On some Ramanujan expressions: mathematical connections with ϕ and various formulas concerning several sectors of Cosmology and Black Holes/Wormholes Physics. XI

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Abstract

In this paper we have described some Ramanujan formulas and obtained some mathematical connections with ϕ *and various equations concerning different sectors of Cosmology and Black Holes/Wormholes Physics.*

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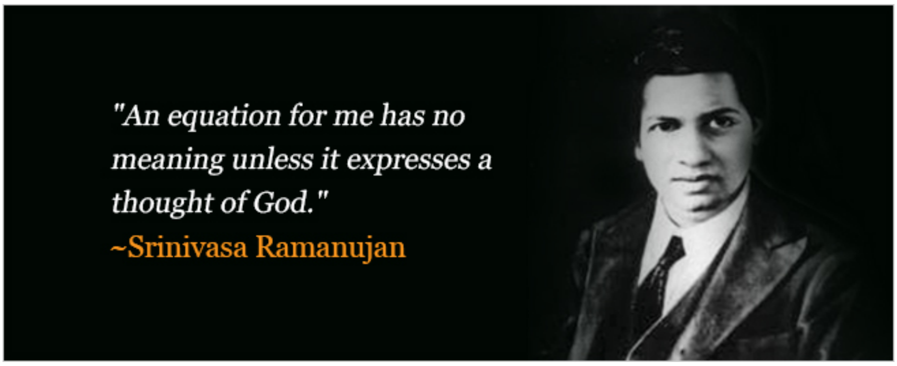
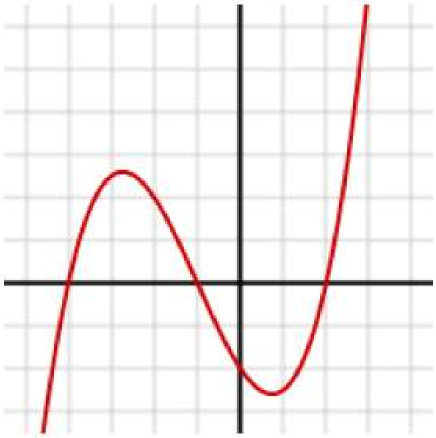
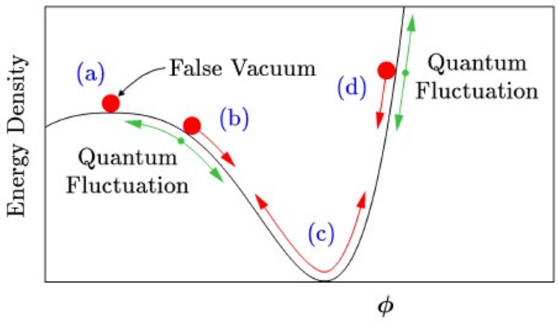


http://www.aicte-india.org/content/srinivasa-ramanujan





(arXiv:2002.01291v1 [astro-ph.GA] 4 Feb 2020)

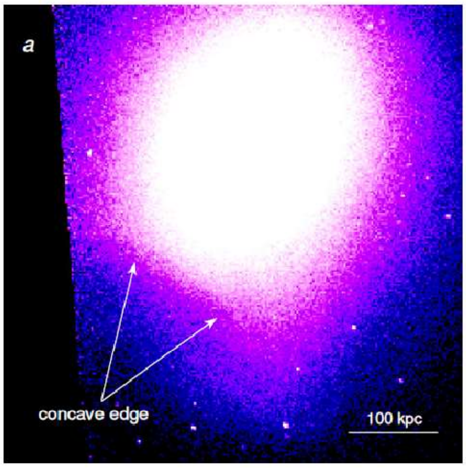


Figure 9. Chandra X-ray image of the Ophiuchus cluster in the 0.5-4 keV band, binned to 4'' pixels. (a) The concave edge, first reported by W16, is shown by arrows.

From:

DISCOVERY OF A GIANT RADIO FOSSIL IN THE OPHIUCHUS GALAXY CLUSTER

S. Giacintucci, M. Markevitch, M. Johnston-Hollitt, D. R. Wik, Q. H. S. Wang, and T. E. Clarke - arXiv:2002.01291v1 [astro-ph.GA] 4 Feb 2020

We have that:

What makes this cavity unique is its size and the energy required to create it. The latter has been estimated by W16 to be $pV \sim 5\times10^{61}$ erg, where p comes from the pressure of the ICM around it and V from the *Chandra* X-ray edge curvature. This value is of course only an order-of-magnitude estimate, as it involves several assumptions, such as where the cavity is located on the line of sight (which should not be too far from the cluster sky plane because it is still visible in the image) and the ICM density and temperature profiles at the relevant 3D radii. With

The energy is: $5 * 10^{61}$ erg, that is equal to:

Input interpretation:

5×10^{61} ergs

Result:

5×10^{61} ergs

Unit conversions:

5×10^{54} J (joules)

3.121×10^{73} eV (electronvolts)

$3.121*10^{73}$ eV

Input interpretation:

convert 3.121×10^{73} eV (electronvolts) to gigaelectronvolts

Result:

3.121×10^{64} GeV (gigaelectronvolts)

$3.121*10^{64}$ GeV

Additional conversions:

5×10^{54} J (joules)

5×10^{61} ergs
(unit officially deprecated)

Input interpretation:

convert 3.121×10^{64} GeV (gigaelectronvolts) to kilograms

Result:

5.564×10^{37} kg (kilograms)
(using $E = mc^2$)

$5.564*10^{37}$ kg

Additional conversions:

1.227×10^{38} lb (pounds)

5.564×10^{40} grams

5.564×10^{34} t (metric tons)

2.798×10^{7} $M_\odot$ (solar masses)

Comparisons as mass:

$\approx$ (0.0028 $\approx$ 1/357) $\times$ upper limit on the mass of a black hole ($\approx 1 \times 10^{10}$ $M_\odot$)

$\approx$ 0.56 $\times$ mass of a typical globular cluster ($\approx 1 \times 10^{38}$ kg)

We have a mass equal to $5.564 * 10^{37}$ kg. We note that:

Chandra observations reported in 2016 first revealed hints of the giant explosion in the Ophiuchus galaxy cluster. Norbert Werner and colleagues reported the discovery of an unusual curved edge in the Chandra image of the cluster. They considered whether this represented part of the wall of a cavity in the hot gas created by jets from the supermassive black hole. However, they discounted this possibility, in part because a huge amount of energy would have been required for the black hole to create a cavity this large.

The latest study by Giacintucci and her colleagues show that an enormous explosion did, in fact, occur. First, they showed that the curved edge is also detected by XMM-Newton, thus confirming the Chandra observation. Their crucial advance was the use of new radio data from the MWA and data from the GMRT archives to show the curved edge is indeed part of the wall of a cavity, because it borders a region filled with radio emission. This emission is from electrons accelerated to nearly the speed of light. The acceleration likely originated from the supermassive black hole.

"The radio data fit inside the X-rays like a hand in a glove," said co-author Maxim Markevitch of NASA's Goddard Space Flight Center in Greenbelt, Maryland. "This is the clincher that tells us an eruption of unprecedented size occurred here."

The amount of energy required to create the cavity in Ophiuchus is about five times greater than the previous record holder, MS 0735+74, and hundreds and thousands of times greater than typical clusters

(https://www.nasa.gov/mission_pages/chandra/news/record-breaking-explosion-by-black-hole-spotted.html)

At the center of the cluster is a large galaxy, which in turn contains a supermassive black hole: researchers think that the source of the eruption is precisely this black hole, which actively feeds on the surrounding gas, occasionally expelling large quantities of matter and energy at relativistic speeds.

https://www.media.inaf.it/2020/02/28/esplosione-ofiuco/

Inserting the above mass value $5.564 * 10^{37}$ kg, we obtain:

Mass = 5.56400e+37

Radius = 8.26346e+10

Temperature = 2.20517e-15

Values of a hypothetical black hole that originates from this mass, deriving from the energy of the eruption

From the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.56400e+37)* sqrt[[-((((2.20517e-15 * 4*Pi*(8.26346e+10)^3-(8.26346e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.56400\times 10^{37}}\sqrt{-\frac{2.20517\times 10^{-15}\times 4\pi\,(8.26346\times 10^{10})^3-(8.26346\times 10^{10})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618078268172943301824784718936010654173678072009482858904...

