+189\sqrt{13}\right)$$

$$\frac{2995}{2}+512\sqrt{5}+\frac{189\sqrt{13}}{2}$$

$$\frac{1}{2}\left(2995+\sqrt{5707253+387072\sqrt{65}}\right)$$

Minimal polynomial:

$x^4 - 5990 x^3 + 10601411 x^2 - 4886001070 x + 56692091689$

Series representations:

$$\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)-21+\phi = 1497+\phi+\sum_{k=0}^{\infty} 2^{-1-2k}\times 3^{1-k}\binom{\frac{1}{2}}{k}\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)$$

$$\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)-21+\phi = 1497+\phi+\sum_{k=0}^{\infty} \frac{(-1)^k\, 2^{-1-2k}\times 3^{1-k}\left(-\frac{1}{2}\right)_k\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)}{k!}$$

$$\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)-21+\phi = 1497+\phi+\sum_{k=0}^{\infty} \frac{3(-1)^k\left(-\frac{1}{2}\right)_k\sqrt{z_0}\left(341(5-z_0)^k+63(13-z_0)^k\right)z_0^{-k}}{2\,k!}$$

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

And:

1/24(((3*((1/2(227+63*sqrt13))) + 3*((1/2(785+341*sqrt5))))))

Input:

$$\frac{1}{24}\left(3\left(\frac{1}{2}\left(227+63\sqrt{13}\right)\right)+3\left(\frac{1}{2}\left(785+341\sqrt{5}\right)\right)\right)$$

Result:

$$\frac{1}{24}\left(\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)\right)$$

Decimal approximation:

125.1030569176037257463774475555004025561926590487362989610...

125.10305691…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{48}\left(3036+1023\sqrt{5}+189\sqrt{13}\right)$$

$$\frac{1}{16}\left(1012+341\sqrt{5}+63\sqrt{13}\right)$$

$$\frac{253}{4}+\frac{341\sqrt{5}}{16}+\frac{63\sqrt{13}}{16}$$

Minimal polynomial:

$$1024x^4-259072x^3+19515440x^2-395835704x+515578891$$

1/24(((3*((1/2(227+63*sqrt13))) + 3*((1/2(785+341*sqrt5))))))+11+Pi

Input:

$$\frac{1}{24}\left(3\left(\frac{1}{2}\left(227+63\sqrt{13}\right)\right)+3\left(\frac{1}{2}\left(785+341\sqrt{5}\right)\right)\right)+11+\pi$$

Result:

$$11+\frac{1}{24}\left(\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)\right)+\pi$$

Decimal approximation:

139.2446495711935189848400909387799054403898284481114047820...

139.24464…. result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$11+\frac{1}{24}\left(\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)\right)+\pi$ is a transcendental number

Alternate forms:

$$\frac{1}{16}\left(1188+341\sqrt{5}+63\sqrt{13}+16\pi\right)$$

$$\frac{297}{4}+\frac{341\sqrt{5}}{16}+\frac{63\sqrt{13}}{16}+\pi$$

$$\frac{1}{16}\left(1188+341\sqrt{5}+63\sqrt{13}\right)+\pi$$

Series representations:

$$\frac{1}{24}\left(\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)\right)+11+\pi = \frac{297}{4}+\pi+\sum_{k=0}^{\infty} 3^{-k}\times 4^{-2-k}\binom{\frac{1}{2}}{k}\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)$$

$$\frac{1}{24}\left(\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)\right)+11+\pi = \frac{297}{4}+\pi+\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{3}\right)^k 4^{-2-k}\left(-\frac{1}{2}\right)_k\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)}{k!}$$

$$\frac{1}{24}\left(\frac{3}{2}\left(227+63\sqrt{13}\right)+\frac{3}{2}\left(785+341\sqrt{5}\right)\right)+11+\pi = \frac{297}{4}+\pi+\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\sqrt{z_0}\left(341(5-z_0)^k+63(13-z_0)^k\right)z_0^{-k}}{16\,k!}$$

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

1/3*1/64(((3*((1/2(227+63*sqrt13))) + 3*((1/2(785+341*sqrt5))))))+2/golden ratio

Input:

$$\frac{1}{3}\times\frac{1}{64}\left(3\left(\frac{1}{2}\left(227+63\sqrt{13}\right)\right)+3\left(\frac{1}{2}\left(785+341\sqrt{5}\right)\right)\right)+\frac{2}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{2}{\phi}+\frac{1}{192}\left(\frac{3}{2}\left(785+341\sqrt{5}\right)+\frac{3}{2}\left(227+63\sqrt{13}\right)\right)$$

Decimal approximation:

16.873950092200255414706354613168826554964700740703563094 40...

16.87395…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternate forms:

$$\frac{1}{384}\left(2652+1407\sqrt{5}+189\sqrt{13}\right)$$

$$\frac{1}{128}\left(884+469\sqrt{5}+63\sqrt{13}\right)$$

$$\frac{469\sqrt{5}}{128}+\frac{63\sqrt{13}}{128}+\frac{221}{32}$$

Minimal polynomial:

$$4194304x^4-115867648x^3+610798592x^2+2616258112x-1408226741$$

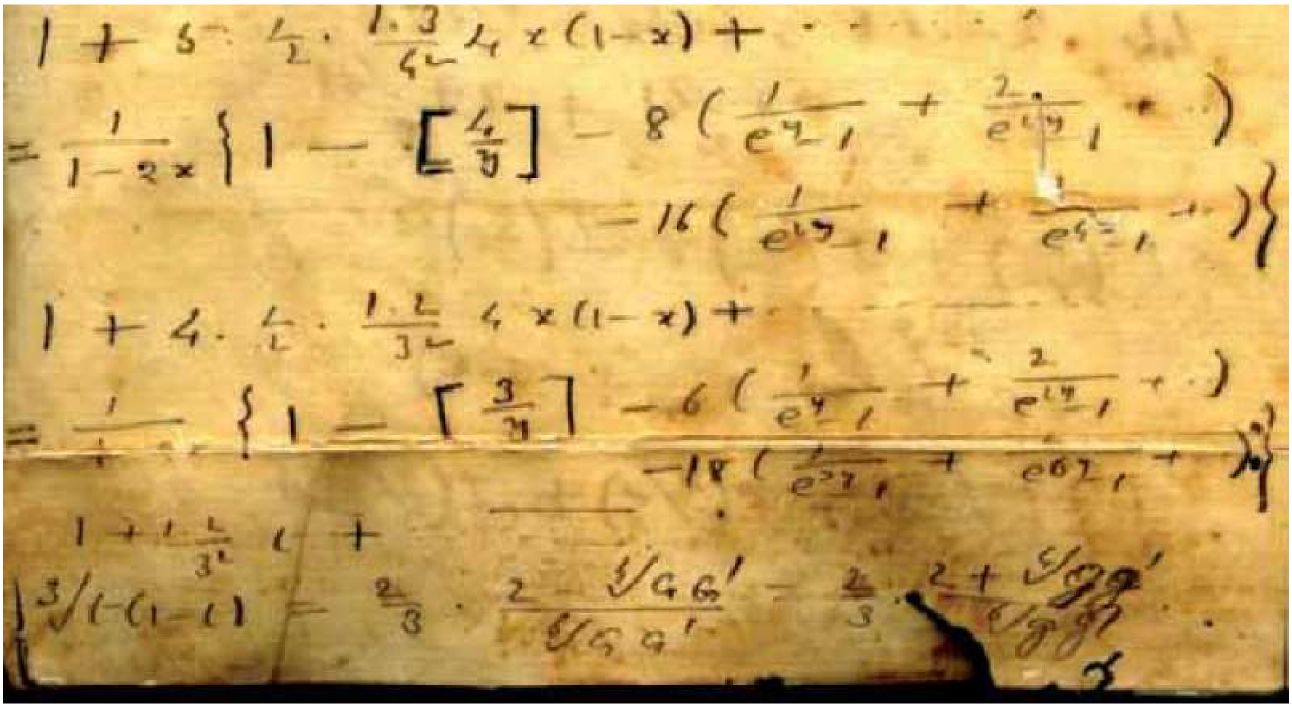
Series representations:

$$\frac{\frac{3}{2}(227+63\sqrt{13})+\frac{3}{2}(785+341\sqrt{5})}{64\times 3}+\frac{2}{\phi}=$$
$$\frac{253}{32}+\frac{2}{\phi}+\sum_{k=0}^{\infty}2^{-7-2k}\times 3^{-k}\binom{\frac{1}{2}}{k}\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)$$

$$\frac{\frac{3}{2}(227+63\sqrt{13})+\frac{3}{2}(785+341\sqrt{5})}{64\times 3}+\frac{2}{\phi}=$$
$$\frac{253}{32}+\frac{2}{\phi}+\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{3}\right)^k 2^{-7-2k}\left(-\frac{1}{2}\right)_k\left(341\times 3^k\sqrt{4}+63\sqrt{12}\right)}{k!}$$

$$\frac{\frac{3}{2}(227+63\sqrt{13})+\frac{3}{2}(785+341\sqrt{5})}{64\times 3}+\frac{2}{\phi}=$$
$$\frac{253}{32}+\frac{2}{\phi}+\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\sqrt{z_0}\left(341(5-z_0)^k+63(13-z_0)^k\right)z_0^{-k}}{128\,k!}$$
$$\text{for not}\left((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0)\right)$$

From:



We obtain:

1+5*(1/2)*(1*3)/(4^2)*((4*2(1-2)))

Input:

$$1+5\times\frac{1}{2}\times\frac{1\times 3}{4^2}(4\times 2(1-2))$$

Exact result:

$$-\frac{11}{4}$$

Decimal form:

$$-2.75$$

-2.75

1+4*(1/2)*(1*2)/(3^2)*((4*2(1-2)))

Input:

$$1+4\times\frac{1}{2}\times\frac{1\times 2}{3^2}(4\times 2(1-2))$$

Exact result:

$$-\frac{23}{9}$$

Decimal approximation:

-2.5555555555555555555555555555555555555555555555555555555555...

-2.5555...

And:

1+5*(1/2)*(1*3)/(4^2)*((4*2(1-2))) + (((1+4*(1/2)*(1*2)/(3^2)*((4*2(1-2))))))

Input:

$$1+5\times\frac{1}{2}\times\frac{1\times3}{4^2}(4\times2(1-2))+\left(1+4\times\frac{1}{2}\times\frac{1\times2}{3^2}(4\times2(1-2))\right)$$

Exact result:

$$-\frac{191}{36}$$

Decimal approximation:

-5.3055555555555555555555555555555555555555555555555555555555...

-5.305555…

We have that:

-Pi*[(((1+5*(1/2)*(1*3)/(4^2)*((4*2(1-2)))))) + (((1+4*(1/2)*(1*2)/(3^2)*((4*2(1-2))))))]

Input:

$$-\pi\left(\left(1+5\times\frac{1}{2}\times\frac{1\times3}{4^2}(4\times2(1-2))\right)+\left(1+4\times\frac{1}{2}\times\frac{1\times2}{3^2}(4\times2(1-2))\right)\right)$$

Result:

$$\frac{191\,\pi}{36}$$

Decimal approximation:

16.667894356545847459621246839066251413379426535573478105720...

16.667894356…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$\frac{191\,\pi}{36}$ is a transcendental number

Alternative representations:

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=-180°\left(2-\frac{32}{9}-\frac{60}{4^2}\right)$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=i\log(-1)\left(2-\frac{32}{9}-\frac{60}{4^2}\right)$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=-\cos^{-1}(-1)\left(2-\frac{32}{9}-\frac{60}{4^2}\right)$$

Series representations:

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\frac{191}{9}\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\sum_{k=0}^{\infty}-\frac{191(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{9(1+2k)}$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\frac{191}{36}\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations:

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\frac{191}{9}\int_0^1\sqrt{1-t^2}\,dt$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\frac{191}{18}\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$-\pi\left(\left(1+\frac{(5(4\times 2(1-2)))3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))2}{2\times 3^2}\right)\right)=\frac{191}{18}\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

-[(((1+5*(1/2)*(1*3)/(4^2)*((4*2(1-2)))))) + (((1+4*(1/2)*(1*2)/(3^2)*((4*2(1-2))))))]^3-18-7+1/golden ratio

where 18 and 7 are Lucas numbers

Input:

$$-\left(\left(1+5\times\frac{1}{2}\times\frac{1\times 3}{4^2}(4\times 2(1-2))\right)+\left(1+4\times\frac{1}{2}\times\frac{1\times 2}{3^2}(4\times 2(1-2))\right)\right)^3-18-7+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+\frac{5801471}{46656}$$

Decimal approximation:

124.96369156762506631596864719101858736326214731423648988 54...

124.9636915…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{5778143+23328\sqrt{5}}{46656}$$

$$\frac{5801471\,\phi+46656}{46656\,\phi}$$

$$\frac{\sqrt{5}}{2}+\frac{5778143}{46656}$$

Alternative representations:

$$-\left(\left(1+\frac{(5(4\times 2(1-2)))\,3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))\,2}{2\times 3^2}\right)\right)^3-18-7+\frac{1}{\phi}=$$
$$-25-\left(2-\frac{32}{9}-\frac{60}{4^2}\right)^3+\frac{1}{2\sin(54\,^\circ)}$$

$$-\left(\left(1+\frac{(5(4\times 2(1-2)))\,3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))\,2}{2\times 3^2}\right)\right)^3-18-7+\frac{1}{\phi}=$$
$$-25+-\frac{1}{2\cos(216\,^\circ)}-\left(2-\frac{32}{9}-\frac{60}{4^2}\right)^3$$

$$-\left(\left(1+\frac{(5(4\times 2(1-2)))\,3}{2\times 4^2}\right)+\left(1+\frac{(4(4\times 2(1-2)))\,2}{2\times 3^2}\right)\right)^3-18-7+\frac{1}{\phi}=$$
$$-25-\left(2-\frac{32}{9}-\frac{60}{4^2}\right)^3+-\frac{1}{2\sin(666\,^\circ)}$$

-[(((1+5*(1/2)*(1*3)/(4^2)*((4*2(1-2)))))) + (((1+4*(1/2)*(1*2)/(3^2)*((4*2(1-2)))))))]^3-13+(((5+sqrt5)/2))-1/golden ratio

Input:

$$-\left(\left(1+5\times\frac{1}{2}\times\frac{1\times 3}{4^2}(4\times 2(1-2))\right)+\left(1+4\times\frac{1}{2}\times\frac{1\times 2}{3^2}(4\times 2(1-2))\right)\right)^3-$$
$$13+\frac{1}{2}\left(5+\sqrt{5}\right)-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

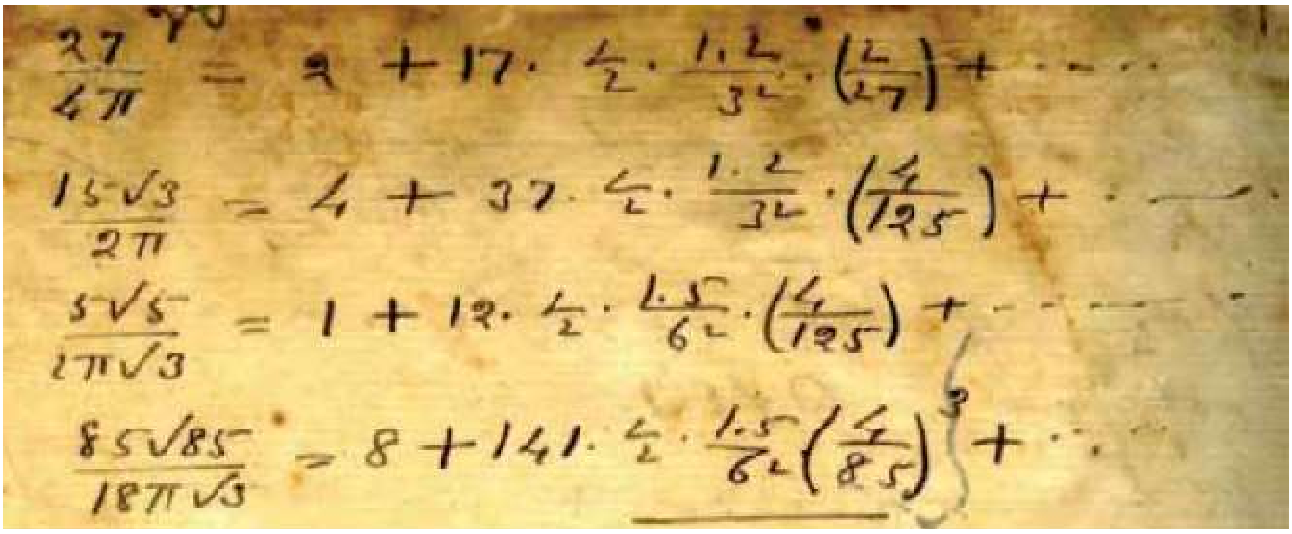
$$\frac{6501311}{46656}$$

Decimal approximation:

139.3456575788751714677640603566529492455418381344307270233...

139.3456575.... result practically equal to the rest mass of Pion meson 139.57 MeV

Page 29



$$\frac{27}{4\pi} = 2 + 17\cdot\frac{1}{2}\cdot\frac{1.2}{3^2}\cdot\left(\frac{2}{27}\right) + \cdots$$
$$\frac{15\sqrt{3}}{2\pi} = 4 + 37\cdot\frac{1}{2}\cdot\frac{1.2}{3^2}\cdot\left(\frac{4}{125}\right) + \cdots$$
$$\frac{5\sqrt{5}}{2\pi\sqrt{3}} = 1 + 12\cdot\frac{1}{2}\cdot\frac{1.5}{6^2}\cdot\left(\frac{4}{125}\right) + \cdots$$
$$\frac{85\sqrt{85}}{18\pi\sqrt{3}} = 8 + 141\cdot\frac{1}{2}\cdot\frac{1.5}{6^2}\left(\frac{4}{85}\right)^3 + \cdots$$

27/(4Pi)+(15sqrt3)/(2Pi)+(5sqrt5)/(2Pi*sqrt3)+(85sqrt85)/(18Pi*sqrt3)

Input:

$$\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}$$

Result:

$$\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}$$

Decimal approximation:

15.311919692398534271929862470325999307248862663070237313 85...

15.311919…

Property:

$\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}$ is a transcendental number

Alternate forms:

$$\frac{729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}}{108\pi}$$

$$\frac{243+270\sqrt{3}+30\sqrt{15}+170\sqrt{\frac{85}{3}}}{36\pi}$$

$$\frac{\frac{27}{4}+\frac{5\sqrt{\frac{5}{3}}}{2}+\frac{15\sqrt{3}}{2}+\frac{85\sqrt{\frac{85}{3}}}{18}}{\pi}$$

Series representations:

$$\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}=$$
$$\left(243\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+270\sqrt{2}^2\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)^2+90\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+170\sqrt{84}\sum_{k=0}^{\infty}84^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(36\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}=$$
$$\left(243\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+270\sqrt{2}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+90\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+170\sqrt{84}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{84}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(36\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}=$$

$$\left(243\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+270\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)^2+\right.$$
$$\left.90\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+170\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(85-z_0)^k z_0^{-k}}{k!}\right)/$$
$$\left(36\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

(2+17*1/2*2/9*2/27)+(4+37/2*2/9*4/125)+(1+12/2*5/36*4/125)+((8+141/2*5/36*(4/85)^3))

Input:

$$\left(2+17\times\frac{1}{2}\times\frac{2}{9}\times\frac{2}{27}\right)+\left(4+\frac{37}{2}\times\frac{2}{9}\times\frac{4}{125}\right)+\left(1+\frac{12}{2}\times\frac{5}{36}\times\frac{4}{125}\right)+\left(8+\frac{141}{2}\times\frac{5}{36}\left(\frac{4}{85}\right)^3\right)$$

Exact result:

$$\frac{2283130033}{149232375}$$

Decimal approximation:

15.29916033970510755457721556733249068776128504287357217225...

15.299160339…

3/2+(((27/(4Pi)+(15sqrt3)/(2Pi)+(5sqrt5)/(2Pi*sqrt3)+(85sqrt85)/(18Pi*sqrt3))))

Input:

$$\frac{3}{2}+\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)$$

Result:

$$\frac{3}{2}+\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}$$

Decimal approximation:

16.811919692398534271929862470325999307248862663070237313385...

16.81191969…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$$\frac{3}{2}+\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\text{ is a transcendental number}$$

Alternate forms:

$$\frac{162\pi+729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}}{108\pi}$$

$$\frac{3}{2}+\frac{729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}}{108\pi}$$

$$\frac{243+270\sqrt{3}+30\sqrt{15}+170\sqrt{\frac{85}{3}}+54\pi}{36\pi}$$

Series representations:

$$\frac{3}{2}+\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)=\left(243\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+54\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+270\sqrt{2}^2\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)^2+90\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+170\sqrt{84}\sum_{k=0}^{\infty}84^{-k}\binom{\frac{1}{2}}{k}\right)\Bigg/\left(36\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{3}{2}+\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)=\left(243\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+54\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+270\sqrt{2}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+90\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+170\sqrt{84}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{84}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(36\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{3}{2}+\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)=$$

$$\left(243\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+54\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+\right.$$
$$270\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)^2+$$
$$\left.90\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+170\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(85-z_0)^k z_0^{-k}}{k!}\right)\Bigg/$$
$$\left(36\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

3/2+(89-8)*(((27/(4Pi)+(15sqrt3)/(2Pi)+(5sqrt5)/(2Pi*sqrt3)+(85sqrt85)/(18Pi*sqrt3))))-11+golden ratio

where 11 is a Lucas number

Input:

$$\frac{3}{2}+(89-8)\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)-11+\phi$$

ϕ is the golden ratio

Result:

$$\phi-\frac{19}{2}+81\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right)$$

Decimal approximation:

1232.383529073031170874523446930771582004878184888494985284...

1232.383529….result very near to the rest mass of Delta baryon 1232

Property:

$$-\frac{19}{2}+\phi+81\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right)$$ is a transcendental number

Alternate forms:

$$\frac{2187+2430\sqrt{3}+270\sqrt{15}+510\sqrt{255}-36\pi+2\sqrt{5}\,\pi}{4\pi}$$

$$-9+\frac{\sqrt{5}}{2}+\frac{3\left(729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}\right)}{4\pi}$$

$$\frac{4\pi\phi+9\left(243+270\sqrt{3}+30\sqrt{15}+170\sqrt{\frac{85}{3}}\right)-38\pi}{4\pi}$$

Series representations:

$$\frac{3}{2}+(89-8)\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)-11+\phi=$$
$$\left(2187\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}-38\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+\right.$$
$$4\phi\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+2430\sqrt{2}^{2}\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)^{2}+$$
$$\left.810\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+1530\sqrt{84}\sum_{k=0}^{\infty}84^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(4\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{3}{2}+(89-8)\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)-11+\phi=$$
$$\left(2187\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}-38\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}+4\phi\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}+\right.$$
$$2430\sqrt{2}^{2}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)^{2}+810\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}+$$
$$\left.1530\sqrt{84}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{84}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)\Big/\left(4\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{3}{2}+(89-8)\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)-11+\phi=$$

$$\left(2187\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}-38\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+4\phi\pi\right.$$
$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+2430\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)^2+$$
$$\left.810\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+1530\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(85-z_0)^k z_0^{-k}}{k!}\right)/$$
$$\left(4\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\quad \text{for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\leq 0))$$

3/2+8*(((27/(4Pi)+(15sqrt3)/(2Pi)+(5sqrt5)/(2Pi*sqrt3)+(85sqrt85)/(18Pi*sqrt3))))+golden ratio

Input:

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+\phi$$

ϕ is the golden ratio

Result:

$$\phi+\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right)$$

Decimal approximation:

125.61339152793816902364348659697363257571121048436766137290...

125.6133915…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$$\frac{3}{2}+\phi+8\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right) \text{ is a transcendental number}$$

Alternate forms:

$$\frac{2916+3240\sqrt{3}+360\sqrt{15}+680\sqrt{255}+108\pi+27\sqrt{5}\,\pi}{54\pi}$$

$$\frac{18\pi\phi+4\left(243+270\sqrt{3}+30\sqrt{15}+170\sqrt{\frac{85}{3}}\right)+27\pi}{18\pi}$$

$$\frac{1}{2}\left(4+\sqrt{5}\right)+\frac{2\left(729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}\right)}{27\pi}$$

Series representations:

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+\phi=\left(972\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+27\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+18\phi\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+1080\sqrt{2}^2\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)^2+360\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+680\sqrt{84}\sum_{k=0}^{\infty}84^{-k}\binom{\frac{1}{2}}{k}\right)\Bigg/\left(18\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+\phi=\left(972\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+27\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+18\phi\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+1080\sqrt{2}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+360\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+680\sqrt{84}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{84}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(18\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+\phi = \left(972\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+27\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+18\phi\pi \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+1080\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)^2+ 360\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+680\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(85-z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(18\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right) \quad \text{for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$$

3/2+8*(((27/(4Pi)+(15sqrt3)/(2Pi)+(5sqrt5)/(2Pi*sqrt3)+(85sqrt85)/(18Pi*sqrt3))))+13+golden ratio^2

where 13 is a Fibonacci number

Input:

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+13+\phi^2$$

ϕ is the golden ratio

Result:

$$\phi^2+\frac{29}{2}+8\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right)$$

Decimal approximation:

139.6133915279381690236434865969736325757112104843676613729...

139.6133915…. result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$$\frac{29}{2}+\phi^2+8\left(\frac{27}{4\pi}+\frac{5\sqrt{\frac{5}{3}}}{2\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{85\sqrt{\frac{85}{3}}}{18\pi}\right)$$ is a transcendental number

Alternate forms:

$$\frac{2916+3240\sqrt{3}+360\sqrt{15}+680\sqrt{255}+864\pi+27\sqrt{5}\,\pi}{54\pi}$$

$$\frac{1}{2}\left(32+\sqrt{5}\right)+\frac{2\left(729+810\sqrt{3}+90\sqrt{15}+170\sqrt{255}\right)}{27\pi}$$

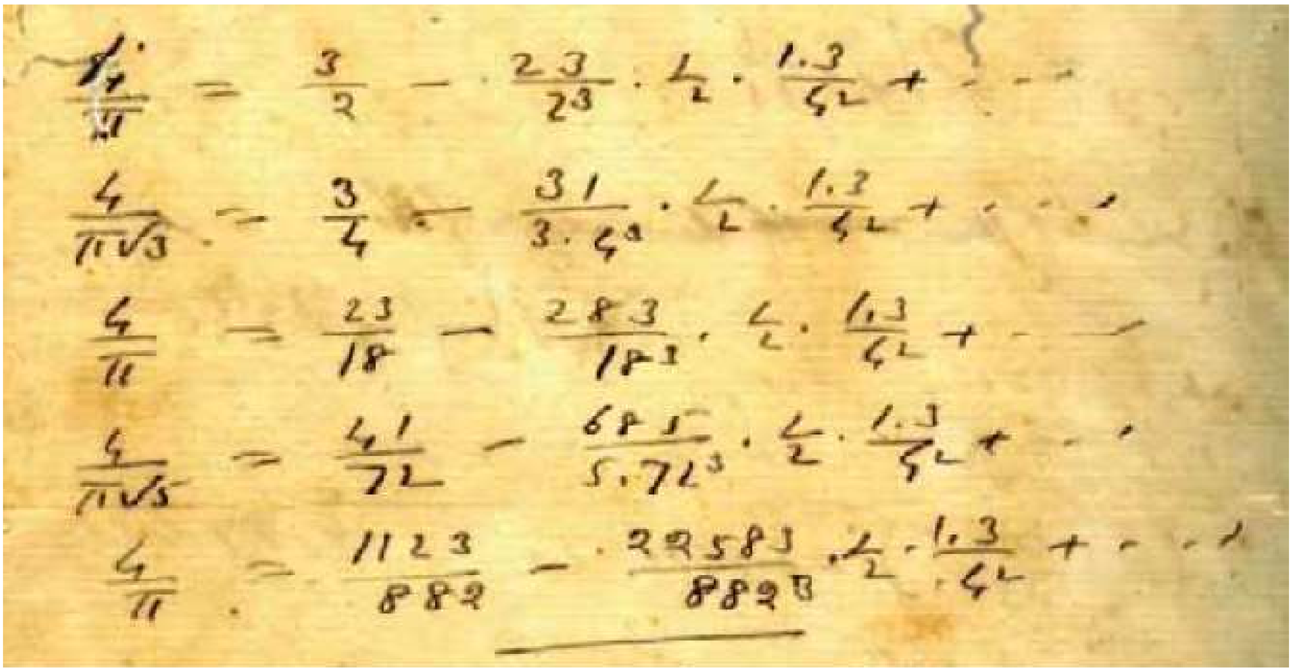
$$\frac{18\pi\phi^2+4\left(243+270\sqrt{3}+30\sqrt{15}+170\sqrt{\frac{85}{3}}\right)+261\pi}{18\pi}$$

Series representations:

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+13+\phi^2=$$
$$\left(972\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+261\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+18\phi^2\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+1080\sqrt{2}^2\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)^2+360\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+680\sqrt{84}\sum_{k=0}^{\infty}84^{-k}\binom{\frac{1}{2}}{k}\right)\Bigg/\left(18\pi\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+13+\phi^2=$$
$$\left(972\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+261\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+18\phi^2\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+1080\sqrt{2}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)^2+360\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+680\sqrt{84}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{84}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(18\pi\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{3}{2}+8\left(\frac{27}{4\pi}+\frac{15\sqrt{3}}{2\pi}+\frac{5\sqrt{5}}{2\pi\sqrt{3}}+\frac{85\sqrt{85}}{18\pi\sqrt{3}}\right)+13+\phi^2=$$
$$\left(972\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+261\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+18\phi^2\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}+1080\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)^2+360\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+680\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(85-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(18\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$



4/Pi + 4/(Pi*sqrt3)+4/Pi+4/(Pi*sqrt5)+4/Pi

Input:

$$\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}$$

Result:

$$\frac{12}{\pi}+\frac{4}{\sqrt{3}\,\pi}+\frac{4}{\sqrt{5}\,\pi}$$

Decimal approximation:

5.124233862834952437916389126480679729385324157339742089990...

5.1242338628…

Property:

$\frac{12}{\pi}+\frac{4}{\sqrt{3}\,\pi}+\frac{4}{\sqrt{5}\,\pi}$ is a transcendental number

Alternate forms:

$$\frac{180+20\sqrt{3}+12\sqrt{5}}{15\pi}$$

$$\frac{12 + \frac{4}{\sqrt{3}} + \frac{4}{\sqrt{5}}}{\pi}$$

$$\frac{4\left(3 + \sqrt{\frac{2}{15}\left(4 + \sqrt{15}\right)}\right)}{\pi}$$

Series representations:

$$\frac{4}{\pi} + \frac{4}{\pi\sqrt{3}} + \frac{4}{\pi} + \frac{4}{\pi\sqrt{5}} + \frac{4}{\pi} = \left(4\left(\sqrt{2}\sum_{k=0}^{\infty} 2^{-k}\binom{\frac{1}{2}}{k} + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 3\sqrt{2}\sqrt{4}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty} 2^{-k_1-2k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\right)\right) \Big/ \left(\pi\sqrt{2}\sqrt{4}\left(\sum_{k=0}^{\infty} 2^{-k}\binom{\frac{1}{2}}{k}\right)\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{4}{\pi} + \frac{4}{\pi\sqrt{3}} + \frac{4}{\pi} + \frac{4}{\pi\sqrt{5}} + \frac{4}{\pi} = \left(4\left(\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!} + \sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!} + 3\sqrt{2}\sqrt{4}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\,2^{-k_1-2k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right)\right) \Big/ \left(\pi\sqrt{2}\sqrt{4}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{4}{\pi} + \frac{4}{\pi\sqrt{3}} + \frac{4}{\pi} + \frac{4}{\pi\sqrt{5}} + \frac{4}{\pi} = \left(4\left(2\sqrt{\pi}\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s) + 2\sqrt{\pi}\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s) + 3\sum_{j_1=0}^{\infty}\sum_{j_2=0}^{\infty}\left(\operatorname{Res}_{s=-\frac{1}{2}+j_1} 2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)\left(\operatorname{Res}_{s=-\frac{1}{2}+j_2} 4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)\right)\right) \Big/ \left(\pi\left(\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)$$

((1123/882-((22583/882^3)*1/2*3/16))) + ((41/72-(685)/(5*72^3)*1/2*3/16)) +

((23/18-283/(18)^3*1/2*3/16)) + ((3/4-(31)/(3*4^3)*1/2*3/16)) + (3/2-23/8*1/2*3/16)

Input:

$$\left(\frac{1123}{882}-\frac{22583}{882^3}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{41}{72}-\frac{685}{5\times72^3}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{23}{18}-\frac{283}{18^3}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{3}{4}-\frac{31}{3\times4^3}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{3}{2}-\frac{23}{8}\times\frac{1}{2}\times\frac{3}{16}\right)$$

Exact result:

$$\frac{2380025490751}{468397375488}$$

Decimal approximation:

5.081210133321881778135331548922446894852572381115382378083...

5.0812101333...

Pi*((4/Pi + 4/(Pi*sqrt3)+4/Pi+4/(Pi*sqrt5)+4/Pi))+1/golden ratio

Input:

$$\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+\left(\frac{12}{\pi}+\frac{4}{\sqrt{3}\,\pi}+\frac{4}{\sqrt{5}\,\pi}\right)\pi$$

Decimal approximation:

16.71628944750822966336852089135848892866321087257549094562...

16.71628944…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternate forms:

$$\frac{1}{30}\left(345+40\sqrt{3}+39\sqrt{5}\right)$$

$$\frac{1}{30}\left(345+\sqrt{15\left(827+208\sqrt{15}\right)}\right)$$

$$\frac{1}{2}\left(23+\sqrt{\frac{1}{15}\left(827+208\sqrt{15}\right)}\right)$$

Series representations:

$$\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}=12+\frac{1}{\phi}+\frac{4}{\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}+\frac{4}{\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}}$$

$$\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}=$$
$$12+\frac{1}{\phi}+\frac{4}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}+\frac{4}{\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}=$$
$$12+\frac{1}{\phi}+\frac{4}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{4}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}}$$

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

8Pi*((4/Pi + 4/(Pi*sqrt3)+4/Pi+4/(Pi*sqrt5)+4/Pi))+1/golden ratio-4

where 4 is a Lucas number

Input:

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}-4$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}-4+8\left(\frac{12}{\pi}+\frac{4}{\sqrt{3}\,\pi}+\frac{4}{\sqrt{5}\,\pi}\right)\pi$$

Decimal approximation:

125.4040776588165733695160592903084446052635227219635875300...

125.40407765…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternate forms:

$$\frac{1}{30}\left(2745+320\sqrt{3}+207\sqrt{5}\right)$$

$$\frac{183}{2}+\frac{32}{\sqrt{3}}+\frac{69}{2\sqrt{5}}$$

$$\frac{1}{2}\left(183+\sqrt{\frac{1}{15}\left(34763+8832\sqrt{15}\right)}\right)$$

Series representations:

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}-4=92+\frac{1}{\phi}+\frac{32}{\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}}+\frac{32}{\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}}$$

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}-4=92+\frac{1}{\phi}+\frac{32}{\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}+\frac{32}{\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+\frac{1}{\phi}-4=92+\frac{1}{\phi}+\frac{32}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{32}{\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}}$$

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

8Pi*((4/Pi + 4/(Pi*sqrt3)+4/Pi+4/(Pi*sqrt5)+4/Pi))+11

where 11 is a Lucas number

Input:

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+11$$

Result:

$$11+8\left(\frac{12}{\pi}+\frac{4}{\sqrt{3}\,\pi}+\frac{4}{\sqrt{5}\,\pi}\right)\pi$$

Decimal approximation:

139.7860436700666785213114724559428064875432135421578246679...