1.6180782681729…

and:

1/ sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.56400e+37)* sqrt[[-((((2.20517e-15 * 4*Pi*(8.26346e+10)^3-(8.26346e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\frac{1}{\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.56400\times 10^{37}}\sqrt{-\frac{2.20517\times 10^{-15}\times 4\pi\left(8.26346\times 10^{10}\right)^3-\left(8.26346\times 10^{10}\right)^2}{6.67\times 10^{-11}}}}}}$$

Result:

0.618017075978130673649368385918799612333908897330592838799...

0.618017075978…

It is possible to deduce that these occasional immense eruptions of the SMBH's are to be connected to the very long process of evaporation and emission of a black hole (Hawking radiation)

From:

Commun. math. Phys. 43, 199—220 (1975)

Particle Creation by Black Holes

S. W. Hawking

Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, England

Abstract. In the classical theory black holes can only absorb and not emit particles. However it is shown that quantum mechanical effects cause black holes to create and emit particles as if they were hot bodies with temperature $\frac{\hbar\kappa}{2\pi k} \approx 10^{-6}\left(\frac{M_\odot}{M}\right)$ °K where κ is the surface gravity of the black hole. This thermal emission leads to a slow decrease in the mass of the black hole and to its eventual disappearance: any primordial black hole of mass less than about 10^{15} g would have evaporated by now. Although these quantum effects violate the classical law that the area of the event horizon of a black hole cannot decrease, there remains a Generalized Second Law: $S+\frac{1}{4}A$ never decreases where S is the entropy of matter outside black holes and A is the sum of the surface areas of the event horizons. This shows that gravitational collapse converts the baryons and leptons in the collapsing body into entropy. It is tempting to speculate that this might be the reason why the Universe contains so much entropy per baryon.

Solar mass = 1.989e+30 kg

Hypothetical SMBH = 5.564e+37 kg

Thence:

1/10^(6) * (((1.989e+30)/(5.564e+37)))

Input interpretation:

$$\frac{1}{10^6} \times \frac{1.989 \times 10^{30}}{5.564 \times 10^{37}}$$

Result:

$3.574766355140186915887850467289719626168224299065420 5... \times 10^{-14}$

$3.574766355140....*10^{-14}$

With a mass equal to the SMBH87 = 13.12806e+39, we obtain:

1/10^(6) * (((1.989e+30)/(13.12806e+39)))

Input interpretation:

$$\frac{1}{10^6} \times \frac{1.989 \times 10^{30}}{13.12806 \times 10^{39}}$$

Result:

$1.515075342434449568329212389340085282974026626934977 4... \times 10^{-16}$

$1.5150753424....*10^{-16}$

We have the following two ratios:

(1/10^(6) * (((1.989e+30)/(13.12806e+39)))) *1/ ((((1/10^(6) * (((1.989e+30)/(5.564e+37)))))))

Input interpretation:

$$\left(\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}\right)\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}}$$

Result:

0.004238249977529048465652960147957885628188780368157976121...

0.004238249977529….

And:

1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39)))))))

Input interpretation:

$$\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}$$

Result:

235.9464414090582314881380301941049604601006470165348670021...

235.9464414.....

We take this second result:

((((1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39))))))))))^1/10+5/10^3

Input interpretation:

$$\sqrt[10]{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}}+\frac{5}{10^3}$$

Result:

1.731956...

1.7319…. $\approx\sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q

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

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

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

Possible closed forms:

$\sqrt{3} \approx 1.7320508$

$\sqrt[\pi]{e}\ \pi \cos^2(e\,\pi) \approx 1.7320014$

$\frac{43\pi}{78} \approx 1.731903642$

((((1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39)))))))))))^1/11-(18+7)*1/10^3

Input interpretation:

$$\sqrt[11]{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}}-(18+7)\times\frac{1}{10^3}$$

Result:

1.618275241456656216204970450661574831749768911755261198567...

1.618275241456…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

and:

1/2((((1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39)))))))))))+21+1/golden ratio

Input interpretation:

$$\frac{1}{2}\left(\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}\right)+21+\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

139.591...

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

1/2((((1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39))))))))))+8-1/golden ratio

Input interpretation:

$$\frac{1}{2}\left(\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}\right)+8-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

125.355...

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

27*1/2(((1/2((((1/10^(6) * (((1.989e+30)/(5.564e+37))) *1/((((1/10^(6) * (((1.989e+30)/(13.12806e+39))))))))))+11-1/golden ratio)))-Pi-1/golden ratio

Input interpretation:

$$27\times\frac{1}{2}\left(\frac{1}{2}\left(\frac{1}{10^6}\times\frac{1.989\times10^{30}}{5.564\times10^{37}}\times\frac{1}{\frac{1}{10^6}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}}\right)+11-\frac{1}{\phi}\right)-\pi-\frac{1}{\phi}$$

ϕ is the golden ratio

Result:

1729.04...

1729.04…

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

Now, we have that:

$$\left(\text{For a Schwarzchild black hole } \kappa = \frac{1}{4M}\right).$$

For a given frequency ω, i.e. a given value of j, the absorption fraction Γ_{jn} goes to zero as the angular quantum number l increases because of the centrifugal barrier. Thus at first sight it might seem that each wave-packet mode of high l value would contain

$$\{\exp(2\pi\omega\kappa^{-1}) - 1\}^{-1}$$

particles and that the total rate of particles and energy crossing the event horizon would be infinite. This calculation would, of course, be inconsistent with the

We have:

(exp((((2Pi*(10^21)*(1/(4*13.12806e+39))^(-1)-1)))))^(-1)

Input interpretation:

$$\frac{1}{\exp\left(\frac{2\pi \times 10^{21}}{\frac{1}{4 \times 13.12806 \times 10^{39}}} - 1\right)}$$

Power of 10 representation:

$$10^{-10^{62.15622472391961}}$$

Thence:

10^(-1.4329291708760 × 10^62)

Input interpretation:

$$10^{-1.4329291708760 \times 10^{62}}$$

Power of 10 representation:

$10^{-10^{62.15622472392286}}$

-ln(ln(exp((((2Pi*(10^21)*(1/(4*13.12806e+39))^(-1)-1)))))^(-1))-Pi-golden ratio

Input interpretation:

$$-\log\left(\frac{1}{\log\left(\exp\left(\frac{2\pi\times10^{21}}{\frac{1}{4\times13.12806\times10^{39}}}-1\right)\right)}\right)-\pi-\phi$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

139.194...

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

-ln(ln(exp((((2Pi*(10^21)*(1/(4*13.12806e+39))^(-1)-1)))))^(-1))-11-2Pi-golden ratio

Input interpretation:

$$-\log\left(\frac{1}{\log\left(\exp\left(\frac{2\pi\times10^{21}}{\frac{1}{4\times13.12806\times10^{39}}}-1\right)\right)}\right)-11-2\pi-\phi$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

125.053...

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

1/Pi+27*1/2(((-ln(ln(exp((((2Pi*(10^21)*(1/(4*13.12806e+39))^(-1)-1)))))^(-1))-8-2Pi-golden ratio)))

Input interpretation:

$$\frac{1}{\pi}+27\times\frac{1}{2}\left(-\log\left(\frac{1}{\log\left(\exp\left(\frac{2\pi\times10^{21}}{\frac{1}{4\times13.12806\times10^{39}}}-1\right)\right)}\right)-8-2\pi-\phi\right)$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1729.03...

1729.03…

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

((((1/Pi+27*1/2(((-ln(ln(exp((((2Pi*(10^21)*(1/(4*13.12806e+39))^(-1)-1)))))^(-1))-8-2Pi-3/2)))))))^1/15-(21+5)*1/10^3

Input interpretation:

$$\sqrt[15]{\frac{1}{\pi}+27\times\frac{1}{2}\left(-\log\left(\frac{1}{\log\left(\exp\left(\frac{2\pi\times10^{21}}{\frac{1}{4\times13.12806\times10^{39}}}-1\right)\right)}\right)-8-2\pi-\frac{3}{2}\right)}-(21+5)\times\frac{1}{10^3}$$

log(x) is the natural logarithm

Result:

1.617918160470874221705043839169332288945934052753135096202...