139.78604367…. result practically equal to the rest mass of Pion meson 139.57 MeV

Alternate forms:

$$\frac{1}{15}\left(1605+160\sqrt{3}+96\sqrt{5}\right)$$

$$107+\frac{32}{\sqrt{3}}+\frac{32}{\sqrt{5}}$$

$$107+32\sqrt{\frac{2}{15}\left(4+\sqrt{15}\right)}$$

Series representations:

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+11=\left(32\sqrt{2}\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}+32\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+107\sqrt{2}\sqrt{4}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}2^{-k_1-2k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\right)\Bigg/\left(\sqrt{2}\sqrt{4}\left(\sum_{k=0}^{\infty}2^{-k}\binom{\frac{1}{2}}{k}\right)\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)$$

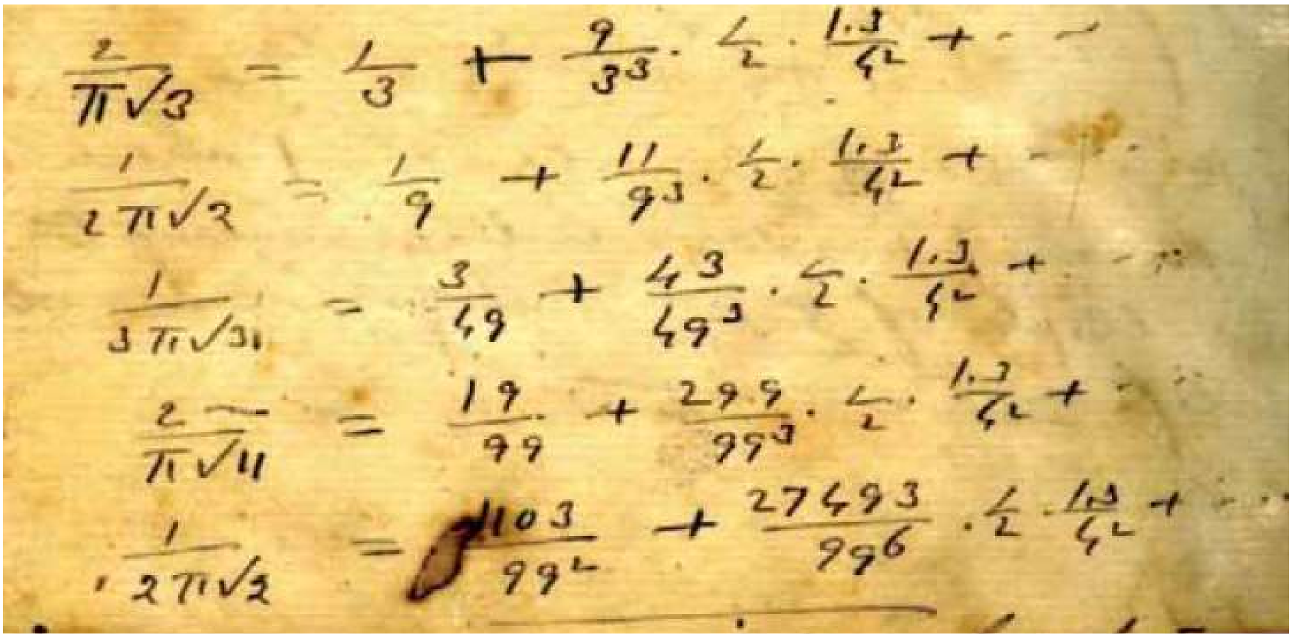
$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+11=\left(32\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+32\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+107\sqrt{2}\sqrt{4}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\,2^{-k_1-2k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right)\Bigg/\left(\sqrt{2}\sqrt{4}\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$8\pi\left(\frac{4}{\pi}+\frac{4}{\pi\sqrt{3}}+\frac{4}{\pi}+\frac{4}{\pi\sqrt{5}}+\frac{4}{\pi}\right)+11=$$

$$\left(64\sqrt{\pi}\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)+64\sqrt{\pi}\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)+\right.$$

$$\left.107\sum_{j_1=0}^{\infty}\sum_{j_2=0}^{\infty}\left(\text{Res}_{s=-\frac{1}{2}+j_1}\,2^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)\left(\text{Res}_{s=-\frac{1}{2}+j_2}\,4^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)\right)\right)/$$

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



2/(Pi*sqrt3)+1/(2Pi*sqrt2)+1/(3Pi*sqrt3)+2/(Pi*sqrt11)+1/(2Pi*sqrt2)

Input:

$$\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}$$

Result:

$$\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}$$

Decimal approximation:

0.845838525696454036831543849152703273533087829859884972722...

0.845838525…

Property:

$\frac{1}{\sqrt{2}\,\pi} + \frac{7}{3\sqrt{3}\,\pi} + \frac{2}{\sqrt{11}\,\pi}$ is a transcendental number

Alternate forms:

$$\frac{198\sqrt{2} + 308\sqrt{3} + 72\sqrt{11}}{396\,\pi}$$

$$\frac{\frac{1}{\sqrt{2}} + \frac{7}{3\sqrt{3}} + \frac{2}{\sqrt{11}}}{\pi}$$

$$\frac{99\sqrt{2} + 154\sqrt{3} + 36\sqrt{11}}{198\,\pi}$$

Series representations:

$$\frac{2}{\pi\sqrt{3}} + \frac{1}{2\pi\sqrt{2}} + \frac{1}{3\pi\sqrt{3}} + \frac{2}{\pi\sqrt{11}} + \frac{1}{2\pi\sqrt{2}} = \left(6\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(2-z_0)^{k_1}(3-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!} + 7\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(2-z_0)^{k_1}(11-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!} + 3\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(3-z_0)^{k_1}(11-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!}\right) \Big/ \left(3\pi\sqrt{z_0}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}\right) \quad \text{for not } ((z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\frac{2}{\pi\sqrt{3}} + \frac{1}{2\pi\sqrt{2}} + \frac{1}{3\pi\sqrt{3}} + \frac{2}{\pi\sqrt{11}} + \frac{1}{2\pi\sqrt{2}} =$$

$$\left(6\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\right.$$

$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(2-x)^{k_1}(3-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!} +$$

$$7\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)$$

$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(2-x)^{k_1}(11-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!} +$$

$$3\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)$$

$$\left.\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}(3-x)^{k_1}(11-x)^{k_2}x^{-k_1-k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}}{k_1!\,k_2!}\right) \Big/$$

$$\left(3\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)\right.$$

$$\sqrt{x}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k(11-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \text{ for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{2}{\pi\sqrt{3}} + \frac{1}{2\pi\sqrt{2}} + \frac{1}{3\pi\sqrt{3}} + \frac{2}{\pi\sqrt{11}} + \frac{1}{2\pi\sqrt{2}} =$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor}\right.$$
$$z_0^{-1/2-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor-1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor}$$
$$\left(6\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor}\right.$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(2-z_0)^{k_1}(3-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!} +$$
$$7\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(2-z_0)^{k_1}(11-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!} +$$
$$3\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor}$$
$$\left.\left.\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}(3-z_0)^{k_1}(11-z_0)^{k_2} z_0^{-k_1-k_2}}{k_1!\,k_2!}\right)\right) \Big/$$
$$\left(3\pi\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}\right)\right.$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}\right)$$

(1/3+9/27*1/2*3/16)+(1/9+11/729*1/2*3/16)+((3/49+(4^3)/(49^3)*1/2*3/16))+((19/99+299/(99^3)*1/2*3/16))+((1103/(99^2)+27493/(99^6)*1/2*3/16))

Input:

$$\left(\frac{1}{3}+\frac{9}{27}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{1}{9}+\frac{11}{729}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{3}{49}+\frac{4^3}{49^3}\times\frac{1}{2}\times\frac{3}{16}\right)+$$
$$\left(\frac{19}{99}+\frac{299}{99^3}\times\frac{1}{2}\times\frac{3}{16}\right)+\left(\frac{1103}{99^2}+\frac{27493}{99^6}\times\frac{1}{2}\times\frac{3}{16}\right)$$

Exact result:

$$\frac{248\,960\,158\,008\,103\,579}{295\,371\,194\,925\,008\,664}$$

Decimal approximation:

0.842872163182031641894635541627382759851450806990937141160...

0.84287216...

12/(((2/(Pi*sqrt3)+1/(2Pi*sqrt2)+1/(3Pi*sqrt3)+2/(Pi*sqrt11)+1/(2Pi*sqrt2))))+golden ratio^2

Input:

$$\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+\phi^2$$

ϕ is the golden ratio

Result:

$$\phi^2+\frac{12}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}$$

Decimal approximation:

16.80513901582268446007768812930409108861965630118573720090...

16.8051139015…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Property:

$$\phi^2+\frac{12}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{125\,234}\left(-7\,106\,616\sqrt{2}\,\pi+6\,264\,720\sqrt{3}\,\pi-3\,004\,128\sqrt{11}\,\pi+1\,197\,504\sqrt{66}\,\pi+187\,851+62\,617\sqrt{5}\right)$$

$$\phi^2+\frac{2376\,\pi}{99\sqrt{2}+154\sqrt{3}+36\sqrt{11}}$$

$$\phi^2+\frac{36\sqrt{66}\,\pi}{3\sqrt{33}+\sqrt{2}\,(6\sqrt{3}+7\sqrt{11})}$$

Series representations:

$$\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+\phi^2 = \phi^2+12\Bigg/\left(\frac{1}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7}{3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{2}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right) \quad \text{for not } ((z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$$

$$\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+\phi^2 = \phi^2+12\Bigg/\left(\frac{1}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{7}{3\pi\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{2}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(11-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right) \quad \text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+\phi^2 = \phi^2+12\Bigg/\left(\frac{\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(3-z_0)/(2\pi)\rfloor)}}{3\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{2\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(11-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right)$$

8*12/(((2/(Pi*sqrt3)+1/(2Pi*sqrt2)+1/(3Pi*sqrt3)+2/(Pi*sqrt11)+1/(2Pi*sqrt2))))+11 +1/golden ratio

where 8 is a Fibonacci number and 11 is a Lucas number

Input:

$$8\times\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+11+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

$$\frac{1}{\phi}+11+\frac{96}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}$$

Decimal approximation:

125.11487420533221174318939719387326188491508615084555757 22...

125.1148742…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Property:

$$11+\frac{1}{\phi}+\frac{96}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{125\,234}\left(1\,314\,957+62\,617\sqrt{5}-56\,852\,928\sqrt{2}\,\pi+50\,117\,760\sqrt{3}\,\pi-24\,033\,024\sqrt{11}\,\pi+9\,580\,032\sqrt{66}\,\pi\right)$$

$$\frac{1}{\phi}+11+\frac{19\,008\,\pi}{99\sqrt{2}+154\sqrt{3}+36\sqrt{11}}$$

$$\frac{1}{\phi}+11+\frac{288\sqrt{66}\,\pi}{3\sqrt{33}+\sqrt{2}\left(6\sqrt{3}+7\sqrt{11}\right)}$$

Series representations:

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+11+\frac{1}{\phi}=11+\frac{1}{\phi}+$$
$$96\Bigg/\left(\frac{1}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7}{3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\right.$$
$$\left.\frac{2}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+11+\frac{1}{\phi}=$$
$$11+\frac{1}{\phi}+96\Bigg/\left(\frac{1}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\right.$$
$$\frac{7}{3\pi\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+$$
$$\left.\frac{2}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(11-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+96\Bigg/\left(\frac{\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(3-z_0)/(2\pi)\rfloor)}}{3\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{2\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(11-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right)$$

8*12/(((2/(Pi*sqrt3)+1/(2Pi*sqrt2)+1/(3Pi*sqrt3)+2/(Pi*sqrt11)+1/(2Pi*sqrt2))))+29-Pi

where 29 is a Lucas number

Input:

$$8\times\frac{12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+29-\pi$$

Result:

$$29+\frac{96}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}-\pi$$

Decimal approximation:

139.3552475629925236565221669762281208829976075716646888891...

139.3552475…. result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$29+\frac{96}{\frac{1}{\sqrt{2}\,\pi}+\frac{7}{3\sqrt{3}\,\pi}+\frac{2}{\sqrt{11}\,\pi}}-\pi$ is a transcendental number

Alternate forms:

$$\frac{1}{62617}\left(-28426464\sqrt{2}\,\pi+25058880\sqrt{3}\,\pi-12016512\sqrt{11}\,\pi+4790016\sqrt{66}\,\pi+1815893-62617\pi\right)$$

$$29+\left(\frac{288\sqrt{66}}{3\sqrt{33}+\sqrt{2}\,(6\sqrt{3}+7\sqrt{11})}-1\right)\pi$$

$$29-\frac{\left(-19008+99\sqrt{2}+154\sqrt{3}+36\sqrt{11}\right)\pi}{99\sqrt{2}+154\sqrt{3}+36\sqrt{11}}$$

Series representations:

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+29-\pi=29-\pi+96\Bigg/\left(\frac{1}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7}{3\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{2}{\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right)\quad\text{for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+29-\pi=29-\pi+96\Bigg/\left(\frac{1}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{7}{3\pi\exp\left(i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}+\frac{2}{\pi\exp\left(i\pi\left\lfloor\frac{\arg(11-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(11-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}\right)\quad\text{for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{8\times 12}{\frac{2}{\pi\sqrt{3}}+\frac{1}{2\pi\sqrt{2}}+\frac{1}{3\pi\sqrt{3}}+\frac{2}{\pi\sqrt{11}}+\frac{1}{2\pi\sqrt{2}}}+29-\pi=$$

$$29-\pi+96\Bigg/\left(\frac{\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}+\frac{7\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(3-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(3-z_0)/(2\pi)\rfloor)}}{3\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(3-z_0)^k z_0^{-k}}{k!}}+\frac{2\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(11-z_0)/(2\pi)\rfloor} z_0^{1/2(-1-\lfloor\arg(11-z_0)/(2\pi)\rfloor)}}{\pi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(11-z_0)^k z_0^{-k}}{k!}}\right)$$

Now, we have that, from the sum of the three results:

(0.84583852569 + 5.1242338628 + 15.311919692398) = 21.281992080888

From which:

1/10^52 ((((1+1/(0.84583852569 + 5.1242338628 + 15.311919692398)+55/10^3+(34+3)/10^4))))

where 55, 34 and 3 are Fibonacci numbers

Input interpretation:

$$\frac{1}{10^{52}}\left(1+\frac{1}{0.84583852569+5.1242338628+15.311919692398}+\frac{55}{10^3}+\frac{34+3}{10^4}\right)$$

Result:

$1.1056880825159236964966420454335110279608299810611894\ldots\times 10^{-52}$

$1.1056880825\ldots*10^{-52}$ result practically equal to the value of Cosmological Constant $1.1056*10^{-52}$ m^{-2}

(0.84583852569 + 5.1242338628 + 15.311919692398)-5+1/golden ratio

Input interpretation:

$$(0.84583852569+5.1242338628+15.311919692398)-5+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

16.900026070...

16.900026070…. result very near to the mass of the hypothetical light particle, the boson m_X = 16.84 MeV

Alternative representations:

$$(0.845838525690000 + 5.12423386280000 + 15.3119196923980000) - 5 + \frac{1}{\phi} = 16.28199208088800 + \frac{1}{2\sin(54°)}$$

$$(0.845838525690000 + 5.12423386280000 + 15.3119196923980000) - 5 + \frac{1}{\phi} = 16.28199208088800 + -\frac{1}{2\cos(216°)}$$

$$(0.845838525690000 + 5.12423386280000 + 15.3119196923980000) - 5 + \frac{1}{\phi} = 16.28199208088800 + -\frac{1}{2\sin(666°)}$$

8*(((0.84583852569 + 5.1242338628 + 15.311919692398)-5))-4-1/golden ratio

where 8 is a Fibonacci number and 4 is a Lucas number

Input interpretation:

$$8((0.84583852569 + 5.1242338628 + 15.311919692398) - 5) - 4 - \frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.63790266...

125.63790266…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representations:

$$8\left(\left(0.845838525690000+5.12423386280000+15.3119196923980000\right)-5\right)-4-\frac{1}{\phi}=126.2559366471040-\frac{1}{2\sin(54°)}$$

$$8\left(\left(0.845838525690000+5.12423386280000+15.3119196923980000\right)-5\right)-4-\frac{1}{\phi}=126.2559366471040--\frac{1}{2\cos(216°)}$$

$$8\left(\left(0.845838525690000+5.12423386280000+15.3119196923980000\right)-5\right)-4-\frac{1}{\phi}=126.2559366471040--\frac{1}{2\sin(666°)}$$

8*(((0.84583852569 + 5.1242338628 + 15.311919692398)-5))+11-golden ratio

where 11 is a Lucas number

Input interpretation:

$$8\left(\left(0.84583852569+5.1242338628+15.311919692398\right)-5\right)+11-\phi$$

ϕ is the golden ratio

Result:

139.63790266...

139.63790266.... result practically equal to the rest mass of Pion meson 139.57 MeV

Example of Ramanujan mathematics applied to the physics: DARK ENERGY AND DARK MATTER

From:

arXiv:1103.5870v3 [astro-ph.CO] 20 Apr 2011
Dark Energy
Miao Li, Xiao-Dong Li, Shuang Wang and Yi Wang

We have that:

provide a good fit to the data. For example, in [531], by using the combined Constitution+BAO+CMB data, Li *et al.* obtained the following $\chi^2_{\min}$s for the ΛCDM and HDE models

$$\chi^2_{\Lambda\text{CDM}} = 467.775, \quad \chi^2_{\text{HDE}} = 465.912. \tag{15.23}$$

So the HDE model is consistent with the current observations. Similar results have been obtained in e.g. [532,533,534,535]. Therefore, from the perspective of current observations, HDE is a competitive model.

and:

- Testing the DGP model from the growth of structure

As a modified gravity scenario, the growth of structure in the DGP gravity differs from that in the ΛCDM scenario. This can be used to test the DGP model [440,554]. The perturbation theory in the DGP model has been studied [555,556,557,558]. These studies showed that the DGP gravity is disfavored by the observational data. For examples, in [556], Song *et al.* showed that the constraints from SNIa+CMB+H_0 exclude the simplest flat DGP model at about 3σ. Even including spatial curvature, best-fit open DGP model is a marginally poorer fit to the data than the flat ΛCDM model. In [548], Fang *et al.* showed that the DGP model is excluded at 4.9σ and 5.8σ levels with and without curvature respectively (see the right panel of Fig. 17). The corresponding $\chi^2_{\min}$s for the DGP and

and:

comparison. For example, in [535], Li *et al.* obtained the following results of $\chi^2_{\min}$s from the combination of Constitution+BAO+CMB+H_0 data

$$\chi^2_{\Lambda\mathrm{CDM}} = 468.461, \quad \chi^2_{\mathrm{RDE}} = 493.772, \quad \chi^2_{\mathrm{ADE}} = 503.039, \quad \chi^2_{\mathrm{DGP}} = 530.443. \qquad (15.54)$$

Compared with the ΛCDM model, the last three models have much larger BIC values

$$\Delta\mathrm{BIC}_{\mathrm{RDE}} = 31.308, \quad \Delta\mathrm{BIC}_{\mathrm{ADE}} = 34.578, \quad \Delta\mathrm{BIC}_{\mathrm{DGP}} = 61.982. \qquad (15.55)$$

From the formula concerning the Coefficients of the '5th order' mock theta function $\phi_0(q)$, we obtain, for n = 295:

sqrt(golden ratio) * exp(Pi*sqrt(295/30)) / (2*5^(1/4)*sqrt(295))

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi\sqrt{\frac{295}{30}}\right)}{2\sqrt[4]{5}\sqrt{295}}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{59/6}\,\pi}\sqrt{\frac{\phi}{59}}}{2\times 5^{3/4}}$$

Decimal approximation:

470.1556217797120142725623202156049658261247147361504925967...

470.1556217797…

Property:

$$\frac{e^{\sqrt{59/6}\,\pi}\sqrt{\frac{\phi}{59}}}{2\times 5^{3/4}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{10}\sqrt{\frac{1}{118}\left(5+\sqrt{5}\right)}\, e^{\sqrt{59/6}\,\pi}$$

$$\frac{\sqrt{\frac{1}{118}\left(1+\sqrt{5}\right)}\, e^{\sqrt{59/6}\,\pi}}{2\times 5^{3/4}}$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{295}{30}}\right)}{2\sqrt[4]{5}\,\sqrt{295}} = \frac{\exp\left(\pi\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{59}{6}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}}{2\sqrt[4]{5}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(295-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{295}{30}}\right)}{2\sqrt[4]{5}\,\sqrt{295}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{59}{6}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{59}{6}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(2\sqrt[4]{5}\,\exp\left(i\pi\left\lfloor\frac{\arg(295-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(295-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{295}{30}}\right)}{2\sqrt[4]{5}\,\sqrt{295}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{59}{6}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{59}{6}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{59}{6}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(295-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(295-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/\left(2\sqrt[4]{5}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(295-z_0)^k z_0^{-k}}{k!}\right)$$

Note that, from the formula concerning the Coefficients of the '5th order' mock theta function ψ_1(q), we obtain for n = 137:

sqrt(golden ratio) * exp(Pi*sqrt(137/15)) / (2*5^(1/4)*sqrt(137))

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{137}{15}}\right)}{2 \sqrt[4]{5} \sqrt{137}}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{137/15}\,\pi} \sqrt{\frac{\phi}{137}}}{2 \sqrt[4]{5}}$$

Decimal approximation:

482.7231265151071576170312716685153298676328769152818875270...

482.723126515…

Property:

$$\frac{e^{\sqrt{137/15}\,\pi} \sqrt{\frac{\phi}{137}}}{2 \sqrt[4]{5}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{2} \sqrt{\frac{5+\sqrt{5}}{1370}}\, e^{\sqrt{137/15}\,\pi}$$

$$\frac{\sqrt{\frac{1}{274}\left(1+\sqrt{5}\right)}\, e^{\sqrt{137/15}\,\pi}}{2 \sqrt[4]{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{137}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{137}} = \frac{\exp\left(\pi\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{137}{15}-z_0\right)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi-z_0)^k z_0^{-k}}{k!}}{2\sqrt[4]{5}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (137-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{137}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{137}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right) \exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{137}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{137}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \Big/ \left(2\sqrt[4]{5}\ \exp\left(i\pi\left\lfloor\frac{\arg(137-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(137-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{137}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{137}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{137}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{137}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{137}{15}-z_0\right)^k z_0^{-k}}{k!}\right) \left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(137-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(137-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(137-z_0)^k z_0^{-k}}{k!}\right)$$

We have that:

ΛCDM model are

$$\chi^2_{\Lambda\text{CDM}} = 2777.8, \qquad \chi^2_{\text{DGP}} = 2805.6. \tag{15.33}$$

sqrt(golden ratio) * exp(Pi*sqrt(199/15)) / (2*5^(1/4)*sqrt(199))

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{199}{15}}\right)}{2 \sqrt[4]{5} \sqrt{199}}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{199/15}\,\pi} \sqrt{\frac{\phi}{199}}}{2 \sqrt[4]{5}}$$

Decimal approximation:

2810.750015888997956961157609357606516464066006066267972657...

2810.750015888…

Property:

$$\frac{e^{\sqrt{199/15}\,\pi} \sqrt{\frac{\phi}{199}}}{2 \sqrt[4]{5}}$$ is a transcendental number

Alternate forms:

$$\frac{1}{2} \sqrt{\frac{5+\sqrt{5}}{1990}}\, e^{\sqrt{199/15}\,\pi}$$

$$\frac{\sqrt{\frac{1}{398}\left(1+\sqrt{5}\right)}\, e^{\sqrt{199/15}\,\pi}}{2 \sqrt[4]{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\, \exp\left(\pi \sqrt{\frac{199}{15}}\right)}{2 \sqrt[4]{5} \sqrt{199}} = \frac{\exp\left(\pi \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{199}{15}-z_0\right)^k z_0^{-k}}{k!}\right) \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi-z_0)^k z_0^{-k}}{k!}}{2 \sqrt[4]{5} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (199-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{199}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{199}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{199}{15}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{199}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \Big/ \left(2\sqrt[4]{5}\,\exp\left(i\pi\left\lfloor\frac{\arg(199-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(199-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{199}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{199}} = \left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{199}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{199}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{199}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(199-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(199-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right) \Big/ \left(2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(199-z_0)^k z_0^{-k}}{k!}\right)$$

sqrt(golden ratio) * exp(Pi*sqrt(138/15)) / (2*5^(1/4)*sqrt(138))

Input:

$$\sqrt{\phi}\times\frac{\exp\left(\pi\sqrt{\frac{138}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{138}}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{46/5}\,\pi}\sqrt{\frac{\phi}{138}}}{2\sqrt[4]{5}}$$

Decimal approximation:

497.8977459531041974813076624555103755760610234014860047731...

497.89774595…

Property:

$$\frac{e^{\sqrt{46/5}\,\pi}\sqrt{\frac{\phi}{138}}}{2\sqrt[4]{5}} \text{ is a transcendental number}$$

Alternate forms:

$$\frac{1}{4}\sqrt{\frac{1}{345}\left(5+\sqrt{5}\right)}\,e^{\sqrt{46/5}\,\pi}$$

$$\frac{\sqrt{\frac{1}{69}\left(1+\sqrt{5}\right)}\,e^{\sqrt{46/5}\,\pi}}{4\sqrt[4]{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{138}{15}}\right)}{2\sqrt[4]{5}\sqrt{138}} = \frac{\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{46}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}}{2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(138-z_0)^k z_0^{-k}}{k!}}$$

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

$$\frac{\sqrt{\phi}\exp\left(\pi\sqrt{\frac{138}{15}}\right)}{2\sqrt[4]{5}\sqrt{138}} = \left(\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{46}{5}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{46}{5}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) \Big/ \left(2\sqrt[4]{5}\exp\left(i\pi\left\lfloor\frac{\arg(138-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(138-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{138}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{138}} =$$

$$\left(\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{46}{5}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{46}{5}-z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{46}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right.$$
$$\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(138-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(138-z_0)/(2\pi)\rfloor+1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right) \Bigg/ \left(2\sqrt[4]{5}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(138-z_0)^k z_0^{-k}}{k!}\right)$$

From:

Mock ϑ-functions (of 5th order).

$$f(q)=1+\frac{q}{1+q}+\frac{q^4}{(1+q)(1+q^2)}+\dots,$$
$$\phi(q)=1+q(1+q)+q^4(1+q)(1+q^3)+q^9(1+q)(1+q^3)(1+q^5)+\dots,$$
$$\psi(q)=q+q^3(1+q)+q^6(1+q)(1+q^2)+q^{10}(1+q)(1+q^2)(1+q^3)+\dots,$$
$$\chi(q)=1+\frac{q}{1-q^2}+\frac{q^2}{(1-q^3)(1-q^4)}+\frac{q^3}{(1-q^4)(1-q^5)(1-q^6)}+\dots$$
$$=1+\frac{q}{1-q}+\frac{q^3}{(1-q^2)(1-q^3)}+\frac{q^5}{(1-q^3)(1-q^4)(1-q^5)}+\dots,$$

we obtain for q = $\sqrt[8]{11}$:

1.3495+1.3495^3(1+1.3495)+1.3495^6(1+1.3495)(1+1.3495^2)+1.3495^10(1+1.3495)(1+1.3495^2)(1+1.3495^3)

Input interpretation:

$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495)(1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495)(1 + 1.3495^2)(1 + 1.3495^3)$

Result:

506.26216333262541921841448144581963833069100147063834840 39...

506.26216333…

1.3495+1.3495^3(1+1.3495)+1.3495^6(1+1.3495)(1+1.3495^2)+1.3495^10(1+1.3495)(1+1.3495^2)(1+1.3495^3)-Pi

Input interpretation:

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi$$

Result:

503.121...

503.121…

Alternative representations:

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi = 1.3495 - 180\,° + 2.3495 \times 1.3495^3 + 2.3495 (1 + 1.3495^2) 1.3495^6 + 2.3495 (1 + 1.3495^2) (1 + 1.3495^3) 1.3495^{10}$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi = 1.3495 + i \log(-1) + 2.3495 \times 1.3495^3 + 2.3495 (1 + 1.3495^2) 1.3495^6 + 2.3495 (1 + 1.3495^2) (1 + 1.3495^3) 1.3495^{10}$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi = 1.3495 - \cos^{-1}(-1) + 2.3495 \times 1.3495^3 + 2.3495 (1 + 1.3495^2) 1.3495^6 + 2.3495 (1 + 1.3495^2) (1 + 1.3495^3) 1.3495^{10}$$

Series representations:

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi = 506.262 - 4 \sum_{k=0}^{\infty} \frac{(-1)^k}{1 + 2k}$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495) (1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495) (1 + 1.3495^2) (1 + 1.3495^3) - \pi = 508.262 - 2 \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495)(1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495)(1 + 1.3495^2)(1 + 1.3495^3) - \pi = 506.262 - \sum_{k=0}^{\infty} \frac{2^{-k} (-6 + 50 k)}{\binom{3k}{k}}$$

Integral representations:

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495)(1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495)(1 + 1.3495^2)(1 + 1.3495^3) - \pi = 506.262 - 2 \int_0^\infty \frac{1}{1 + t^2}\, dt$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495)(1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495)(1 + 1.3495^2)(1 + 1.3495^3) - \pi = 506.262 - 4 \int_0^1 \sqrt{1 - t^2}\, dt$$

$$1.3495 + 1.3495^3 (1 + 1.3495) + 1.3495^6 (1 + 1.3495)(1 + 1.3495^2) + 1.3495^{10} (1 + 1.3495)(1 + 1.3495^2)(1 + 1.3495^3) - \pi = 506.262 - 2 \int_0^\infty \frac{\sin(t)}{t}\, dt$$

Now, we have that:

$\Omega_m = 0.272$ and $h = 0.704$

$$\Omega_m = 0.27^{+0.018}_{-0.017},\ \Omega_{r_c} = 0.216^{+0.012}_{-0.013},\ \Omega_k = -0.350^{+0.080}_{-0.083},$$

In 2005, Eisenstein *et al.* [340] provided a constraint $D_V(z) = 1370 \pm 64$ Mpc at the redshift z=0.35. In 2009, the SDSS DR7 sample [351] gives $D_V(0.35)/D_V(0.2) = 1.736 \pm 0.065$. One can use this quantity to reflect the impact of the BAO data.

Lastly, we introduce the quantity $r_s(z_d)/D_V(z)$. From the SDSS and the 2dFGRS, one can extract a quantity $r_s(z_d)/D_V(z)$ at given z, where z_d denotes the redshift of the drag epoch, whose fitting formula is proposed by Eisensten and Hu [324]

$$z_d = \frac{1291(\Omega_m h^2)^{0.251}}{1 + 0.659(\Omega_m h^2)^{0.828}} \left[1 + b_1(\Omega_b h^2)^{b2}\right], \tag{13.21}$$

Thence:

$$z_d = \frac{1291(\Omega_m h^2)^{0.251}}{1+0.659(\Omega_m h^2)^{0.828}}\left[1+b_1(\Omega_b h^2)^{b2}\right], \quad (13.21)$$

where

$$b_1 = 0.313(\Omega_m h^2)^{-0.419}\left[1+0.607(\Omega_m h^2)^{0.674}\right], \quad b_2 = 0.238(\Omega_m h^2)^{0.223}. \quad (13.22)$$

0.313(0.272*0.704^2)^(-0.419)*((1+0.607(0.272*0.704^2)^0.674))

Input:

$$\frac{0.313\left(1+0.607\left(0.272\times 0.704^2\right)^{0.674}\right)}{\left(0.272\times 0.704^2\right)^{0.419}}$$

Result:

0.838735...

0.838735.... = b_1

0.238(0.272*0.704^2)^0.223

Input:

$$0.238\left(0.272\times 0.704^2\right)^{0.223}$$

Result:

0.152231...

0.152231....= b_2

((1291*(0.272*0.704^2)^0.251)) / ((1+0.659(0.272*0.704^2)^0.828)) * ((1+0.838735(0.216*0.704^2)^0.223))

Input interpretation:

$$\frac{1291\left(0.272\times 0.704^2\right)^{0.251}}{1+0.659\left(0.272\times 0.704^2\right)^{0.828}}\left(1+0.838735\left(0.216\times 0.704^2\right)^{0.223}\right)$$

Result:

1047.222807577370114890444396586870354519029226456483416899...

1047.22280 = z_d

$D_V(z) = 1370 \pm 64$ Mpc

1/1370((((((1291*(0.272*0.704^2)^0.251)) / ((1+0.659(0.272*0.704^2)^0.828)) * ((1+0.838735(0.216*0.704^2)^0.223))))))

Input interpretation:

$$\frac{1}{1370}\left(\frac{1291\,(0.272\times 0.704^2)^{0.251}}{1+0.659\,(0.272\times 0.704^2)^{0.828}}\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})\right)$$

Result:

0.764396209910489134956528756632752083590532282085024391897...

0.7643962...

We have also that, from

$$\sqrt{\frac{e\pi}{2}} = \sum_{n=0}^{\infty}\frac{1}{(2n+1)!!} + \cfrac{1}{1+\cfrac{1}{1+\cfrac{2}{1+\cfrac{3}{1+\cfrac{4}{1+\dots}}}}} \approx 2.0663656771$$

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

We note that, from the following calculations, we obtain:

1/Pi(2.0663656771) + 1/5(0.5269391135)

Input interpretation:

$$\frac{1}{\pi}\times 2.0663656771 + \frac{1}{5}\times 0.5269391135$$

Result:

0.76313244619...

0.76313244619…. result very near to the previous 0.7643962...

Alternative representations:

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=\frac{0.526939}{5}+\frac{2.06636567710000}{180\,^{\circ}}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=\frac{0.526939}{5}+-\frac{2.06636567710000}{i\log(-1)}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=\frac{0.526939}{5}+\frac{2.06636567710000}{\cos^{-1}(-1)}$$

Series representations:

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{0.516591419275000}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{1.03318283855000}{-1.00000000000000+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{2.06636567710000}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{1.03318283855000}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{0.516591419275000}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{2.06636567710000}{\pi}+\frac{0.526939}{5}=0.105388+\frac{1.03318283855000}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

Now, we have that:

$$w = -\frac{1}{3} - \frac{2}{3}\frac{\sqrt{\Omega_{de}}}{c},$$

$\Omega_{de} = 0.73$ and c = 1, c > 1 = 3; c < 1 = 1/2 or 0.9991104684, -8, -1729, -(172^3 + 1)

-1/3-2/3(sqrt0.73)

Input:

$-\frac{1}{3} - \frac{2}{3}\sqrt{0.73}$

Result:

-0.9029336...

-0.9029336...

-1/3-2/3(sqrt0.73)/(3)

Input:

$-\frac{1}{3} - \frac{2}{3} \times \frac{\sqrt{0.73}}{3}$

Result:

-0.5232001...

-0.5232001...

-1/3-2/3(sqrt0.73)/(0.5)

Input:

$-\frac{1}{3} - \frac{2}{3} \times \frac{\sqrt{0.73}}{0.5}$

Result:

$-1.47253...$

-1.47253...

-1/3-2/3(sqrt0.73)/(0.9991104684)

Input interpretation:

$$-\frac{1}{3}-\frac{2}{3}\times\frac{\sqrt{0.73}}{0.9991104684}$$

Result:

$-0.9034407...$

-0.9034407....

-1/3-2/3(sqrt0.73)/(-8)

Input:

$$-\frac{1}{3}-\frac{2}{3}\left(-\frac{\sqrt{0.73}}{8}\right)$$

Result:

$-0.2621333...$

-0.2621333...

-1/3-2/3(sqrt0.73)/(-1729)

Input:

$$-\frac{1}{3}-\frac{2}{3}\left(-\frac{\sqrt{0.73}}{1729}\right)$$

Result:

$-0.333003894...$

-0.333003894...

-1/3-2/3(sqrt0.73)/-(172^3+1)

Input:

$$-\frac{1}{3}-\frac{2}{3}\left(-\frac{\sqrt{0.73}}{172^3+1}\right)$$

Result:

$-0.3333332213935\ldots$

-0.3333332213935...

We note that increasing the value of c < 1, the result tend to -1/3

From the above expression, we obtain:

[1/1370((((((1291*(0.272*0.704^2)^0.251)) / ((1+0.659(0.272*0.704^2)^0.828)) * ((1+0.838735(0.216*0.704^2)^0.223))))))]^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{1370}\left(\frac{1291\,(0.272\times 0.704^2)^{0.251}}{1+0.659\,(0.272\times 0.704^2)^{0.828}}\left(1+0.838735\,(0.216\times 0.704^2)^{0.223}\right)\right)}$$

Result:

$0.99947539\ldots$

0.99947539.... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value **0.989117352243** = $\boldsymbol{\phi}$

1/4*log base 0.99947539[1/1370((((((1291*(0.272*0.704^2)^0.251)) / ((1+0.659(0.272*0.704^2)^0.828)) * ((1+0.838735(0.216*0.704^2)^0.223))))))]-Pi+1/golden ratio

Input interpretation:

$$\frac{1}{4}\log_{0.99947539}\left(\frac{1}{1370}\left(\frac{1291\,(0.272\times 0.704^2)^{0.251}}{1+0.659\,(0.272\times 0.704^2)^{0.828}}\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})\right)\right)-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.476...