1.61791816047…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Polar coordinates:

$r \approx 1.4041$ (radius), $\theta \approx 12.2206°$ (angle)

1.4041

Now, we have that:

Solar mass = 1.989e+30 kg

From Wikipedia:

$$E = h\nu = h\frac{c}{\lambda} = hc\frac{c^2}{2GM} = \frac{hc^3}{2GM}.$$

In SI units, the radiation from a Schwarzschild black hole is blackbody radiation with temperature

$$T = \frac{\hbar c^3}{8\pi G k_B M} \approx 1.227 \times 10^{+23} \mathrm{K{\cdot}kg} \times \frac{1}{M} = 6.169 \times 10^{-8} \mathrm{K} \times \frac{M_\odot}{M},$$

where $\hbar$ is the reduced Planck constant, c is the speed of light, k_B is the Boltzmann constant, G is the gravitational constant, $M_\odot$ is the solar mass, and M is the mass of the black hole.

Thence:

$$T = \frac{\hbar c^3}{8\pi G k_B M} \approx 1.227 \times 10^{+23} \mathrm{K{\cdot}kg} \times \frac{1}{M} = 6.169 \times 10^{-8} \mathrm{K} \times \frac{M_\odot}{M},$$

(6.169e-8)*(((1.989e+30)/(13.12806e+39)))

Input interpretation:

$$6.169 \times 10^{-8} \times \frac{1.989 \times 10^{30}}{13.12806 \times 10^{39}}$$

Result:

$9.346499787478119387022911229838986110666770261561875 8... \times 10^{-18}$

9.346499787...*10^-18

Input interpretation:

convert $9.346499787\times 10^{-18}$ K (kelvins) to gigaelectronvolts per Boltzmann constant

Result:

$8.05419035\times 10^{-31}$ GeV/k_B (gigaelectronvolts per Boltzmann constant)

$8.05419035 * 10^{-31}$

((((6.169e-8)*(((1.989e+30)/(13.12806e+39))))))^1/4096

Input interpretation:

$$\sqrt[4096]{6.169\times 10^{-8}\times \frac{1.989\times 10^{30}}{13.12806\times 10^{39}}}$$

Result:

0.990472549...

0.990472549…. result very near to the value of the following Rogers-Ramanujan continued fraction:

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

and to the value associate to dilaton $\mathbf{0.989117352243 = \phi}$

2(((log base 0.990472549((((6.169e-8)*(((1.989e+30)/(13.12806e+39))))))))^1/2-Pi+1/golden ratio

Input interpretation:

$$2\sqrt{\log_{0.990472549}\left(6.169\times 10^{-8}\times \frac{1.989\times 10^{30}}{13.12806\times 10^{39}}\right)}-\pi+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

125.4764...

125.4764… result very near to the Higgs boson mass 125.18 GeV

2(((log base 0.990472549((((6.169e-8)*(((1.989e+30)/(13.12806e+39))))))))^1/2+11+1/golden ratio

Input interpretation:

$$2\sqrt{\log_{0.990472549}\left(6.169\times10^{-8}\times\frac{1.989\times10^{30}}{13.12806\times10^{39}}\right)}+11+\frac{1}{\phi}$$

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

ϕ is the golden ratio

Result:

139.6180...

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

From

$$E = h\nu = h\frac{c}{\lambda} = hc\frac{c^2}{2GM} = \frac{hc^3}{2GM}.$$

((((1.0545718×10^-34)(2.99792×10^8)^3)))/((((2*(6.674e-11)(13.12806e+39)))))

Input interpretation:

$$\frac{1.0545718\times10^{-34}\,(2.99792\times10^{8})^3}{2\times6.674\times10^{-11}\times13.12806\times10^{39}}$$

Result:

$1.62150958883853047033832320235968094019526770332114 65... \times 10^{-39}$

1.621509588838....*10^{-39}

1.621509588838 × 10^-39 Kg = GeV

Input interpretation:

convert $1.621509588838 \times 10^{-39}$ kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

$9.09600171051 \times 10^{-13}$ GeV/c^2

$9.096...*10^{-13}$

Indeed we have, in GeV:

((((6.582119×10^-25 GeV*s)(2.99792×10^8 m)^3)))/((((2*(6.674e-11 Newton meters^2/kg^2)(7.3643e+66 GeV/c^2)))))

Input interpretation:

$$(6.582119 \times 10^{-25}\ \text{s GeV (second gigaelectronvolts)}\ (2.99792 \times 10^{8}\ \text{meters})^3)/(2 \times 6.674 \times 10^{-11}\ \text{N m}^2/\text{kg}^2\ \text{(newton square meters per kilogram squared)} \times 7.3643 \times 10^{66}\ \text{GeV}/c^2)$$

Result:

1.622×10^{-39} kg m^{2}s (kilogram meter squared seconds)

$1.622*10^{-39}$

Input interpretation:

convert 1.622×10^{-39} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

9.099×10^{-13} GeV/c^2

$9.099*10^{-13}$

From which we obtain the following energy:

Input interpretation:

$9.099 \times 10^{-13}\ (2.99792 \times 10^{8})^2$ GeV (gigaelectronvolts)

Result:

81 777 GeV (gigaelectronvolts)

Result:

8.1777×10^4

$8.1777 * 10^4$ GeV m^2s

Input interpretation:

convert 81777 GeV/c^2 to kilograms

Result:

1.458×10^{-22} kg (kilograms)

Additional conversion:

1.458×10^{-19} grams

$1.458 * 10^{-22}$ kg

From the ratio between temperature T and energy E, we obtain:

(9.346499787*10^-18 / 1.458×10^-22)

Input interpretation:

$$\frac{9.346499787 \times 10^{-18}}{1.458 \times 10^{-22}}$$

Result:

64104.93681069958847736625514403292181069958847736625514403...

64104.93681....

From which:

(9.346499787*10^-18 / 1.458×10^-22)^1/23

Input interpretation:

$$\sqrt[23]{\frac{9.346499787 \times 10^{-18}}{1.458 \times 10^{-22}}}$$

Result:

1.618062458019936289099914393777263007044780280122070999720...

1.618062458019... result that is a very good approximation to the value of the golden ratio 1.618033988749...

1.61806.....

Possible closed forms:

$\phi \approx 1.618033988$

$\frac{25 e}{42} \approx 1.618024897$

$-e! + 5 - \frac{5}{e} + e \approx 1.6180641462$

And performing the square root, we obtain:

(9.346499787*10^-18 / 1.458×10^-22)^1/2

Input interpretation:

$$\sqrt{\frac{9.346499787 \times 10^{-18}}{1.458 \times 10^{-22}}}$$

Result:

253.190...

253.19…

And:

1/2 (9.346499787*10^-18 / 1.458×10^-22)^1/2 - sqrt2

Input interpretation:

$$\frac{1}{2} \sqrt{\frac{9.346499787 \times 10^{-18}}{1.458 \times 10^{-22}}} - \sqrt{2}$$

Result:

125.181...

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

1/2 (9.346499787*10^-18 / 1.458×10^-22)^1/2 +13

Input interpretation:

$$\frac{1}{2}\sqrt{\frac{9.346499787\times10^{-18}}{1.458\times10^{-22}}}+13$$

Result:

139.595...

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

27*1/2*(((1/2 (9.346499787*10^-18 / 1.458×10^-22)^1/2 + 2)))-7

Input interpretation:

$$27\times\frac{1}{2}\left(\frac{1}{2}\sqrt{\frac{9.346499787\times10^{-18}}{1.458\times10^{-22}}}+2\right)-7$$

Result:

1729.03...

1729.03...

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

With regard 27 (From Wikipedia):

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

From:

Replica Wormholes and the Entropy of Hawking Radiation
Ahmed Almheiri,1 Thomas Hartman,2 Juan Maldacena,1 Edgar Shaghoulian,2 and Amirhossein Tajdini2 - arXiv:1911.12333v1 [hep-th] 27 Nov 2019

We have that:

The metric of eternal black hole, glued to flat space on both sides, is

$$ds^2_{\text{in}} = \frac{4\pi^2}{\beta^2}\frac{dyd\bar{y}}{\sinh^2\frac{\pi}{\beta}(y+\bar{y})}, \qquad ds^2_{\text{out}} = \frac{1}{\epsilon^2}dyd\bar{y}\ , \tag{3.1}$$

$$y = \sigma + i\tau, \qquad \bar{y} = \sigma - i\tau\ , \qquad \tau = \tau + \beta\ . \tag{3.2}$$

The subscript 'in' refers to the gravity zone, and 'out' refers to the matter zone[4]. The interface is along the circle $\sigma = -\epsilon$. Lorenztian time t is $\tau = -it$. The welding maps of figure 10 are trivial and we have

$$z = v = w = e^{2\pi y/\beta}\ , \qquad y = \frac{\beta}{2\pi}\log w\ . \tag{3.4}$$

x/(2Pi) * ln(e^(((2Pi*a)/x))) = y

Input:

$$\frac{x}{2\pi}\log\left(e^{(2\pi a)/x}\right) = y$$

log(x) is the natural logarithm

Exact result:

$$\frac{x\log\left(e^{(2\pi a)/x}\right)}{2\pi} = y$$

Alternate form assuming a, x, and y are real:

$$2\pi y = x\log\left(e^{(2\pi a)/x}\right)$$

Alternate form assuming a, x, and y are positive:

$$a = y$$

Solution:

$$y = \frac{x\log\left(e^{(2\pi a)/x}\right)}{2\pi}$$

x/(2Pi) * ln(e^(((2Pi*(t-1/12))/x))) = t-1/12

Input:

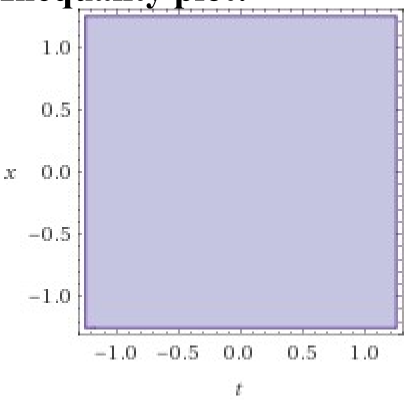
$$\frac{x}{2\pi}\log\left(e^{\left(2\pi\left(t-\frac{1}{12}\right)\right)/x}\right)=t-\frac{1}{12}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{x\log\left(e^{\left(2\pi\left(t-\frac{1}{12}\right)\right)/x}\right)}{2\pi}=t-\frac{1}{12}$$

Inequality plot:



Alternate form assuming t and x are real:

$$12\pi t=6x\log\left(e^{\left(2\pi\left(t-\frac{1}{12}\right)\right)/x}\right)+\pi$$

Alternate form:

$$2\pi t-x\log\left(e^{\left(\pi\left(2t-\frac{1}{6}\right)\right)/x}\right)=\frac{\pi}{6}$$

(Pi/6)/(2Pi) * ln(e^(((2Pi*(t-1/12))/(Pi/6)))) = t-1/12

Input:

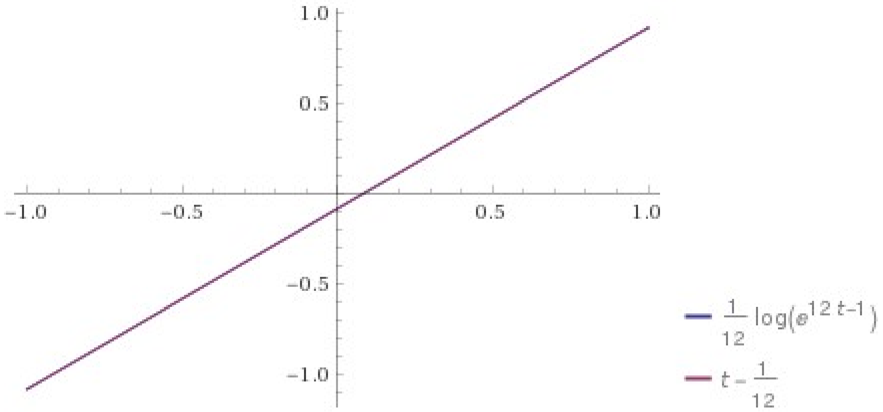
$$\frac{\frac{\pi}{6}}{2\pi}\log\left(e^{\left(2\pi\left(t-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)=t-\frac{1}{12}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{1}{12}\log\left(e^{12(t-1/12)}\right)=t-\frac{1}{12}$$

Plot:



Alternate forms:

$$\log(e^{12t-1}) - 12t = -1$$

$$\frac{1}{12}\log(e^{12t-1}) = t - \frac{1}{12}$$

Alternate form assuming t>0:

True

For t = 1, we obtain:

(Pi/6)/(2Pi) * ln(e^(((2Pi*(1-1/12))/(Pi/6))))

Input:

$$\frac{\frac{\pi}{6}}{2\pi}\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{11}{12}$$

Decimal approximation:

0.9166666666666666666666666666666666666666666666666666666666...

0.916666…

Alternative representations:

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{2\pi^2\left(1-\frac{1}{12}\right)}{\frac{6}{6}(2\pi)\pi}$$

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{\pi \log_e\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)}{6(2\pi)}$$

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{\pi \log(a) \log_a\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)}{6(2\pi)}$$

Series representations:

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{1}{12}\log(-1+e^{11}) - \frac{1}{12}\sum_{k=1}^{\infty}\frac{(-1)^k(-1+e^{11})^{-k}}{k}$$

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{1}{6} i\pi \left\lfloor \frac{\arg(e^{11}-x)}{2\pi} \right\rfloor + \frac{\log(x)}{12} - \frac{1}{12}\sum_{k=1}^{\infty}\frac{(-1)^k(e^{11}-x)^k x^{-k}}{k}$$

for $x < 0$

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{1}{12}\left\lfloor \frac{\arg(e^{11}-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \frac{\log(z_0)}{12} + \frac{1}{12}\left\lfloor \frac{\arg(e^{11}-z_0)}{2\pi} \right\rfloor \log(z_0) - \frac{1}{12}\sum_{k=1}^{\infty}\frac{(-1)^k(e^{11}-z_0)^k z_0^{-k}}{k}$$

Integral representations:

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{1}{12}\int_1^{e^{11}} \frac{1}{t}\,dt$$

$$\frac{\log\left(e^{\left(2\pi\left(1-\frac{1}{12}\right)\right)/\frac{\pi}{6}}\right)\pi}{6(2\pi)} = \frac{1}{24 i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{(-1+e^{11})^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

Thence: $\beta = \pi / 6$ and $y = 11/12$ $\sigma = -1/12$,

$$\phi = \frac{2\pi\phi_r}{\beta}\frac{1+|w|^2}{1-|w|^2} = -\frac{2\pi\phi_r}{\beta}\frac{1}{\tanh\frac{2\pi\sigma}{\beta}} \ .$$

-2Pi*x*1/(Pi/6)*1/(tanh((((2Pi*(-1/12))/(Pi/6))))) = y

Input:

$$-2\pi x \times \frac{1}{\frac{\pi}{6}} \times \frac{1}{\tanh\left(\frac{\frac{2}{12}\pi\times(-1)}{\frac{\pi}{6}}\right)} = y$$

$\tanh(x)$ is the hyperbolic tangent function

Exact result:

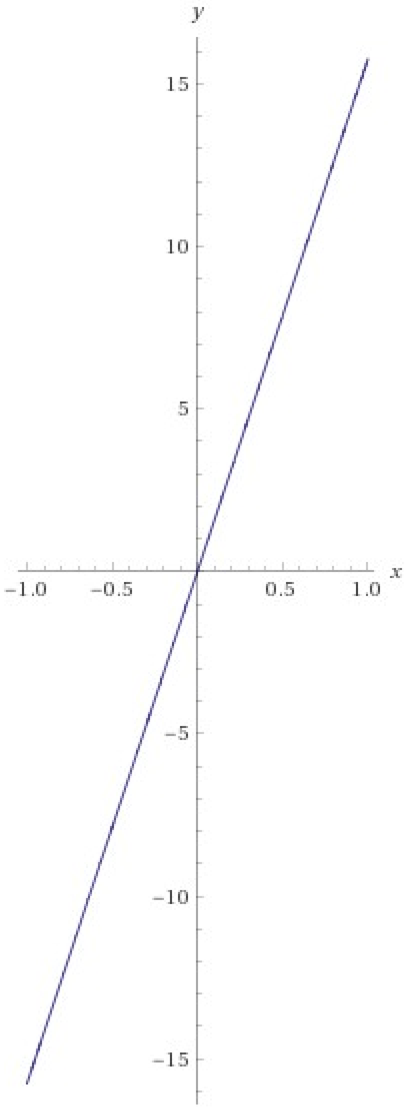
$$12\, x \coth(1) = y$$

$\coth(x)$ is the hyperbolic cotangent function

Geometric figure:

line

Implicit plot:



Alternate forms:

$$x = \frac{1}{12}\, y \tanh(1)$$

$$12\,x\coth(1) - y = 0$$
$$\frac{12\,x\cosh(1)}{\sinh(1)} = y$$

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

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

Alternate form assuming x and y are real:

$$-\frac{12\,x\sinh(2)}{1-\cosh(2)} = y$$

Real solution:

$$y = 12\,x\coth(1)$$

Solution:

$$y = 12\,x\coth(1)$$

Partial derivatives:

$$\frac{\partial}{\partial x}(12\,x\coth(1)) = 12\coth(1)$$
$$\frac{\partial}{\partial y}(12\,x\coth(1)) = 0$$

Input:

$$-2\,\pi\,x\times\frac{1}{\frac{\pi}{6}}\times\frac{1}{\tanh\left(\frac{\frac{2}{12}\,\pi\times(-1)}{\frac{\pi}{6}}\right)}$$

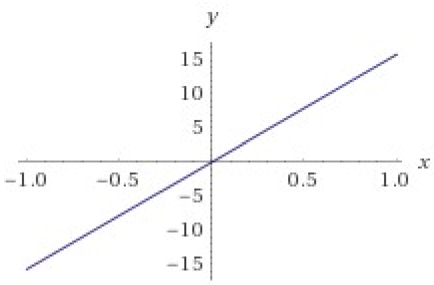
$\tanh(x)$ is the hyperbolic tangent function

Exact result:

$12\,x\coth(1)$

$\coth(x)$ is the hyperbolic cotangent function

Plot:



(x from −1 to 1)

Geometric figure:

line

Alternate forms:

$$\frac{12\,x\cosh(1)}{\sinh(1)}$$

$$\frac{12\,(e^2\,x+x)}{e^2-1}$$

$$\frac{6\,e\,x}{\frac{e}{2}-\frac{1}{2\,e}}+\frac{6\,x}{\left(\frac{e}{2}-\frac{1}{2\,e}\right)e}$$

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

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

For x = (sqrt(1110/943)*1/π^2)

Input:

$$\sqrt{\frac{1110}{943}}\times\frac{1}{\pi^2}$$

Result:

$$\frac{\sqrt{\frac{1110}{943}}}{\pi^2}$$

Decimal approximation:

0.1099273851843445106625859555327415385120888645482465754 52...

0.1099273851843…

Property:

$\frac{\sqrt{\frac{1110}{943}}}{\pi^2}$ is a transcendental number

We obtain:

-2Pi(sqrt(1110/943)*1/π^2)/(Pi/6)*1/(tanh((((2Pi*(-1/12))/(Pi/6)))))

Input:

$$-2\,\pi\left(\frac{\sqrt{\frac{1110}{943}}\times\frac{1}{\pi^2}}{\frac{\pi}{6}}\times\frac{1}{\tanh\left(\frac{\frac{2}{12}\,\pi\times(-1)}{\frac{\pi}{6}}\right)}\right)$$

$\tanh(x)$ is the hyperbolic tangent function

Exact result:

$$\frac{12\sqrt{\frac{1110}{943}}\coth(1)}{\pi^2}$$

$\coth(x)$ is the hyperbolic cotangent function

Decimal approximation:

1.732062427076649079745367253208367159001503033027710447384...

1.732062427…. = $\phi \approx \sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q

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

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

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

Alternate forms:

$$\frac{12\sqrt{\frac{1110}{943}}\cosh(1)}{\pi^2\sinh(1)}$$

$$-\frac{12\sqrt{\frac{1110}{943}}\sinh(2)}{\pi^2(1-\cosh(2))}$$

$$\frac{12\sqrt{\frac{1110}{943}}\left(\frac{1}{e}+e\right)}{\left(e-\frac{1}{e}\right)\pi^2}$$

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

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

Alternative representations:

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{2\pi\sqrt{\frac{1110}{943}}}{\frac{\pi\pi^2}{6\coth\left(-\frac{2\pi}{\frac{12\pi}{6}}\right)}}$$

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{2\pi\sqrt{\frac{1110}{943}}}{\frac{1}{6}\pi\pi^2\left(-1+\frac{2}{1+e^{(4\pi)/\frac{12\pi}{6}}}\right)}$$

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{2\pi\sqrt{\frac{1110}{943}}}{\frac{1}{6}\coth\left(-\frac{i\pi}{2}-\frac{2\pi}{\frac{12\pi}{6}}\right)\pi\pi^2}$$

Series representations:

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = \frac{12\sqrt{\frac{1110}{943}}}{\pi^2} + \frac{24\sqrt{\frac{1110}{943}}\sum_{k=0}^{\infty} e^{-2(1+k)}}{\pi^2}$$

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = \frac{12\sqrt{\frac{1110}{943}}\sum_{k=-\infty}^{\infty}\frac{1}{1+k^2\pi^2}}{\pi^2}$$

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{12\sqrt{\frac{1110}{943}}}{\pi^2} - \frac{24\sqrt{\frac{1110}{943}}\sum_{k=1}^{\infty} q^{2k}}{\pi^2} \quad \text{for } q = e$$

Integral representation:

$$-\frac{(2\pi)\sqrt{\frac{1110}{943}}}{\frac{1}{6}(\pi^2\pi)\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{12\sqrt{\frac{1110}{943}}}{\pi^2}\int_{\frac{i\pi}{2}}^{1}\operatorname{csch}^2(t)\,dt$$

For x = 0.11 = 11/10

-2Pi(0.11)*1/(Pi/6)*1/(tanh((((2Pi*(-1/12))/(Pi/6)))))

Input:

$$-2\pi\left(0.11\times\frac{1}{\frac{\pi}{6}}\times\frac{1}{\tanh\left(\frac{\frac{2}{12}\pi\times(-1)}{\frac{\pi}{6}}\right)}\right)$$

$\tanh(x)$ is the hyperbolic tangent function

Result:

1.73321...

1.73321.... ≈ $\sqrt{3}$ that is the ratio between the gravitating mass M_0 and the Wheelerian mass q

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

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

Alternative representations:

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{\frac{2\pi(-1)}{12\pi}}{6}\right)} = -\frac{0.22\pi}{\frac{\pi}{6\coth\left(-\frac{\frac{2\pi}{12\pi}}{6}\right)}}$$

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{\frac{2\pi(-1)}{12\pi}}{6}\right)} = -\frac{0.22\pi}{\frac{1}{6}\coth\left(-\frac{i\pi}{2}-\frac{\frac{2\pi}{12\pi}}{6}\right)\pi}$$

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{\frac{2\pi(-1)}{12\pi}}{6}\right)} = -\frac{0.22\pi}{\frac{1}{6}\pi\left(-1+\frac{2}{1+e^{(4\pi)/\frac{12\pi}{6}}}\right)}$$

Series representations:

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = \frac{0.66}{0.5+\sum_{k=1}^{\infty}(-1)^k q^{2k}} \quad \text{for } e\,q = 1$$

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = \frac{0.165}{\sum_{k=1}^{\infty}\frac{1}{4+(1-2k)^2\pi^2}}$$

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = \frac{1.32}{\sum_{k=1}^{\infty}\frac{(-1)^{2k}4^k\left(-1+4^k\right)B_{2k}}{(2k)!}}$$

Integral representation:

$$-\frac{(2\pi)\,0.11}{\frac{1}{6}\pi\tanh\left(\frac{2\pi(-1)}{\frac{12\pi}{6}}\right)} = -\frac{1.32}{\int_0^{-1}\operatorname{sech}^2(t)\,dt}$$

Now, we have that:

$$\partial_a S_{\text{gen}} = 0 \quad \rightarrow \qquad \sinh\left(\frac{2\pi a}{\beta}\right) = \frac{12\pi\phi_r}{\beta c}\frac{\sinh\left(\frac{\pi}{\beta}(b+a)\right)}{\sinh\left(\frac{\pi}{\beta}(a-b)\right)}$$

12Pi(0.11)/(Pi/6)*(sinh(((Pi/(Pi/6)(2+3))))/((sinh(((Pi/6)))))

(12Pi*0.11)(6/Pi)*sinh(((30)))/sinh((6))

Input:

$$(12\pi\times 0.11)\times\frac{6}{\pi}\times\frac{\sinh(30)}{\sinh(6)}$$

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

Result:

$2.09795\ldots \times 10^{11}$

$2.09795\ldots*10^{11}$

Alternative representations:

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{7.92\,\pi}{\frac{\pi\operatorname{csch}(30)}{\operatorname{csch}(6)}}$$

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{3.96\,\pi\left(-\frac{1}{e^{30}}+e^{30}\right)}{\frac{1}{2}\,\pi\left(-\frac{1}{e^{6}}+e^{6}\right)}$$