125.476…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representation:

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291\,(0.272\times 0.704^2)^{0.251})(1+0.838735\,(0.216\times 0.704^2)^{0.223})}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)-\pi+\frac{1}{\phi}=-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1291\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})(0.272\times 0.704^2)^{0.251}}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)}{4\log(0.999475)}$$

Series representations:

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291\,(0.272\times 0.704^2)^{0.251})(1+0.838735\,(0.216\times 0.704^2)^{0.223})}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k\,(-0.235604)^k}{k}}{4\log(0.999475)}$$

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291\,(0.272\times 0.704^2)^{0.251})\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-476.419\log(0.764396)-\frac{1}{4}\log(0.764396)\sum_{k=0}^{\infty}(-0.00052461)^k\,G(k)$$

$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}\,k}{2\,(1+k)\,(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}\,G(-j+k)}{1+j}\right)$$

1/4*log base 0.99947539[1/1370((((((1291*(0.272*0.704^2)^0.251)) / ((1+0.659(0.272*0.704^2)^0.828)) * ((1+0.838735(0.216*0.704^2)^0.223))))))]+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$\frac{1}{4}\log_{0.99947539}\left(\frac{1}{1370}\left(\frac{1291\,(0.272\times 0.704^2)^{0.251}}{1+0.659\,(0.272\times 0.704^2)^{0.828}}\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})\right)\right)+11+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

139.617...

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

Alternative representation:

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291\,(0.272\times 0.704^2)^{0.251})\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}+\frac{\log\left(\frac{1291\,(1+0.838735\,(0.216\times 0.704^2)^{0.223})\,(0.272\times 0.704^2)^{0.251}}{1370\,(1+0.659\,(0.272\times 0.704^2)^{0.828})}\right)}{4\log(0.999475)}$$

Series representations:

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291(0.272\times0.704^2)^{0.251})(1+0.838735(0.216\times0.704^2)^{0.223})}{1370(1+0.659(0.272\times0.704^2)^{0.828})}\right)+$$
$$11+\frac{1}{\phi}=11+\frac{1}{\phi}-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k(-0.235604)^k}{k}}{4\log(0.999475)}$$

$$\frac{1}{4}\log_{0.999475}\left(\frac{(1291(0.272\times0.704^2)^{0.251})(1+0.838735(0.216\times0.704^2)^{0.223})}{1370(1+0.659(0.272\times0.704^2)^{0.828})}\right)+11+$$
$$\frac{1}{\phi}=11+\frac{1}{\phi}-476.419\log(0.764396)-\frac{1}{4}\log(0.764396)\sum_{k=0}^{\infty}(-0.00052461)^k G(k)$$
$$\text{for}\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

From:

Warm dark energy

Gianguido DallAgata, Sergio Gonzalez-Martin, Alexandros Papageorgiou, Marco Peloso - arXiv:1912.09950v1 [hep-th] 20 Dec 2019

Accelerated expansion requires $w < -\frac{1}{3}$. This is however not enough to agree with the data. For this potential, comparison with data provides an upper bound on λ. Marginalizing over the scale of the potential, one obtains $\lambda \lesssim 0.49$, 0.80, and 1.02 at 68%, 95%, and 99.7%, respectively [11]. This is incompatible with the generic expectation coming from string theory, where $\lambda \gtrsim \sqrt{6}$ [7, 9]. In our numerical study, we fix $\lambda = 1$, leading to $w_\phi = -2/3$ when the scalar field dominates. This is compatible with the data only at 3σ, and, we therefore study whether the additional friction from this production can allow for a more phenomenologically acceptable expansion law.

Figure 10. The parameters used for this run are $V_0 = 6\cdot10^{-59}M_p^4$, $\bar{\rho}_m = 10^{12}$, $\tilde{f} = 10^{-2}$, $w = 1/3$ and $\alpha = 10^3$. *Top left panel*: We observe similar steps in the evolution of the field as in the case of the exponential potential. *Top right panel*: The equation of state of the Universe evolves from

We have the following equation:

$$\frac{\langle E^2+B^2\rangle_{\rm in}}{2V_0}=\frac{4}{729\,\pi^2}\,\frac{\lambda^2\,\bar{\rho}_m^{-4/3}}{\tilde{f}^4}\,\frac{V_0}{M_p^4}\int d\tilde{k}\,\tilde{k}^3\,.$$

For k = 1, we have that:

Indefinite integral:

$\int 1 \times 1^3 \, dk = k + \text{constant}$

thence is equal to 1

Now, we have that:

x/(2*6e-59*(2.435e+18)^4) = 4/(729Pi^2)*(((1*10^12)^(4/3)))/(((10^-2)^4)))*(((6e-59*(2.435e+18)^4))/((2.435e+18)^4)

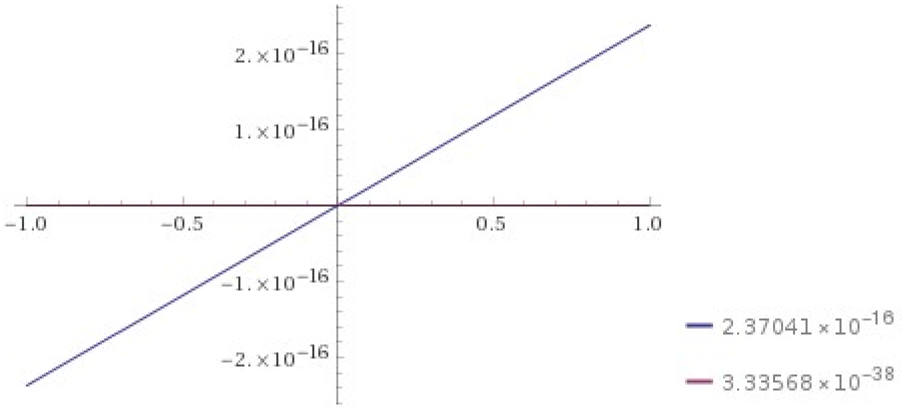
Input interpretation:

$$\frac{x}{2 \times 6 \times 10^{-59}\,(2.435 \times 10^{18})^4} = \frac{4}{729\,\pi^2} \times \frac{(1 \times 10^{12})^{4/3}}{\left(\frac{1}{10^2}\right)^4} \times \frac{6 \times 10^{-59}\,(2.435 \times 10^{18})^4}{(2.435 \times 10^{18})^4}$$

Result:

$2.37041 \times 10^{-16}\, x = 3.33568 \times 10^{-38}$

Plot:



Alternate form:

$2.37041 \times 10^{-16}\, x - 3.33568 \times 10^{-38} = 0$

Alternate form assuming x is real:

$2.37041 \times 10^{-16}\, x + 0 = 3.33568 \times 10^{-38}$

Solution:

$x \approx 1.40722 \times 10^{-22}$

$1.40722*10^{-22}$

1.40722e-22/(2*6e-59*(2.435e+18)^4)

Input interpretation:

$$\frac{1.40722\times 10^{-22}}{2\times 6\times 10^{-59}\,(2.435\times 10^{18})^4}$$

Result:

$3.3356839140317192716520546242815167449760637986313094... \times 10^{-38}$

3.335683914…*10^-38

4/(729Pi^2)*(((1*10^12)^(4/3)))/(((10^-2)^4)))*(((6e-59*(2.435e+18)^4))/((2.435e+18)^4)

Input interpretation:

$$\frac{4}{729\,\pi^2}\times\frac{(1\times 10^{12})^{4/3}}{\left(\frac{1}{10^2}\right)^4}\times\frac{6\times 10^{-59}\,(2.435\times 10^{18})^4}{(2.435\times 10^{18})^4}$$

Result:

$3.33567682773128466... \times 10^{-38}$

3.335676827…*10^-38

(((((4/(x*Pi^2)*(((1*10^12)^(4/3)))/(((10^-2)^4)))*(((6e-59*(2.435e+18)^4))/((2.435e+18)^4)))))) = 3.335676827e-38

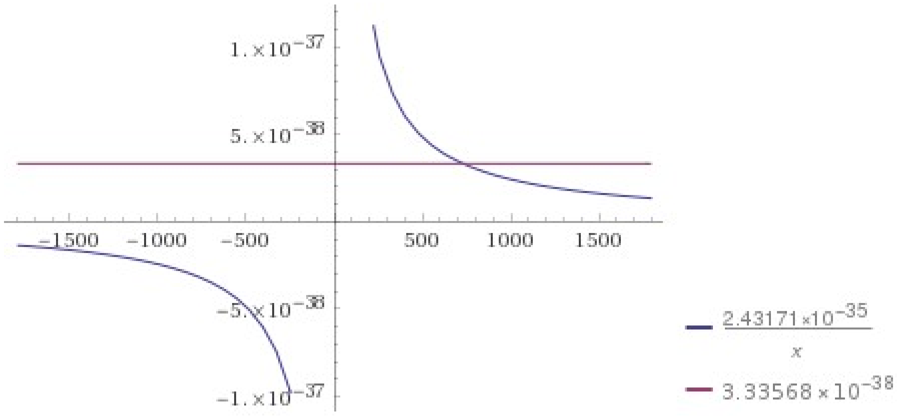
Input interpretation:

$$\left(\frac{4}{x\,\pi^2}\times\frac{(1\times 10^{12})^{4/3}}{\left(\frac{1}{10^2}\right)^4}\right)\times\frac{6\times 10^{-59}\,(2.435\times 10^{18})^4}{(2.435\times 10^{18})^4} = 3.335676827\times 10^{-38}$$

Result:

$$\frac{2.43171\times 10^{-35}}{x} = 3.33568\times 10^{-38}$$

Plot:



Alternate form assuming x is positive:

$3.33568\times10^{-38}\, x = 2.43171\times10^{-35}$ (for $x \neq 0$)

Alternate form assuming x is real:

$$\frac{2.43171\times10^{-35}}{x} + 0 = 3.33568\times10^{-38}$$

Solution:

$x \approx 729.$

729

And:

(((((4/((Pi^2)(x+1))*(((1*10^12)^(4/3)))/(((10^-2)^4)))*(((6e-59*(2.435e+18)^4))/((2.435e+18)^4)))))) = 3.335676827e-38

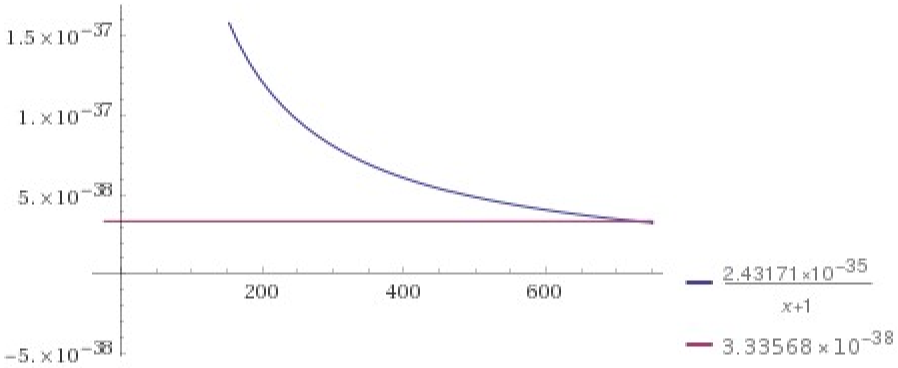
Input interpretation:

$$\left(\frac{4}{\pi^2\,(x+1)}\times\frac{(1\times10^{12})^{4/3}}{\left(\frac{1}{10^2}\right)^4}\right)\times\frac{6\times10^{-59}\,(2.435\times10^{18})^4}{(2.435\times10^{18})^4} = 3.335676827\times10^{-38}$$

Result:

$$\frac{2.43171\times10^{-35}}{x+1} = 3.33568\times10^{-38}$$

Plot:



Alternate form:

$$\frac{2.43171\times10^{-35}}{x+1} = 3.33568\times10^{-38}$$

Alternate form assuming x is positive:

$3.33568\times10^{-38}\,x = 2.42837\times10^{-35}$ (for $x \neq -1$)

Alternate form assuming x is real:

$$\frac{2.43171\times10^{-35}}{x+1} + 0 = 3.33568\times10^{-38}$$

Solution:

$x \approx 728.$

$728 = 9^3 - 1$ (Ramanujan cube)

From:

Baryogenesis and dark matter from B mesons

Gilly Elor, Miguel Escudero and Ann E. Nelson

(Received 17 October 2018; published 20 February 2019)

We have that:

TABLE III. Here we itemize the lightest possible initial and final states for the B decay process to visible and dark sector states resulting from the four possible operators. The diagram in Fig. 2 corresponds to the first line. The mass difference between initial and final visible sector states corresponds to the kinematic upper bound on the mass of the dark sector ψ baryon.

Operator	Initial state	Final state	ΔM [MeV]
ψbus	B_d	$\psi + \Lambda(usd)$	4163.95
	B_s	$\psi + \Xi^0(uss)$	4025.03
	B^+	$\psi + \Sigma^+(uus)$	4089.95
	Λ_b	$\bar{\psi} + K^0$	5121.9
ψbud	B_d	$\psi + n(udd)$	4340.07
	B_s	$\psi + \Lambda(uds)$	4251.21
	B^+	$\psi + p(duu)$	4341.05
	Λ_b	$\bar{\psi} + \pi^0$	5484.5
ψbcs	B_d	$\psi + \Xi_c^0(csd)$	2807.76
	B_s	$\psi + \Omega_c(css)$	2671.69
	B^+	$\psi + \Xi_c^+(csu)$	2810.36
	Λ_b	$\bar{\psi} + D^- + K^+$	3256.2
ψbcd	B_d	$\psi + \Lambda_c + \pi^-(cdd)$	2853.60
	B_s	$\psi + \Xi_c^0(cds)$	2895.02
	B^+	$\psi + \Lambda_c(dcu)$	2992.86
	Λ_b	$\bar{\psi} + \bar{D}^0$	3754.7

We observe that from the value 4341.05, adding the proton mass in MeV, we obtain:

4341.05 + 938.272046 = 5279.322 that is practically equal to the rest mass of B meson 5279.15±0.31

Thence, the value 4341.05 is the mass of the dark sector ψ baryon.

It would therefore seem that from the mass of the proton, added to the dark Dirac fermion mass, we obtain that of the particle under examination: the B meson. It is therefore the proton, together with these quantities of dark Dirac fermion masses, to play a fundamental role in the formation of particles of baryonic or mesonic matter.

With regard 938.272046, we note that, from the formula concerning the Coefficients of the '5th order' mock theta function $\psi_1(q)$, we obtain, for n = 159:

sqrt(golden ratio) * exp(Pi*sqrt(159/15)) / (2*5^(1/4)*sqrt(159)) + 3*8/5

where 3, 5 and 8 are Fibonacci numbers

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{159}{15}}\right)}{2 \sqrt[4]{5} \sqrt{159}} + 3 \times \frac{8}{5}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{53/5}\,\pi} \sqrt{\frac{\phi}{159}}}{2 \sqrt[4]{5}} + \frac{24}{5}$$

Decimal approximation:

938.2914384739291727969003749468566110863240913932294878407...

938.291438...

Property:

$\frac{24}{5} + \frac{e^{\sqrt{53/5}\,\pi} \sqrt{\frac{\phi}{159}}}{2 \sqrt[4]{5}}$ is a transcendental number

Alternate forms:

$$\frac{24}{5} + \frac{1}{2} \sqrt{\frac{5 + \sqrt{5}}{1590}}\, e^{\sqrt{53/5}\,\pi}$$

$$\frac{15\,264 + 5^{3/4} \sqrt{318 \left(1 + \sqrt{5}\right)}\, e^{\sqrt{53/5}\,\pi}}{3180}$$

$$\frac{24}{5} + \frac{\sqrt{\frac{1}{318} \left(1 + \sqrt{5}\right)}\, e^{\sqrt{53/5}\,\pi}}{2 \sqrt[4]{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{159}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{159}}+\frac{3\times 8}{5}=\left(48\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(159-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{53}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(159-z_0)^k z_0^{-k}}{k!}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{159}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{159}}+\frac{3\times 8}{5}=\left(48\exp\left(i\pi\left\lfloor\frac{\arg(159-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(159-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{53}{5}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{53}{5}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(159-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(159-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{159}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{159}}+\frac{3\times 8}{5}=\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(159-z_0)/(2\pi)\rfloor}z_0^{-1/2\lfloor\arg(159-z_0)/(2\pi)\rfloor}\left(48\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(159-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(159-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(159-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{53}{5}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{53}{5}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{53}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(159-z_0)^k z_0^{-k}}{k!}\right)$$

From the following 7th order Ramanujan mock theta function

$$1+\frac{q}{1-q^2}+\frac{q^4}{(1-q^3)(1-q^4)}+\frac{q^9}{(1-q^4)(1-q^5)(1-q^6)}+\ldots$$

For q equal to:

((-21.79216*((-e^(-0.5)))))

Input interpretation:

$$-\frac{21.79216\times(-1)}{e^{0.5}}$$

Result:

13.2176...

13.2176...

We have that:

((((1+(13.2176)/(1-13.2176^2) + (13.2176)^4 / ((1-13.2176^3)(1-13.2176^4)))) + ((((13.2176)^9 / ((1-13.2176^4)(1-13.2176^5)(1-13.2176^6))))

Input interpretation:

$$\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}$$

Result:

0.924340821067919518354514035705117825600423588312092538393...

0.924340821...

From which:

(((10^3*(((((1+(13.2176)/(1-13.2176^2) + (13.2176)^4 / ((1-13.2176^3)(1-13.2176^4)))) + ((((13.2176)^9 / ((1-13.2176^4)(1-13.2176^5)(1-13.2176^6))))))))))+11+3

Input interpretation:

$$10^3\left(\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+11+3$$

Result:

938.34082106791951835451403570511782560042358831209253839 39...

938.340821...

We have also the value (absolute value) 4267.24 concerning always a Ramanujan mock theta function. Note that, adding this value to 938.340821, we obtain 5205.580821. Thence from the previous expression, performing some calculations, we obtain finally:

4267.24+(((10^3*(((((1+(13.2176)/(1-13.2176^2) + (13.2176)^4 / ((1-13.2176^3)(1-13.2176^4)))) + ((((13.2176)^9 / ((1-13.2176^4)(1-13.2176^5)(1-13.2176^6))))))))))+76+11+1/golden ratio

where 76 and 11 are Lucas numbers

Input interpretation:

$$4267.24+10^3\left(\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+76+11+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

5279.20...