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = -\frac{7.92\,i\,\pi}{\frac{\pi\csc(30\,i)(-i)}{\csc(6\,i)}}$$

Series representations:

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{7.92\sum_{k=0}^{\infty}\frac{30^{1+2k}}{(1+2k)!}}{\sum_{k=0}^{\infty}\frac{6^{1+2k}}{(1+2k)!}}$$

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{7.92\sum_{k=0}^{\infty}I_{1+2k}(30)}{\sum_{k=0}^{\infty}I_{1+2k}(6)}$$

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{7.92\sum_{k=0}^{\infty}\frac{\left(30-\frac{i\pi}{2}\right)^{2k}}{(2k)!}}{\sum_{k=0}^{\infty}\frac{\left(6-\frac{i\pi}{2}\right)^{2k}}{(2k)!}}$$

Integral representations:

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{39.6\int_0^1\cosh(30\,t)\,dt}{\int_0^1\cosh(6\,t)\,dt}$$

$$\frac{(6\sinh(30))\,12\,(\pi\,0.11)}{\pi\sinh(6)} = \frac{39.6\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{225/s+s}}{s^{3/2}}\,ds}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{9/s+s}}{s^{3/2}}\,ds} \quad \text{for } \gamma > 0$$

From

$$S_{\text{gen}}([-a,b]) = S_0 + \frac{2\pi\phi_r}{\beta}\frac{1}{\tanh\left(\frac{2\pi a}{\beta}\right)} + \frac{c}{6}\log\left(\frac{2\beta\sinh^2\left(\frac{\pi}{\beta}(a+b)\right)}{\pi\epsilon\sinh\left(\frac{2\pi a}{\beta}\right)}\right) .$$

1.732062427…. = ϕ

where the CFT action is defined over a geometry which is rigid in the exterior region and is dynamical in the interior region. We are setting $4G_N = 1$ so that the area terms in the entropies will be just given by the value of ϕ, $\frac{\text{Area}}{4G_N} = S_0 + \phi$.

S_0 = 1.985163e+96 ; $\phi_r = 0.11$; β = π / 6 ; a = 2 ; b = 3 ; c = 1 ;

ϵ = 1/12 ; π / β = 6

$$S_0 + \frac{2\pi\phi_r}{\beta}\frac{1}{\tanh\left(\frac{2\pi a}{\beta}\right)} + \frac{c}{6}\log\left(\frac{2\beta\sinh^2\left(\frac{\pi}{\beta}(a+b)\right)}{\pi\epsilon\sinh\left(\frac{2\pi a}{\beta}\right)}\right)$$

(1.985163e+96) + 12*0.11*1/(tanh24) + 1/6 ln((((2Pi)/6)*sinh^2(30))/((Pi/12*sinh24))))

Input interpretation:

$$1.985163\times 10^{96} + 12\times 0.11\times\frac{1}{\tanh(24)} + \frac{1}{6}\log\left(\frac{\frac{2\pi}{6}\sinh^2(30)}{\frac{\pi}{12}\sinh(24)}\right)$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function
log(x) is the natural logarithm

Result:

$1.98516... \times 10^{96}$

1.98516…*10^{96}

ln(((((1.985163e+96) + 12*0.11*1/(tanh24) + 1/6 ln((((2Pi)/6)*sinh^2(30))/((Pi/12*sinh24)))))))

Input interpretation:

$$\log\left(1.985163 \times 10^{96} + 12 \times 0.11 \times \frac{1}{\tanh(24)} + \frac{1}{6} \log\left(\frac{\frac{2\pi}{6} \sinh^2(30)}{\frac{\pi}{12} \sinh(24)}\right)\right)$$

tanh(x) is the hyperbolic tangent function
sinh(x) is the hyperbolic sine function
log(x) is the natural logarithm

Result:

221.734...

221.734…

From the formula of coefficients of the '5th order' mock theta function ψ_1(q): (A053261 OEIS Sequence)

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

for n = 113, and subtracting the conjugate of the golden ratio, we obtain:

sqrt(golden ratio) * exp(Pi*sqrt(113/15)) / (2*5^(1/4)*sqrt(113)) - 1/golden ratio

Input:

$$\sqrt{\phi} \times \frac{\exp\left(\pi \sqrt{\frac{113}{15}}\right)}{2\sqrt[4]{5}\sqrt{113}} - \frac{1}{\phi}$$

ϕ is the golden ratio

Exact result:

$$\frac{e^{\sqrt{113/15}\,\pi}\sqrt{\frac{\phi}{113}}}{2\sqrt[4]{5}}-\frac{1}{\phi}$$

Decimal approximation:

221.7000320639370687672740569221542994151689678136548309446...

221.700032063937….

Property:

$\frac{e^{\sqrt{113/15}\,\pi}\sqrt{\frac{\phi}{113}}}{2\sqrt[4]{5}}-\frac{1}{\phi}$ is a transcendental number

Alternate forms:

$$\frac{1}{2}\left(1-\sqrt{5}\right)+\frac{1}{2}\sqrt{\frac{5+\sqrt{5}}{1130}}\,e^{\sqrt{113/15}\,\pi}$$

$$\frac{e^{\sqrt{113/15}\,\pi}\,\phi^{3/2}-2\sqrt[4]{5}\sqrt{113}}{2\sqrt[4]{5}\sqrt{113}\,\phi}$$

$$\frac{\sqrt{\frac{1}{226}\left(1+\sqrt{5}\right)}\,e^{\sqrt{113/15}\,\pi}}{2\sqrt[4]{5}}-\frac{2}{1+\sqrt{5}}$$

Series representations:

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{113}{15}}\right)}{2\sqrt[4]{5}\sqrt{113}}-\frac{1}{\phi}=\left(-10\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(113-z_0)^k z_0^{-k}}{k!}+5^{3/4}\,\phi\right.$$
$$\left.\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{113}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(113-z_0)^k z_0^{-k}}{k!}\right)\quad\text{for (not } (z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0))$$

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{113}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{113}} - \frac{1}{\phi} = \left(-10\exp\left(i\,\pi\left\lfloor\frac{\arg(113-x)}{2\,\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(113-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!} + 5^{3/4}\,\phi\exp\left(i\,\pi\left\lfloor\frac{\arg(\phi-x)}{2\,\pi}\right\rfloor\right)\exp\left(\pi\exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{113}{15}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{113}{15}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(\phi-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/ \left(10\,\phi\exp\left(i\,\pi\left\lfloor\frac{\arg(113-x)}{2\,\pi}\right\rfloor\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,(113-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)$$

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

$$\frac{\sqrt{\phi}\,\exp\left(\pi\sqrt{\frac{113}{15}}\right)}{2\sqrt[4]{5}\,\sqrt{113}} - \frac{1}{\phi} = \left(\left(\frac{1}{z_0}\right)^{-1/2\lfloor\arg(113-z_0)/(2\pi)\rfloor} z_0^{-1/2\lfloor\arg(113-z_0)/(2\pi)\rfloor}\left(-10\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(113-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(113-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(113-z_0)^k z_0^{-k}}{k!} + 5^{3/4}\,\phi\exp\left(\pi\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(\frac{113}{15}-z_0\right)/(2\pi)\right\rfloor} z_0^{1/2\left(1+\left\lfloor\arg\left(\frac{113}{15}-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(\frac{113}{15}-z_0\right)^k z_0^{-k}}{k!}\right)\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor} z_0^{1/2\lfloor\arg(\phi-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\phi-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/ \left(10\,\phi\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(113-z_0)^k z_0^{-k}}{k!}\right)$$

The generalized entropy, including the island, is

$$S_{\text{gen}}(I\cup R) = 2S_0 + \frac{2\phi_r}{\tanh a} + S_{\text{fermions}}(I\cup R)\ , \tag{5.8}$$

Without an island, the entropy is the CFT entropy on the complement of R, the interval $[P_4, P_2]$, which is

$$S_{\text{gen}}^{\text{no island}} = S_{\text{fermions}}(R) = \frac{c}{3}\log\left(2\cosh t_b\right) \tag{5.9}$$

At $t=0$,

$$S_{\text{gen}}^{\text{island}} = 2S_0 + \frac{2\phi_r}{\tanh a} + \frac{c}{3}\log\left(\frac{4\tanh^2\frac{a+b}{2}}{\sinh a}\right)\ . \tag{5.10}$$

From:

$$S_{\text{gen}}^{\text{island}} = 2S_0 + \frac{2\phi_r}{\tanh a} + \frac{c}{3}\log\left(\frac{4\tanh^2\frac{a+b}{2}}{\sinh a}\right)$$

$S_0 = 1.985163e+96$; $\phi_r = 0.11$; $\beta = \pi / 6$; $a = 2$; $b = 3$; $c = 1$;

2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2)))))

Input interpretation:

$$2\times 1.985163\times 10^{96} + \frac{2\times 0.11}{\tanh(2)} + \frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)$$

$\tanh(x)$ is the hyperbolic tangent function
$\sinh(x)$ is the hyperbolic sine function
$\log(x)$ is the natural logarithm

Result:

$3.97033... \times 10^{96}$

$3.97033...*10^{96}$

And:

ln(((2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2))))))))

Input interpretation:

$$\log\left(2\times 1.985163\times 10^{96} + \frac{2\times 0.11}{\tanh(2)} + \frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)\right)$$

$\tanh(x)$ is the hyperbolic tangent function
$\sinh(x)$ is the hyperbolic sine function
$\log(x)$ is the natural logarithm

Result:

222.427017...