5279.2….result practically equal to the rest mass of B meson 5279.26

Alternative representations:

$$4267.24+10^3\left(\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+76+11+\frac{1}{\phi}=$$
$$4354.24+10^3\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+\frac{1}{2\sin(54°)}$$

$$4267.24 + 10^3\left(\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+76+11+\frac{1}{\phi} =$$

$$4354.24 + -\frac{1}{2\cos(216°)} + 10^3\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)$$

$$4267.24 + 10^3\left(\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}\right)+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right)+76+11+\frac{1}{\phi} =$$

$$4354.24 + 10^3\left(1+\frac{13.2176}{1-13.2176^2}+\frac{13.2176^4}{(1-13.2176^3)(1-13.2176^4)}+\frac{13.2176^9}{(1-13.2176^4)(1-13.2176^5)(1-13.2176^6)}\right) + -\frac{1}{2\sin(666°)}$$

We have also that:

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}=\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3$$

(130sqrt5+29sqrt101)+(169440+7540sqrt505)^1/2 =
(((sqrt(1/8(113+5sqrt505))+sqrt(1/8(105+5sqrt505)))))^3

Input:

$$\left(130\sqrt{5}+29\sqrt{101}\right)+\sqrt{169440+7540\sqrt{505}} = \left(\sqrt{\frac{1}{8}\left(113+5\sqrt{505}\right)}+\sqrt{\frac{1}{8}\left(105+5\sqrt{505}\right)}\right)^3$$

Exact result:

$$130\sqrt{5}+29\sqrt{101}+\sqrt{169440+7540\sqrt{505}} = \left(\frac{1}{2}\sqrt{\frac{1}{2}\left(105+5\sqrt{505}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(113+5\sqrt{505}\right)}\right)^3$$

Alternate forms:

True

$$130\sqrt{5}+29\sqrt{101}+\sqrt{169440+7540\sqrt{505}} = \frac{1}{64}\left(5\sqrt{5}+\sqrt{101}+\sqrt{10\left(21+\sqrt{505}\right)}\right)^3$$

$$130\sqrt{5}+29\sqrt{101}+2\sqrt{5\left(8472+377\sqrt{505}\right)} = \frac{\left(\sqrt{5(21+\sqrt{505})}+\sqrt{113+5\sqrt{505}}\right)^3}{16\sqrt{2}}$$

$$130\sqrt{5}+29\sqrt{101}+2\sqrt{5\left(8472+377\sqrt{505}\right)} = \frac{5}{16}\sqrt{\frac{5}{2}}\left(21+\sqrt{505}\right)^{3/2}+\frac{15}{16}\left(21+\sqrt{505}\right)\sqrt{\frac{1}{2}\left(113+5\sqrt{505}\right)}+\frac{3}{16}\sqrt{\frac{5}{2}\left(21+\sqrt{505}\right)}\left(113+5\sqrt{505}\right)+\frac{(113+5\sqrt{505})^{3/2}}{16\sqrt{2}}$$

$$130\sqrt{5}+29\sqrt{101}+\sqrt{169440+7540\sqrt{505}} = \frac{339}{16}\sqrt{\frac{1}{2}\left(105+5\sqrt{505}\right)}+\frac{(105+5\sqrt{505})^{3/2}}{16\sqrt{2}}+\frac{15}{16}\sqrt{\frac{505}{2}\left(105+5\sqrt{505}\right)}+\frac{315}{16}\sqrt{\frac{1}{2}\left(113+5\sqrt{505}\right)}+\frac{(113+5\sqrt{505})^{3/2}}{16\sqrt{2}}+\frac{15}{16}\sqrt{\frac{505}{2}\left(113+5\sqrt{505}\right)}$$

If we take

(((sqrt(1/8(113+5sqrt505))+sqrt(1/8(105+5sqrt505)))))^3

Input:

$$\left(\sqrt{\frac{1}{8}\left(113+5\sqrt{505}\right)}+\sqrt{\frac{1}{8}\left(105+5\sqrt{505}\right)}\right)^3$$

Result:

$$\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(105+5\sqrt{505}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(113+5\sqrt{505}\right)}\right)^3$$

Decimal approximation:

1164.2696012673646675898669740107791287605844995969651428 88...

1164.2696….

Alternate forms:

$$\frac{\left(5\sqrt{10\left(21+\sqrt{505}\right)}+25\sqrt{5}+5\sqrt{101}\right)^3}{8000}$$

$$\frac{1}{64}\left(5\sqrt{5}+\sqrt{101}+\sqrt{105-40\,i}+\sqrt{105+40\,i}\right)^3$$

$$\sqrt{338\,881+15\,080\sqrt{505}+4\sqrt{5\left(2\,871\,007\,052+127\,758\,137\sqrt{505}\right)}}$$

Minimal polynomial:

$$x^8-1\,355\,524\,x^6+400\,646\,x^4-1\,355\,524\,x^2+1$$

We note that:

(((5+sqrt5)/2))*(((sqrt(1/8(113+5sqrt505))+sqrt(1/8(105+5sqrt505)))))^3 + 938.340821+128+1/golden ratio

Input interpretation:

$$\left(\frac{1}{2}\left(5+\sqrt{5}\right)\right)\left(\sqrt{\frac{1}{8}\left(113+5\sqrt{505}\right)}+\sqrt{\frac{1}{8}\left(105+5\sqrt{505}\right)}\right)^3+938.340821+128+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

5279.325844...

5279.325844...

And also this result is practically equal to the rest mass of B meson 5279.26

Now, we have that:

TABLE II. Parameters in the model, their explored range, benchmark values, and a summary of constraints. Note that the benchmark values for $A^q_{\ell\ell} \times \mathrm{Br}(B_q \to \phi\xi + \mathrm{baryon} + X)$, for $\langle\sigma v\rangle_\phi$ and $\langle\sigma v\rangle_\xi$, are fixed by the requirement of obtaining the observed baryon asymmetry ($Y_B = 8.7 \times 10^{-11}$) and the correct DM abundance ($\Omega_{\mathrm{DM}} h^2 = 0.12$), respectively.

Parameter	Description	Range	Benchmark value	Constraint
m_Φ	Φ mass	11–100 GeV	25 GeV	...
Γ_Φ	Φ width	$3\times10^{-23} < \Gamma_\Phi/\mathrm{GeV} < 5\times10^{-21}$	10^{-22} GeV	Decay between 3.5 MeV $< T <$ 30 MeV
m_ψ	Dirac fermion mediator	1.5 GeV $< m_\psi <$ 4.2 GeV	3.3 GeV	Lower limit from $m_\psi > m_\phi + m_\xi$
m_ξ	Majorana DM	0.3 GeV $< m_\xi <$ 2.7 GeV	1.0 and 1.8 GeV	$\lvert m_\xi - m_\phi \rvert < m_p - m_e$
m_ϕ	Scalar DM	1.2 GeV $< m_\phi <$ 2.7 GeV	1.5 and 1.3 GeV	$\lvert m_\xi - m_\phi \rvert < m_p - m_e$, $m_\phi >$ 1.2 GeV
y_d	Yukawa for $\mathcal{L} = y_d \bar{\psi}\phi\xi$		0.3	$<\sqrt{4\pi}$
$\mathrm{Br}(B \to \phi\xi + \cdots)$	Br of $B \to$ ME+baryon	$2 \times 10^{-4} - 0.1$	10^{-3}	<0.1 [4]
$A^s_{\ell\ell}$	Lepton asymmetry B_d	$5 \times 10^{-6} < A^d_{\ell\ell} < 8 \times 10^{-4}$	6×10^{-4}	$A^d_{\ell\ell} = -0.0021 \pm 0.0017$ [4]
$A^s_{\ell\ell}$	Lepton asymmetry B_s	$10^{-5} < A^s_{\ell\ell} < 4 \times 10^{-3}$	10^{-3}	$A^s_{\ell\ell} = -0.0006 \pm 0.0028$ [4]
$\langle\sigma v\rangle_\phi$	Annihilation Xsec for ϕ	$(6 - 20) \times 10^{-25}$ cm^3/s	10^{-24} cm^3/s	Depends upon the channel [2]
$\langle\sigma v\rangle_\xi$	Annihilation Xsec for ξ	$(6 - 20) \times 10^{-25}$ cm^3/s	10^{-24} cm^3/s	Depends upon the channel [2]

We observe the values of range and of benchmark (point of reference-value) of Majorana DM and the Scalar DM:

$$0.3 \text{ GeV} < m_\xi < 2.7 \text{ GeV} \quad 1.0 \text{ and } 1.8 \text{ GeV}$$
$$1.2 \text{ GeV} < m_\phi < 2.7 \text{ GeV} \quad 1.5 \text{ and } 1.3 \text{ GeV}$$

The two means are: (0.3+2.7+1+1.8) / 4 = 1.45 with a minimum of 0.3 and a maximum of 2.7 for the m_ξ , while (1.2+2.7+1.5+1.3) / 4 = 1.675 with a minimum of 1.2 and a maximum of 2.7
The mean of all values is 1.5625 and the inverse is 0.64
We have also:

1+(((8/(((0.3+2.7+1+1.8)+(1.2+2.7+1.5+1.3))))))

Input:

$$1 + \frac{8}{(0.3 + 2.7 + 1 + 1.8) + (1.2 + 2.7 + 1.5 + 1.3)}$$

Result:

1.64

$1.64 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

The means of two benchmark is the same: 1.4 GeV value very near to the following Ramanujan mock theta function:

$$\phi(q) = 1 + \frac{q}{1+q^2} + \frac{q^4}{(1+q^2)(1+q^4)} + \ldots$$

((((((1+(0.449329)/(1+0.449329^2) + (0.449329)^4 / ((1+0.449329^2)(1+0.449329^4))))

Input interpretation:

$$1 + \frac{0.449329}{1 + 0.449329^2} + \frac{0.449329^4}{(1 + 0.449329^2)(1 + 0.449329^4)}$$

Result:

1.406436589504891048492970141912370852583779342136575571764...

$\boldsymbol{\phi(q) = 1.40643658\ldots}$

We have that:

From Eq. (2), note that Y is dominantly pair produced at colliders through the strong interaction. The produced Y's could then decay as either $Y \to \bar{u}b$ or $Y \to s\bar{\psi}$ so that the expected collider signatures are 4-jets (two tagged b quarks) or 2-jets plus missing energy. If the former decay dominates, then 4-jet searches [51] apply, implying a bound on the colored scalar mass of $m_Y > 500$ GeV. While, if $Y \to s\bar{\psi}$ dominates, then s-quark searches apply for a single light quark resulting in the bound $m_Y > 960$ GeV [51]. Such constraints allow for sizable $\mathrm{Br}(B \to \xi\phi + \mathrm{baryon}) \sim 10^{-3}$ with moderately large couplings $\sqrt{y_{ub}y_{\psi s}} > 0.25$ and are thus not in tension with our model's prediction of $\mathrm{Br}(B \to \xi\phi + \mathrm{baryon} + X) = 2 \times 10^{-4} - 0.1$.

$$\mathrm{Br}(B \to \xi\phi + \mathrm{baryon}) \simeq 10^{-3}\left(\frac{m_B - m_\psi}{2\ \mathrm{GeV}}\right)^4 \left(\frac{1\ \mathrm{TeV}}{m_Y}\frac{\sqrt{y_{ub}y_{\psi s}}}{0.53}\right)^4.$$

For $m_Y = 994$ and $\sqrt{y_{ub}y_{\psi s}} > 0.25 = 0.29$, we obtain:

1/10^(3)*((x-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4

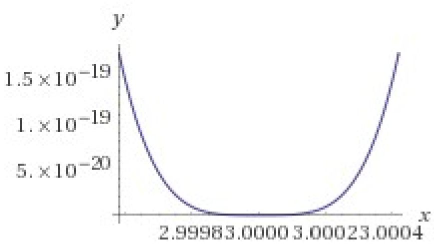
Input:

$$\frac{1}{10^3}\left(\frac{x-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4$$

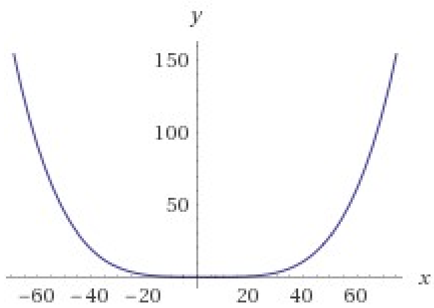
Result:

$$5.73883\times10^{-6}\,(x-3)^4$$

Plots:



(x from 3 to 3)



(x from −69 to 75)

Alternate forms:

$x(x((5.73883\times10^{-6}x-0.0000688659)x+0.000309897)-0.000619793)+$
0.000464845

$5.73883\times10^{-6}(x-3.00038)(x-2.99962)(x^2-6.x+9.)$

$5.73883\times10^{-6}(x-3.00038)(x-2.99962)(x^2-6.x+9.)$

Expanded form:

$5.73883\times10^{-6}x^4-0.0000688659x^3+0.000309897x^2-0.000619793x+$
0.000464845

Real roots:

$x\approx2.99962$

$x\approx3.00038$

2.99962 and 3.00038

Complex roots:

$x=3.-0.000381157i$

$x=3.+0.000381157i$

Integer root:

$x=3$

Polynomial discriminant:

$\Delta=0$

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\{y\in\mathbb{R}: y\geq0\}$ (all non-negative real numbers)

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

Derivative:

$$\frac{d}{dx}\left(\frac{\left(\frac{x-3}{2}\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{10^3}\right) = 0.0000229553\,(x-3)^3$$

Indefinite integral:

$$\int 5.73883\times 10^{-6}\,(-3+x)^4\,dx = 1.14777\times 10^{-6}\,(x-3)^5 + \text{constant}$$

Global minimum:

$$\min\left\{\frac{\left(\frac{x-3}{2}\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{10^3}\right\} = 0 \text{ at } x = 3$$

And:

1/10^(3)*((3.00038-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4

Input interpretation:

$$\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4$$

Result:

$1.1966230919169765354856271221476877437110939197776143... \times 10^{-19}$

$1.19662309....*10^{-19}$

We note that from the following three values of Ramanujan mock theta functions:

$\psi(q)$ = 1.8236681145196...   f(q) = 1.1424432422... $\phi(q)$ = 0.50970737445...

we obtain:

(1.8236681145196-1.1424432422+0.50970737445)

Input interpretation:

1.8236681145196 − 1.1424432422 + 0.50970737445

Result:

1.1909322467696

1.1909322467696

Thence:

(1.8236681145196-1.1424432422+0.50970737445)*1e-19

Input interpretation:

$(1.8236681145196 - 1.1424432422 + 0.50970737445) \times 1 \times 10^{-19}$

Result:

$1.1909322467696 \times 10^{-19}$

$1.19093224676960000000000000000 \times 10^{-19}$

1.190932246...*10^{-19}

For $m_Y = 516$, we obtain:

1/10^(3)*((x-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4

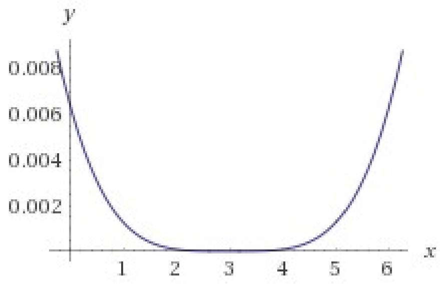
Input:

$$\frac{1}{10^3}\left(\frac{x-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4$$

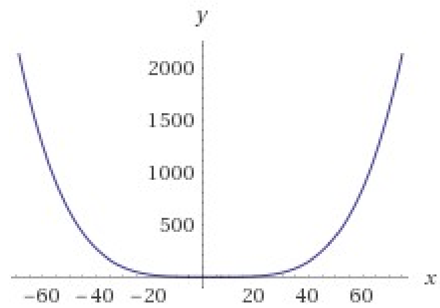
Result:

$0.0000790259\,(x-3)^4$

Plots:



(x from -0.2 to 6.2)



(x from -69 to 75)

Alternate forms:

$x\,(x\,((0.0000790259\,x - 0.000948311)\,x + 0.0042674) - 0.0085348) + 0.0064011$

$0.0000790259\,(x^2 - 6.00035\,x + 9.00106)\,(x^2 - 5.99965\,x + 8.99894)$

$0.0000790259\,(x^2 - 6.00035\,x + 9.00106)\,(x^2 - 5.99965\,x + 8.99894)$

Expanded form:

$0.0000790259\,x^4 - 0.000948311\,x^3 + 0.0042674\,x^2 - 0.0085348\,x + 0.0064011$

Complex roots:

$x = 2.99982 - 0.000177204\, i$

$x = 2.99982 + 0.000177204\, i$

$x = 3.00018 - 0.000177209\, i$

$x = 3.00018 + 0.000177209\, i$

Integer root:

$x = 3$

Polynomial discriminant:

$\Delta = 0$

Properties as a real function:

Domain

$\mathbb{R}$ (all real numbers)

Range

$\{y \in \mathbb{R} : y \geq 0\}$ (all non-negative real numbers)

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

Derivative:

$$\frac{d}{dx}\left(\frac{\left(\frac{x-3}{2}\right)^4 \left(\frac{10^3 \times 0.29}{516 \times 0.53}\right)^4}{10^3}\right) = 0.000316104\,(x-3)^3$$

Indefinite integral:

$$\int 0.0000790259\,(-3+x)^4\, dx = 0.0000158052\,(x-3)^5 + \text{constant}$$

Global minimum:

$$\min\left\{\frac{\left(\frac{x-3}{2}\right)^4 \left(\frac{10^3 \times 0.29}{516 \times 0.53}\right)^4}{10^3}\right\} = 0 \text{ at } x = 3$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty (0.0000790259\,(-3+x)^4 - (0.0064011 - 0.0085348\,x + 0.0042674\,x^2 - 0.000948311\,x^3 + 0.0000790259\,x^4))\,dx = 0$$

And:

1/10^(3)*((2.99982-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4

Input interpretation:

$$\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4$$

Result:

$8.2958281018185699694144681440935256511260414992484338... \times 10^{-20}$

$8.29582810181....*10^{-20}$

From the sum of the following values of Ramanujan mock theta functions, we obtain:

1/4+(1.962364415 + 2.73991141808516+ 1.897512108 + 0.50970737445 + 1.8236681145196 - 0.54471718545239-0.34647193607819)

Input interpretation:

$$\frac{1}{4}+(1.962364415+2.73991141808516+1.897512108+0.50970737445+1.8236681145196-0.54471718545239-0.34647193607819)$$

Result:

8.29197430852418

And:

((1/4+(1.962364415 + 2.73991141808516+ 1.897512108 + 0.50970737445 + 1.8236681145196 - 0.54471718545239-0.34647193607819)))*1e-20

Input interpretation:

$$\left(\frac{1}{4}+(1.962364415+2.73991141808516+1.897512108+0.50970737445+1.8236681145196-0.54471718545239-0.34647193607819)\right)\times 1\times 10^{-20}$$

Result:

$8.29197430852418 \times 10^{-20}$

$8.2919743....*10^{-20}$

Now, from the division of the two expressions, we obtain:

(((((1/10^(3)*((3.00038-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4)))))/
(((((1/10^(3)*((2.99982-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4)))))

Input interpretation:

$$\frac{\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4}{\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4}$$

Result:

1.442439594010703768861122836112562060716158828666434277721...