222.427017…. result practically equal to the previous

From which, we have also:

1/2 ln(((2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2))))))))+29-1/golden ratio

Input interpretation:

$$\frac{1}{2}\log\left(2\times 1.985163\times 10^{96}+\frac{2\times 0.11}{\tanh(2)}+\frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)\right)+29-\frac{1}{\phi}$$

$\tanh(x)$ is the hyperbolic tangent function

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

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

139.595475...

139.595475… result practically equal to the rest mass of Pion meson 139.57 MeV

1/2 ln(((2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2))))))))+13+golden ratio

Input interpretation:

$$\frac{1}{2}\log\left(2\times 1.985163\times 10^{96}+\frac{2\times 0.11}{\tanh(2)}+\frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)\right)+13+\phi$$

$\tanh(x)$ is the hyperbolic tangent function

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

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result:

125.831543...

125.831543… result very near to the Higgs boson mass 125.18 GeV

27*1/2(((1/2 ln(((2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2))))))))+18-1/golden ratio))) – 7

Input interpretation:

$$27\times\frac{1}{2}\left(\frac{1}{2}\log\left(2\times1.985163\times10^{96}+\frac{2\times0.11}{\tanh(2)}+\frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)\right)+18-\frac{1}{\phi}\right)-7$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1729.03891...

1729.03891…

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

((((27*1/2(((1/2 ln(((2(1.985163e+96) + (2*0.11)/(tanh2) + 1/3 ln((((4tanh^2(2.5))/((sinh2))))))))+18-1/golden ratio))) - 7))))^1/15-(29-3)*1/10^3

Input interpretation:

$$\sqrt[15]{27\times\frac{1}{2}\left(\frac{1}{2}\log\left(2\times1.985163\times10^{96}+\frac{2\times0.11}{\tanh(2)}+\frac{1}{3}\log\left(\frac{4\tanh^2(2.5)}{\sinh(2)}\right)\right)+18-\frac{1}{\phi}\right)-7}-(29-3)\times\frac{1}{10^3}$$

tanh(x) is the hyperbolic tangent function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

ϕ is the golden ratio

Result:

1.6178176947188905294920594537320729930080985415737979570 56...

1.6178176947…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

From:

The island always exists and dominates the entropy at late times, because the non-island entropy grows linearly with t, see fig. 5. This solution is in the OPE limit where we can approximate the entanglement entropy by twice the single-interval answer,

$$S_{\text{matter}}(I \cup R) \approx 2S_{\text{matter}}([P_1, P_2]) = \frac{c}{3} \log \left(\frac{2|\cosh(a+b) - \cosh(t_a - t_b)|}{\sinh a} \right) . \qquad (5.13)$$

and the QES condition sets $t_a = t_b$.

$$S_{\text{matter}}(I \cup R) \approx 2S_{\text{matter}}([P_1, P_2]) - \frac{c}{3} \log \left(\frac{2|\cosh(a+b) - \cosh(t_a - t_b)|}{\sinh a} \right)$$

For $t_a = 8$, $t_b = 5$, we obtain:

1/3 ln [(((2cosh5)-(cosh(8-5)))/(((sinh2)))]

Input:

$$\frac{1}{3} \log\left(\frac{2 \cosh(5) - \cosh(8-5)}{\sinh(2)}\right)$$

cosh(x) is the hyperbolic cosine function

sinh(x) is the hyperbolic sine function

log(x) is the natural logarithm

Exact result:

$$\frac{1}{3} \log((2 \cosh(5) - \cosh(3)) \operatorname{csch}(2))$$

csch(x) is the hyperbolic cosecant function

Decimal approximation:

1.213811829519095958729226937173996438391902830055849237366...

1.213811829519...

Alternate forms:

$$\frac{1}{3} \log(-(\cosh(3) - 2 \cosh(5)) \operatorname{csch}(2))$$

$$\frac{1}{3} (\log(2 \cosh(5) - \cosh(3)) + \log(\operatorname{csch}(2)))$$

$$\frac{1}{3}\left(-3-\log(e^2-1)+\log\left(2-3e^2+3e^4-3e^6+2e^8\right)\right)$$

Alternative representations:

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=\frac{1}{3}\log_e\left(\frac{-\cosh(3)+2\cosh(5)}{\sinh(2)}\right)$$

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=\frac{1}{3}\log(a)\log_a\left(\frac{-\cosh(3)+2\cosh(5)}{\sinh(2)}\right)$$

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=\frac{1}{3}\log\left(\frac{\frac{1}{e^5}+\frac{1}{2}\left(-\frac{1}{e^3}-e^3\right)+e^5}{\frac{1}{2}\left(-\frac{1}{e^2}+e^2\right)}\right)$$

Series representations:

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=$$
$$\frac{1}{3}\log(-1-\cosh(3)\operatorname{csch}(2)+2\cosh(5)\operatorname{csch}(2))-\frac{1}{3}\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1+\cosh(3)\operatorname{csch}(2)-2\cosh(5)\operatorname{csch}(2)}\right)^k}{k}$$

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=$$
$$\frac{1}{3}\log(-1+(-\cosh(3)+2\cosh(5))\operatorname{csch}(2))-\frac{1}{3}\sum_{k=1}^{\infty}\frac{\left(\frac{1}{1+\cosh(3)\operatorname{csch}(2)-2\cosh(5)\operatorname{csch}(2)}\right)^k}{k}$$

Integral representations:

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=\frac{1}{3}\int_1^{-(\cosh(3)-2\cosh(5))\operatorname{csch}(2)}\frac{1}{t}\,dt$$

$$\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)=$$
$$-\frac{i}{6\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1-\cosh(3)\operatorname{csch}(2)+2\cosh(5)\operatorname{csch}(2))^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

From which:

(((1/3 ln [((2cosh5)-(cosh(8-5)))/(((sinh2)))])))^((3(1+π))/5)

Input:

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{1/5\,(3\,(1+\pi))}$$

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

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

$\log(x)$ is the natural logarithm

Exact result:

$$\left(\frac{1}{3}\log((2\cosh(5)-\cosh(3))\operatorname{csch}(2))\right)^{(3\,(1+\pi))/5}$$

$\operatorname{csch}(x)$ is the hyperbolic cosecant function

Decimal approximation:

1.618498893374221320570909198323269336782118581336142843154...