1.4424395940…..

Input interpretation:

1.442439594010703768861122836112562060716158828666434277721

Rational approximation:

$$\frac{1591144758673235353648465955698598036521138031}{1103092819470558781040011298024652642691546822} = 1 + \frac{488051939202676572608454657673945393829591209}{1103092819470558781040011298024652642691546822}$$

Possible closed forms:

$$\tan\left(\sec\left(\frac{57428222}{12696249}\right)\right) \approx 1.44243959401070376890567$$

$$\frac{2870 + 3497\pi + 1884\pi^2}{7161\pi} \approx 1.4424395940107037688827958$$

$$\frac{2238719980\pi}{4875868821} \approx 1.4424395940107037688893544$$

$$\frac{269210\pi^2 - 1782179}{193050\pi} \approx 1.442439594010703768853675$$

root of $1899x^4 + 951x^3 + 233x^2 - 960x - 10175$ near $x = 1.44244$ $\approx$ 1.442439594010703768858549

π root of $39927x^3 - 39758x^2 + 27882x - 8285$ near $x = 0.459143$ $\approx$ 1.442439594010703768881097

π root of $5728x^4 - 2584x^3 + 2057x^2 + 455x - 647$ near $x = 0.459143$ $\approx$ 1.4424395940107037688663199

$$\frac{1}{\boxed{\text{root of } 10175x^4 + 960x^3 - 233x^2 - 951x - 1899 \text{ near } x = 0.69327}} \approx$$
1.44243959401070376858549

$$\frac{3\sqrt[3]{3}\left(\frac{85067330}{14253097}\right)^{2/3}}{\pi^2} \approx 1.44243959401070376 38068$$

$$\boxed{\text{root of } 11473x^3 - 23249x^2 - 33921x + 62869 \text{ near } x = 1.44244} \approx$$
1.44243959401070376880436

$$\log\left(\frac{1}{116}\left(342 + 22\sqrt{2} - 232e + 38e^2 - 291\pi + 140\pi^2\right)\right) \approx$$
1.4424395940107037689 1438

$$\frac{1}{\boxed{\text{root of } 62869x^3 - 33921x^2 - 23249x + 11473 \text{ near } x = 0.69327}} \approx$$
1.44243959401070376880436

$$\pi \boxed{\text{root of } 507x^5 + 303x^4 - 877x^3 - 2541x^2 + 1132x + 77 \text{ near } x = 0.459143} \approx$$
1.44243959401070376886 79041

$$e^{\frac{31}{20} - \frac{17}{10e} + \frac{21e}{20} + \frac{1}{20\pi} - \frac{3\pi}{10}} \pi^{3/20-(4e)/5} \sin^{3/10}(e\pi) \sqrt[5]{-\cos(e\pi)} \approx$$
1.4424395940107037686 2304

$$\frac{2^{219/410} e^{278/205} \log^{73/410}(2)}{3 \times 3^{3/410} \log^2(3)} \approx 1.4424395940107037687 4866$$

We have also the following Ramanujan mock theta function:

$$\phi(q) = 1 + \frac{q}{1+q^2} + \frac{q^4}{(1+q^2)(1+q^4)} + \ldots$$

For q = 0.449329

((((((1+(0.449329)/(1+0.449329^2) + (0.449329)^4 / ((1+0.449329^2)(1+0.449329^4))))

Input interpretation:

$$1 + \frac{0.449329}{1 + 0.449329^2} + \frac{0.449329^4}{(1 + 0.449329^2)(1 + 0.449329^4)}$$

Result:

1.406436589504891048492970141912370852583779342136575571764...

$\phi(q) = 1.40643658\ldots$

From which:

((1+(0.449329)/(1+0.449329^2) + (0.449329)^4 / ((1+0.449329^2)(1+0.449329^4))))+29/10^3+7/10^3

where 29 and 7 are Lucas numbers

Input interpretation:

$$\left(1+\frac{0.449329}{1+0.449329^2}+\frac{0.449329^4}{(1+0.449329^2)(1+0.449329^4)}\right)+\frac{29}{10^3}+\frac{7}{10^3}$$

Result:

1.442436589504891048492970141912370852583779342136575571764...

1.4424365895.....

We have also:

(((1/((((((((((1/10^(3)*((3.00038-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4)))))/ (((((1/10^(3)*((2.99982-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4)))))))))))^1/128

Input interpretation:

$$\sqrt[128]{\frac{1}{\frac{\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4}{\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4}}}$$

Result:

0.997142092843676789017537432253608451136183199411475659739...

0.9971420928..... result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the dilaton value **0.989117352243 = ϕ**

From which:

log base 0.99714209 (((1/((((1/10^(3)*((3.00038-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4)))/ (((1/10^(3)*((2.99982-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4)))))))-Pi+1/golden ratio

Input interpretation:

$$\log_{0.99714209}\left(\frac{1}{\frac{\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4}{\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4}}\right)-\pi+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.476...

125.476…. result very near to the dilaton mass calculated as a type of Higgs boson: 125 GeV for T = 0 and to the Higgs boson mass 125.18 GeV

Alternative representation:

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times 0.29}{516\times 0.53}\right)^4\right)10^3}{10^3}}}\right)-\pi+\frac{1}{\phi}=$$

$$-\pi+\frac{1}{\phi}+\frac{\log\left(\frac{1}{\frac{0.00019^4\left(\frac{0.29\times 10^3}{0.53\times 994}\right)^4}{\frac{10^3\left((-0.00009)^4\left(\frac{0.29\times 10^3}{0.53\times 516}\right)^4\right)}{10^3}}}\right)}{\log(0.997142)}$$

$\log(x)$ is the natural logarithm

Series representations:

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times0.29}{994\times0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times0.29}{516\times0.53}\right)^4\right)10^3}{10^3}}}\right)-\pi+\frac{1}{\phi}=\frac{1}{\phi}-\pi-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k(-0.30673)^k}{k}}{\log(0.997142)}$$

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times0.29}{994\times0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times0.29}{516\times0.53}\right)^4\right)10^3}{10^3}}}\right)-\pi+\frac{1}{\phi}=$$
$$\frac{1}{\phi}-\pi-349.406\log(0.69327)-\log(0.69327)\sum_{k=0}^{\infty}(-0.00285791)^k G(k)$$
$$\text{for }\left(G(0)=0\text{ and }G(k)=\frac{(-1)^{1+k}k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

And:

log base 0.99714209 (((1/((((1/10^(3)*((3.00038-3)/(2))^4 * (((10^3)/(994) * (0.29/0.53)))^4)))/ (((1/10^(3)*((2.99982-3)/(2))^4 * (((10^3)/(516) * (0.29/0.53)))^4)))))))+11+1/golden ratio

where 11 is a Lucas number

Input interpretation:

$$\log_{0.99714209}\left(\frac{1}{\frac{\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4}{\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4}}\right)+11+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

139.618...

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

Alternative representation:

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times 0.29}{516\times 0.53}\right)^4\right)10^3}{10^3}}}\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}+\frac{\log\left(\frac{1}{\frac{0.00019^4\left(\frac{0.29\times 10^3}{0.53\times 994}\right)^4}{\frac{10^3\left((-0.00009)^4\left(\frac{0.29\times 10^3}{0.53\times 516}\right)^4\right)}{10^3}}}\right)}{\log(0.997142)}$$

log(x) is the natural logarithm

Series representations:

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times 0.29}{516\times 0.53}\right)^4\right)10^3}{10^3}}}\right)+11+\frac{1}{\phi}=11+\frac{1}{\phi}-\frac{\sum_{k=1}^{\infty}\frac{(-1)^k(-0.30673)^k}{k}}{\log(0.997142)}$$

$$\log_{0.997142}\left(\frac{1}{\frac{\left(\frac{1}{2}(3.00038-3)\right)^4\left(\frac{10^3\times 0.29}{994\times 0.53}\right)^4}{\frac{\left(\left(\frac{1}{2}(2.99982-3)\right)^4\left(\frac{10^3\times 0.29}{516\times 0.53}\right)^4\right)10^3}{10^3}}}\right)+11+\frac{1}{\phi}=$$

$$11+\frac{1}{\phi}-349.406\log(0.69327)-\log(0.69327)\sum_{k=0}^{\infty}(-0.00285791)^k G(k)$$

$$\text{for}\left(G(0)=0 \text{ and } G(k)=\frac{(-1)^{1+k}k}{2(1+k)(2+k)}+\sum_{j=1}^{k}\frac{(-1)^{1+j}G(-j+k)}{1+j}\right)$$

From the following Ramanujan mock theta function

$$2\phi(-q^2)-f(q)=\frac{1-2q+2q^4-2q^9+\ldots}{(1-q)(1-q^4)(1-q^6)(1-q^9)\ldots},$$

(((((1-2*0.449329 + 2*0.449329^4 - 2*0.449329^9) / ((1-0.449329)(1-0.449329^4)(1-0.449329^6)(1-0.449329^9)))

Input interpretation:

$$\frac{1+2\times(-0.449329)+2\times 0.449329^4-2\times 0.449329^9}{(1-0.449329)\left(1-0.449329^4\right)\left(1-0.449329^6\right)\left(1-0.449329^9\right)}$$

Result:

0.346471936078199831796528233455818281740464490507361168330...

0.346471936078....

We obtain:

1/10^52((((([(((((1/10^(3)((3.00038-3)/(2))^4 (((10^3)/(994)(0.29/0.53)))^4)))))/(((((1/10^(3)((2.99982-3)/(2))^4 (((10^3)/(516)(0.29/0.53)))^4)))))]-0.346471936078+(11/10^3-13/10^4))))))

Where 11 is a Lucas number and 13 is a Fibonacci number

Input interpretation:

$$\frac{1}{10^{52}}\left(\frac{\frac{1}{10^3}\left(\frac{3.00038-3}{2}\right)^4\left(\frac{10^3}{994}\times\frac{0.29}{0.53}\right)^4}{\frac{1}{10^3}\left(\frac{2.99982-3}{2}\right)^4\left(\frac{10^3}{516}\times\frac{0.29}{0.53}\right)^4} - 0.346471936078 + \left(\frac{11}{10^3} - \frac{13}{10^4}\right)\right)$$

Result:

$1.1056676579327037688611228361125620607161588286664342... \times 10^{-52}$

$1.105667...*10^{-52}$ result practically equal to the value of Cosmological Constant $1.1056*10^{-52}$ m^{-2}

From:

$$\sigma_{\phi^*\phi\to\xi\xi} = \frac{y_d^4(m_\xi + m_\psi)^2[(m_\phi - m_\xi)(m_\xi + m_\phi)]^{3/2}}{2\pi m_\phi^3(-m_\xi^2 + m_\psi^2 + m_\phi^2)^2},$$

$$\sigma_{\xi\xi\to\phi^*\phi}|_{m_\phi\to 0} = \frac{v^2 y_d^4}{48\pi(m_\xi^2 + m_\psi^2)^4} \times [2m_\xi^5 m_\psi + 5m_\xi^4 m_\psi^2 + 8m_\xi^3 m_\psi^3 + 9m_\xi^2 m_\psi^4 + 6m_\xi m_\psi^5 + 3m_\xi^6 + 3m_\psi^6]. \quad \text{(C1)}$$

(((0.3^4 (1.8+3)^2((1.3-1.8)(1.8+1.3))^1.5)))/(((2Pi*1.3^3(-1.8^2+3^2+1.3^2)^2)))

Input:

$$\frac{0.3^4\,(1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}}{2\pi\times 1.3^3\,(-1.8^2+3^2+1.3^2)^2}$$

Result:

$-0.000470048...\,i$

Polar coordinates:

$r = 0.000470048$ (radius), $\theta = -90.°$ (angle)

0.000470048

Alternative representations:

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=\frac{(-1.55)^{1.5}\,0.3^4\times 4.8^2}{360\,°\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{(-1.55)^{1.5}\,0.3^4\times 4.8^2}{2\,i\log(-1)\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=\frac{(-1.55)^{1.5}\,0.3^4\times 4.8^2}{2\cos^{-1}(-1)\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

Series representations:

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{6.78141\times10^{-20}+0.000369175\,i}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{1.35628\times10^{-19}+0.00073835\,i}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{2.71257\times10^{-19}+0.0014767\,i}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{1.35628\times10^{-19}+0.00073835\,i}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{6.78141\times10^{-20}+0.000369175\,i}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{0.3^4\left((1.8+3)^2\left((1.3-1.8)(1.8+1.3)\right)^{1.5}\right)}{2\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}=-\frac{1.35628\times10^{-19}+0.00073835\,i}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

FIG. 3. Evolution of comoving number density of various components for the benchmark points we consider in Table II: $\{m_\Phi, \Gamma_\Phi, \mathrm{Br}(B \to \xi\phi + \mathrm{baryon}), m_\Psi, y_d\} = \{25\ \mathrm{GeV}, 10^{-22}\ \mathrm{GeV}, 5.6 \times 10^{-3}, 3.3\ \mathrm{GeV}, 0.3\}$. The left panel corresponds to the DM mainly composed of Majorana ξ particles, as we take $m_\xi = 1$ GeV and $m_\phi = 1.5$ GeV. We take both the B_s^0 and the B_d^0 contributions to the leptonic asymmetry to be positive, $A_{\ell\ell}^s = 10^{-4} = A_{\ell\ell}^d$. The change in behavior of the asymmetric yield at $T \sim 15$ MeV corresponds to decoherence effects spoiling the B_d^0 oscillations while B_s^0 oscillations are still active. The right panel corresponds to the DM being composed mainly of dark baryons $\phi + \phi^*$, with $m_\phi = 1.3$ GeV and $m_\xi = 1.8$ GeV. We now take $A_{\ell\ell}^s = 10^{-3}$ and $A_{\ell\ell}^d = A_{\ell\ell}^d|^{\mathrm{SM}} = -4.2 \times 10^{-4}$—the dip in the asymmetry can be understood from the negative value of $A_{\ell\ell}^d$ chosen in this case to correspond to the SM prediction. Both benchmark points reproduce the observed DM abundance $\Omega_{\mathrm{DM}}h^2 = 0.12$ and baryon asymmetry $Y_B = 8.7 \times 10^{-11}$.

TABLE II. Parameters in the model, their explored range, benchmark values, and a summary of constraints. Note that the benchmark values for $A_{\ell\ell}^q \times \mathrm{Br}(B_q \to \phi\xi + \mathrm{baryon} + X)$, for $\langle\sigma v\rangle_\phi$ and $\langle\sigma v\rangle_\xi$, are fixed by the requirement of obtaining the observed baryon asymmetry ($Y_B = 8.7 \times 10^{-11}$) and the correct DM abundance ($\Omega_{\mathrm{DM}}h^2 = 0.12$), respectively.

Parameter	Description	Range	Benchmark value	Constraint
m_Φ	Φ mass	11–100 GeV	25 GeV	...
Γ_Φ	Φ width	$3\times10^{-23} < \Gamma_\Phi/\mathrm{GeV} < 5\times10^{-21}$	10^{-22} GeV	Decay between $3.5\,\mathrm{MeV} < T < 30\,\mathrm{MeV}$
m_ψ	Dirac fermion mediator	$1.5\ \mathrm{GeV} < m_\psi < 4.2\ \mathrm{GeV}$	3.3 GeV	Lower limit from $m_\psi > m_\phi + m_\xi$
m_ξ	Majorana DM	$0.3\ \mathrm{GeV} < m_\xi < 2.7\ \mathrm{GeV}$	1.0 and 1.8 GeV	$\lvert m_\xi - m_\phi \rvert < m_p - m_e$
m_ϕ	Scalar DM	$1.2\ \mathrm{GeV} < m_\phi < 2.7\ \mathrm{GeV}$	1.5 and 1.3 GeV	$\lvert m_\xi - m_\phi \rvert < m_p - m_e$, $m_\phi > 1.2$ GeV
y_d	Yukawa for $\mathcal{L} = y_d \bar{\psi}\phi\xi$		0.3	$< \sqrt{4\pi}$
$\mathrm{Br}(B \to \phi\xi + \cdots)$	Br of $B \to$ ME+baryon	$2 \times 10^{-4} - 0.1$	10^{-3}	<0.1 [4]
$A_{\ell\ell}^s$	Lepton asymmetry B_d	$5 \times 10^{-6} < A_{\ell\ell}^d < 8 \times 10^{-4}$	6×10^{-4}	$A_{\ell\ell}^d = -0.0021 \pm 0.0017$ [4]
$A_{\ell\ell}^s$	Lepton asymmetry B_s	$10^{-5} < A_{\ell\ell}^s < 4 \times 10^{-3}$	10^{-3}	$A_{\ell\ell}^s = -0.0006 \pm 0.0028$ [4]
$\langle\sigma v\rangle_\phi$	Annihilation Xsec for ϕ	$(6 - 20) \times 10^{-25}\ \mathrm{cm}^3/\mathrm{s}$	$10^{-24}\ \mathrm{cm}^3/\mathrm{s}$	Depends upon the channel [2]
$\langle\sigma v\rangle_\xi$	Annihilation Xsec for ξ	$(6 - 20) \times 10^{-25}\ \mathrm{cm}^3/\mathrm{s}$	$10^{-24}\ \mathrm{cm}^3/\mathrm{s}$	Depends upon the channel [2]

(x^2)*(0.3^4)/((48Pi(1.8^2+3^2)^4))*((2*1.8^5*3+5*1.8^4*3^2+8*1.8^3*3^3+9*1.8^2*3^4+6*1.8*3^5+3*1.8^6+3*3^6)) = x

Input:

$$x^2 \times \frac{0.3^4}{48\,\pi\,(1.8^2 + 3^2)^4}\,\left(2 \times 1.8^5 \times 3 + 5 \times 1.8^4 \times 3^2 + 8 \times 1.8^3 \times 3^3 + 9 \times 1.8^2 \times 3^4 + 6 \times 1.8 \times 3^5 + 3 \times 1.8^6 + 3 \times 3^6\right) = x$$

Result:

$$0.0000218275\,x^2 = x$$

Alternate form:

$$0.0000218275\,x^2 - x = 0$$

Alternate form assuming x is real:

$$0.0000218275\,x^2 + 0 = x$$

Solutions:

$x = 0$

$x \approx 45813.7$

45813.7

(45813.7^2)*(0.3^4)/((48Pi(1.8^2+3^2)^4))*((2*1.8^5*3+5*1.8^4*3^2+8*1.8^3*3^3+9*1.8^2*3^4+6*1.8*3^5+3*1.8^6+3*3^6))

Input interpretation:

$$45813.7^2 \times \frac{0.3^4}{48\pi(1.8^2+3^2)^4} \left(2\times 1.8^5\times 3+5\times 1.8^4\times 3^2+8\times 1.8^3\times 3^3+9\times 1.8^2\times 3^4+6\times 1.8\times 3^5+3\times 1.8^6+3\times 3^6\right)$$

Result:

45813.710256353028954218760566697341710073365929420281170 21...

45813.710256….

Alternative representations:

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times 1.8^5\times 3+5\times 1.8^4\times 3^2+8\times 1.8^3\times 3^3+9\times 1.8^2\times 3^4+6\times 1.8\times 3^5+3\times 1.8^6+3\times 3^6\right)\right)0.3^4 = \frac{1}{8640^\circ(9+1.8^2)^4} 0.3^4\left(216\times 1.8^3+45\times 1.8^4+6\times 1.8^5+3\times 1.8^6+9\times 1.8^2\times 3^4+10.8\times 3^5+3\times 3^6\right) 45813.7^2$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times 1.8^5\times 3+5\times 1.8^4\times 3^2+8\times 1.8^3\times 3^3+9\times 1.8^2\times 3^4+6\times 1.8\times 3^5+3\times 1.8^6+3\times 3^6\right)\right)0.3^4 = -\left(\left(0.3^4\left(216\times 1.8^3+45\times 1.8^4+6\times 1.8^5+3\times 1.8^6+9\times 1.8^2\times 3^4+10.8\times 3^5+3\times 3^6\right) 45813.7^2\right)/\left(48\, i\log(-1)(9+1.8^2)^4\right)\right)$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \left(0.3^4\left(216\times1.8^3+45\times1.8^4+6\times1.8^5+3\times1.8^6+9\times1.8^2\times3^4+10.8\times3^5+3\times3^6\right)45813.7^2\right)/\left(48\cos^{-1}(-1)\left(9+1.8^2\right)^4\right)$$

Series representations:

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{35982.}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{71964.}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{143928.}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{71964.}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{35982.}{\int_0^1\sqrt{1-t^2}\,dt}$$

$$\frac{1}{48\pi(1.8^2+3^2)^4}\left(45813.7^2\left(2\times1.8^5\times3+5\times1.8^4\times3^2+8\times1.8^3\times3^3+9\times1.8^2\times3^4+6\times1.8\times3^5+3\times1.8^6+3\times3^6\right)\right)0.3^4 = \frac{71964.}{\int_0^\infty\frac{\sin(t)}{t}\,dt}$$

And also:

45813.710256353*(((((((0.3^4 (1.8+3)^2((1.3-1.8)(1.8+1.3))^1.5)))/(((2Pi*1.3^3(-1.8^2+3^2+1.3^2)^2)))))))

Input interpretation:

$$45813.710256353\times\frac{0.3^4\,(1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}}{2\pi\times1.3^3\,(-1.8^2+3^2+1.3^2)^2}$$

Result:

$-21.5347\ldots\,i$

Polar coordinates:

$r = 21.5347$ (radius), $\theta = -90.°$ (angle)

21.5347

Alternative representations:

$$\frac{45813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}\right)}{2\pi\,1.3^3\,(-1.8^2+3^2+1.3^2)^2} = \frac{45813.7102563530000\,(-1.55)^{1.5}\,0.3^4\times4.8^2}{360°\,1.3^3\,(9+1.3^2-1.8^2)^2}$$

$$\frac{45813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}\right)}{2\pi\,1.3^3\,(-1.8^2+3^2+1.3^2)^2} = -\frac{45813.7102563530000\,(-1.55)^{1.5}\,0.3^4\times4.8^2}{2\,i\log(-1)\,1.3^3\,(9+1.3^2-1.8^2)^2}$$

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = \frac{45\,813.7102563530000\,(-1.55)^{1.5}\,0.3^4\times 4.8^2}{2\cos^{-1}(-1)\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

Series representations:

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{3.10682\times 10^{-15}+16.9133\,i}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}$$

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{6.21363\times 10^{-15}+33.8266\,i}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}}$$

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{1.24273\times 10^{-14}+67.6531\,i}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}}$$

Integral representations:

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{6.21363\times 10^{-15}+33.8266\,i}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{3.10682\times 10^{-15}+16.9133\,i}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{45\,813.7102563530000\left(0.3^4\,(1.8+3)^2\,((1.3-1.8)\,(1.8+1.3))^{1.5}\right)}{2\,\pi\,1.3^3\left(-1.8^2+3^2+1.3^2\right)^2} = -\frac{6.21363\times 10^{-15}+33.8266\,i}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

And:

2Pi*45813.710256353*(((((((0.3^4 (1.8+3)^2((1.3-1.8)(1.8+1.3))^1.5)))/(((2Pi*1.3^3(-1.8^2+3^2+1.3^2)^2)))))))-4i

Where 4 is a Lucas number

Input interpretation:

$$2\pi\times 45813.710256353\times\frac{0.3^4\,(1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}}{2\pi\times 1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}-4i$$

i is the imaginary unit

Result:

$-139.306\ldots i$

Polar coordinates:

$r = 139.306$ (radius), $\theta = -90.°$ (angle)

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

Alternative representations:

$$\frac{(2\pi\, 45813.7102563530000)\,0.3^4\left((1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}\right)}{2\pi\, 1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}-i\,4 = -4i+\frac{1.64929356922870800\times 10^7\,°\,(-1.55)^{1.5}\,0.3^4\times 4.8^2}{360\,°\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

$$\frac{(2\pi\, 45813.7102563530000)\,0.3^4\left((1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}\right)}{2\pi\, 1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}-i\,4 = -4i--\frac{91627.4205127060000\,i\log(-1)\,(-1.55)^{1.5}\,0.3^4\times 4.8^2}{2\,i\log(-1)\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

$$\frac{(2\pi\, 45813.7102563530000)\,0.3^4\left((1.8+3)^2\,((1.3-1.8)(1.8+1.3))^{1.5}\right)}{2\pi\, 1.3^3\left(-1.8^2+3^2+1.3^2\right)^2}-i\,4 = -4i+\frac{91627.4205127060000\cos^{-1}(-1)\,(-1.55)^{1.5}\,0.3^4\times 4.8^2}{2\cos^{-1}(-1)\,1.3^3\left(9+1.3^2-1.8^2\right)^2}$$

We note that, from the formula concerning the Coefficients of the '5th order' mock theta function ψ_1(q), we obtain, for n = 318:

sqrt(golden ratio) * exp(Pi*sqrt(318/15)) / (2*5^(1/4)*sqrt(318)) + 123 + 29 - 2

where 123, 29 and 2 are Lucas numbers

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{318}{15}}\right)}{2 \sqrt[4]{5} \sqrt{318}} + 123 + 29 - 2$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{106/5}\,\pi} \sqrt{\frac{\phi}{318}}}{2 \sqrt[4]{5}} + 150$$

Decimal approximation:

45813.401720819789467972899722271244814413702859900111194842...

45813.4017208….

Property:

$$150 + \frac{e^{\sqrt{106/5}\,\pi} \sqrt{\frac{\phi}{318}}}{2 \sqrt[4]{5}}$$ is a transcendental number

Alternate forms:

$$150 + \frac{1}{4} \sqrt{\frac{1}{795} \left(5 + \sqrt{5}\right)} e^{\sqrt{106/5}\,\pi}$$

$$150 + \frac{\sqrt{\frac{1}{159} \left(1 + \sqrt{5}\right)} e^{\sqrt{106/5}\,\pi}}{4 \sqrt[4]{5}}$$

$$\frac{477000+5^{3/4}\sqrt{159\left(1+\sqrt{5}\right)}\ e^{\sqrt{106/5}\ \pi}}{3180}$$

Series representations:

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{318}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{318}}+123+29-2=\left(1500\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(318-z_0)^k z_0^{-k}}{k!}+5^{3/4}\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{106}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Bigg/\left(10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(318-z_0)^k z_0^{-k}}{k!}\right)\text{ for not }((z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{318}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{318}}+123+29-2=\left(1500\exp\left(i\pi\left\lfloor\frac{\arg(318-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(318-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}+5^{3/4}\exp\left(i\pi\left\lfloor\frac{\arg(\phi-x)}{2\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{106}{5}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{106}{5}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k(\phi-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Bigg/\left(10\exp\left(i\pi\left\lfloor\frac{\arg(318-x)}{2\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k(318-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\text{ for }(x\in\mathbb{R}\text{ and }x<0)$$

$$\frac{\sqrt{\phi}\ \exp\left(\pi\sqrt{\frac{318}{15}}\right)}{2\sqrt[4]{5}\ \sqrt{318}} + 123 + 29 - 2 =$$

$$\left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(318-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(318-z_0)/(2\pi)\rfloor} \left(1500\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(318-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(318-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (318-z_0)^k z_0^{-k}}{k!} + 5^{3/4} \exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{106}{5}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{106}{5}-z_0\right)/(2\pi)\right\rfloor\right)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{106}{5}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (\phi-z_0)^k z_0^{-k}}{k!}\right)\right) \Bigg/ \left(10\sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (318-z_0)^k z_0^{-k}}{k!}\right)$$

Now, we have that:

$$\langle\sigma v\rangle_{\xi\xi\to NN} = y_N^4 \frac{m_N^2}{32\pi m_{\Phi'}^4}\left[1 + \frac{2m_\xi^2}{3m_N^2}v^2\right], \qquad (32)$$

$$\langle\sigma v\rangle_{\phi^*\phi\to NN} = y_N^4 \frac{m_N^2}{8\pi m_{\Psi'}^4}\left[1 + \frac{m_\phi^2}{6m_N^2}v^2\right]. \qquad (33)$$

(x^4)*(((0.08333^2))/((32Pi*25^4)))*(((1+(2*1.8^2*45813.7^2)/(3*0.08333^2)))) = x

Input interpretation:

$$x^4 \times \frac{0.08333^2}{32\pi \times 25^4}\left(1 + \frac{2\times 1.8^2 \times 45\,813.7^2}{3\times 0.08333^2}\right) = x$$

Result:

$$115.448\, x^4 = x$$

Alternate form:

$115.448\, x^4 - x = 0$

Alternate form assuming x is real:

$115.448\, x^4 + 0 = x$

Real solutions:

$x = 0$

$x \approx 0.205371$

0.205371

Complex solutions:

$x = -0.102685 - 0.177856\, i$

$x = -0.102685 + 0.177856\, i$

And:

(0.205371^4)*(((0.08333^2))/((32Pi*25^4)))*(((1+(2*1.8^2*45813.7^2)/(3*0.08333^2))))

Input interpretation:

$$0.205371^4 \times \frac{0.08333^2}{32\,\pi \times 25^4} \left(1 + \frac{2 \times 1.8^2 \times 45\,813.7^2}{3 \times 0.08333^2}\right)$$

Result:

0.205372…

0.205372…

Alternative representations:

$$\frac{\left(0.205371^4 \left(1 + \frac{2 \times 1.8^2 \times 45\,813.7^2}{3 \times 0.08333^2}\right)\right) 0.08333^2}{32\,\pi\, 25^4} = \frac{0.08333^2 \times 0.205371^4 \left(1 + \frac{2 \times 1.8^2 \times 45\,813.7^2}{3 \times 0.08333^2}\right)}{5760 \circ 25^4}$$

$$\frac{\left(0.205371^4 \left(1 + \frac{2 \times 1.8^2 \times 45\,813.7^2}{3 \times 0.08333^2}\right)\right) 0.08333^2}{32\,\pi\, 25^4} = -\frac{0.08333^2 \times 0.205371^4 \left(1 + \frac{2 \times 1.8^2 \times 45\,813.7^2}{3 \times 0.08333^2}\right)}{32\, i \log(-1)\, 25^4}$$

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.08333^2\times0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)}{32\cos^{-1}(-1)\,25^4}$$

Series representations:

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.161299}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.322597}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.645195}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.322597}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.161299}{\int_0^{1}\sqrt{1-t^2}\,dt}$$

$$\frac{\left(0.205371^4\left(1+\frac{2\times1.8^2\times45813.7^2}{3\times0.08333^2}\right)\right)0.08333^2}{32\,\pi\,25^4} = \frac{0.322597}{\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

(0.205371^4)*(((0.08333^2))/((8Pi*3.3^4)))*(((1+(1.3^2*45813.7^2)/(6*0.08333^2)
)))

Input interpretation:

$$0.205371^4 \times \frac{0.08333^2}{8\pi \times 3.3^4}\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)$$

Result:

352.847…

352.847…

Alternative representations:

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{1440\,°\,3.3^4}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=-\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{8\,i\log(-1)\,3.3^4}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{8\cos^{-1}(-1)\,3.3^4}$$

Series representations:

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=\frac{277.126}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=\frac{554.252}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\,3.3^4}=\frac{1108.5}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

Integral representations:

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\, 3.3^4}=\frac{554.252}{\int_0^\infty \frac{1}{1+t^2}\,dt}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\, 3.3^4}=\frac{277.126}{\int_0^1 \sqrt{1-t^2}\,dt}$$

$$\frac{\left(0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)0.08333^2}{8\pi\, 3.3^4}=\frac{554.252}{\int_0^\infty \frac{\sin(t)}{t}\,dt}$$

From which:

(((0.205371^4)*(((0.08333^2))/((8Pi*3.3^4)))*(((1+(1.3^2*45813.7^2)/(6*0.08333^2)))))) / ((((0.205371^4)*(((0.08333^2))/((32Pi*25^4)))*(((1+(2*1.8^2*45813.7^2)/(3*0.08333^2)))))))

Input interpretation:

$$\frac{0.205371^4\times\frac{0.08333^2}{8\pi\times 3.3^4}\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)}{0.205371^4\times\frac{0.08333^2}{32\pi\times 25^4}\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)}$$

Result:

1718.090235474595689485055063129254845872059084702723151216...

1718.0902354….

Alternative representations:

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)\left(8\pi\, 3.3^4\right)}{32\pi\, 25^4}}=\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)}{\frac{\left(1440^\circ\, 3.3^4\right)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)}{5760^\circ\, 25^4}}$$

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45\,813.7^2}{3\times 0.08333^2}\right)\right)(8\pi\,3.3^4)}{32\pi\,25^4}} = -\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{-\frac{(8\,i\log(-1)\,3.3^4)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45\,813.7^2}{3\times 0.08333^2}\right)\right)}{32\,i\log(-1)\,25^4}}$$

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45\,813.7^2}{3\times 0.08333^2}\right)\right)(8\pi\,3.3^4)}{32\pi\,25^4}} = \frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{\frac{(8\cos^{-1}(-1)\,3.3^4)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45\,813.7^2}{3\times 0.08333^2}\right)\right)}{32\cos^{-1}(-1)\,25^4}}$$

And:

(((0.205371^4)*(((0.08333^2))/((8Pi*3.3^4)))*(((1+(1.3^2*45813.7^2)/(6*0.08333^2)))))) / ((((0.205371^4)*(((0.08333^2))/((32Pi*25^4)))*(((1+(2*1.8^2*45813.7^2)/(3*0.08333^2))))))) +11

Where 11 is a Lucas number

Input interpretation:

$$\frac{0.205371^4\times\frac{0.08333^2}{8\pi\times 3.3^4}\left(1+\frac{1.3^2\times 45\,813.7^2}{6\times 0.08333^2}\right)}{0.205371^4\times\frac{0.08333^2}{32\pi\times 25^4}\left(1+\frac{2\times 1.8^2\times 45\,813.7^2}{3\times 0.08333^2}\right)}+11$$

Result:

1729.090235474595689485055063129254845872059084702723151216...

1729.09023547…..

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

Alternative representations:

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)\left(8\pi\, 3.3^4\right)}{32\pi\, 25^4}}+11 = 11+\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)}{\frac{\left(1440^\circ\, 3.3^4\right)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)}{5760^\circ\, 25^4}}$$

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)\left(8\pi\, 3.3^4\right)}{32\pi\, 25^4}}+11 = 11+-\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)}{-\frac{\left(8\, i\log(-1)\, 3.3^4\right)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)}{32\, i\log(-1)\, 25^4}}$$

$$\frac{0.205371^4\left(0.08333^2\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)\right)}{\frac{\left(0.205371^4\times 0.08333^2\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)\left(8\pi\, 3.3^4\right)}{32\pi\, 25^4}}+11 = 11+\frac{0.08333^2\times 0.205371^4\left(1+\frac{1.3^2\times 45813.7^2}{6\times 0.08333^2}\right)}{\frac{\left(8\cos^{-1}(-1)\, 3.3^4\right)\left(0.08333^2\times 0.205371^4\left(1+\frac{2\times 1.8^2\times 45813.7^2}{3\times 0.08333^2}\right)\right)}{32\cos^{-1}(-1)\, 25^4}}$$

Acknowledgments

We would like to thank Prof. **George E. Andrews** Evan Pugh Professor of Mathematics at Pennsylvania State University for his great availability and kindness towards me

References

Manuscript Book Of Srinivasa Ramanujan Volume 3

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

Andrews, G.E.: **A polynomial identity which implies the Rogers–Ramanujan identities**. Scr. Math. **28**, 297–305 (1970)