1.61849889337…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternate forms:

$$\left(\frac{1}{3}\log(-(\cosh(3)-2\cosh(5))\operatorname{csch}(2))\right)^{(3\,(1+\pi))/5}$$

$$\left(\frac{1}{3}(\log(2\cosh(5)-\cosh(3))+\log(\operatorname{csch}(2)))\right)^{(3\,(1+\pi))/5}$$

$$\left(\frac{3}{\log((2\cosh(5)-\cosh(3))\operatorname{csch}(2))}\right)^{-3/5-(3\,\pi)/5}$$

Alternative representations:

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3\,(1+\pi))/5}=\left(\frac{1}{3}\log_e\left(\frac{-\cosh(3)+2\cosh(5)}{\sinh(2)}\right)\right)^{(3\,(1+\pi))/5}$$

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3\,(1+\pi))/5}=\left(\frac{1}{3}\log(a)\log_a\left(\frac{-\cosh(3)+2\cosh(5)}{\sinh(2)}\right)\right)^{(3\,(1+\pi))/5}$$

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3(1+\pi))/5} = \left(\frac{1}{3}\log\left(\frac{-\cos(-3i)+2\cos(-5i)}{\frac{1}{2}\left(-\frac{1}{e^2}+e^2\right)}\right)\right)^{(3(1+\pi))/5}$$

Series representations:

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3(1+\pi))/5} = 3^{-3/5(1+\pi)}\left(\log(-1-\cosh(3)\operatorname{csch}(2)+2\cosh(5)\operatorname{csch}(2)) - \sum_{k=1}^{\infty}\frac{\left(\frac{1}{1+\cosh(3)\operatorname{csch}(2)-2\cosh(5)\operatorname{csch}(2)}\right)^k}{k}\right)^{(3(1+\pi))/5}$$

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3(1+\pi))/5} = 3^{-3/5(1+\pi)}\left(\log(-1+(-\cosh(3)+2\cosh(5))\operatorname{csch}(2)) - \sum_{k=1}^{\infty}\frac{\left(\frac{1}{1+\cosh(3)\operatorname{csch}(2)-2\cosh(5)\operatorname{csch}(2)}\right)^k}{k}\right)^{(3(1+\pi))/5}$$

Integral representations:

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3(1+\pi))/5} = 3^{-3/5(1+\pi)}\left(\int_1^{-(\cosh(3)-2\cosh(5))\operatorname{csch}(2)}\frac{1}{t}\,dt\right)^{(3(1+\pi))/5}$$

$$\left(\frac{1}{3}\log\left(\frac{2\cosh(5)-\cosh(8-5)}{\sinh(2)}\right)\right)^{(3(1+\pi))/5} = (6\pi)^{-3/5(1+\pi)}\left(-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+(-\cosh(3)+2\cosh(5))\operatorname{csch}(2))^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{(3(1+\pi))/5}$$

for $-1 < \gamma < 0$

Inserting the value of the following entropy 1.213811829519 , we obtain:

Mass = 6.76435e-9

Radius = 1.00462e-35

Temperature = 1.81386e+31

from the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(6.76435e-9)* sqrt[[-((((1.81386e+31* 4*Pi*(1.00462e-35)^3-(1.00462e-35)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{6.76435\times 10^{-9}}\sqrt{-\frac{1.81386\times 10^{31}\times 4\,\pi\,(1.00462\times 10^{-35})^3-(1.00462\times 10^{-35})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618076518068711694432585565297965344920826737518373017261...

1.6180765180687…

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

We have:

$$G_{265}^2 = \sqrt{\left\{(2+\sqrt{5})\left(\frac{7+\sqrt{53}}{2}\right)\right\}}\left\{\sqrt{\left(\frac{89+5\sqrt{265}}{8}\right)}+\sqrt{\left(\frac{81+5\sqrt{265}}{8}\right)}\right\},$$

sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[(((sqrt(((1/8(89+5sqrt265))))+sqrt(((1/8(81+5sqrt265))))]

Input:

$$\sqrt{(2+\sqrt{5})\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)$$

Decimal approximation:

50.15968798302038256866854827034993177912872451993729147673...

50.159687983...

Alternate forms:

$$\frac{1}{40}\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)2}\left(5\sqrt{2\left(81+5\sqrt{265}\right)}+25\sqrt{5}+5\sqrt{53}\right)$$

$$\frac{1}{4}\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{81+5\sqrt{265}}+\sqrt{89+5\sqrt{265}}\right)$$

root of $x^8-47x^7-153x^6-268x^5-362x^4-268x^3-153x^2-47x+1$ near $x=50.1597$

Minimal polynomial:

$$x^8-47x^7-153x^6-268x^5-362x^4-268x^3-153x^2-47x+1$$

From which:

sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[sqrt(((1/8(89+5sqrt(x+29)))))+sqrt(((1/8(81+5sqrt(x+29)))))] =50.159687983

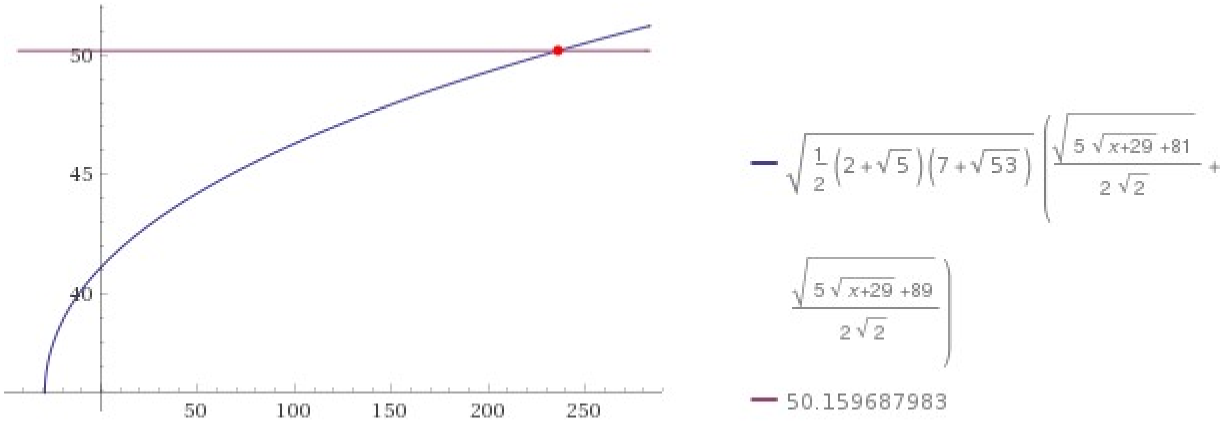
Input interpretation:

$$\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{x+29}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{x+29}\right)}\right)=50.159687983$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{\sqrt{5\sqrt{x+29}+81}}{2\sqrt{2}}+\frac{\sqrt{5\sqrt{x+29}+89}}{2\sqrt{2}}\right)=50.159687983$$

Plot:



Solution:

$x \approx 235.9999999959828$

235.9999…

and:

sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[sqrt(((1/8(89+5sqrt(x+12)))))+sqrt(((1/8(81+5sqrt(x+12)))))] =50.159687983

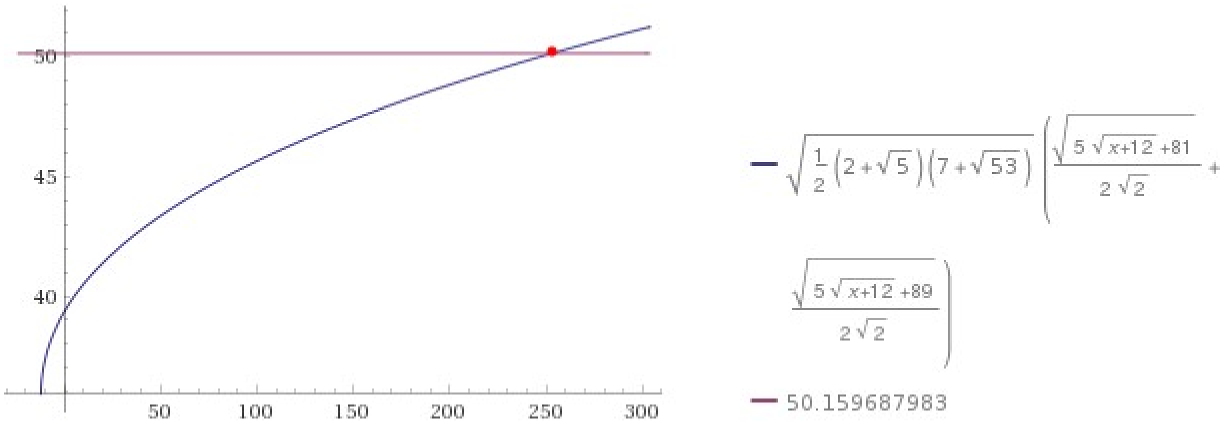
Input interpretation:

$$\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{x+12}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{x+12}\right)}\right)= 50.159687983$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{\sqrt{5\sqrt{x+12}+81}}{2\sqrt{2}}+\frac{\sqrt{5\sqrt{x+12}+89}}{2\sqrt{2}}\right)=50.159687983$$

Plot:



Solution:

$x \approx 252.9999999959828$

252.9999...

[((((sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[(((sqrt(((1/8(89+5sqrt265))))+sqrt(((1/8(81+5sqrt265))))]))))))*Pi]-18

Input:

$$\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-18$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi-18$$

Decimal approximation:

139.58130727381306744275970744618975766069834783886189846 77...

139.5813072738… result practically equal to the rest mass of Pion meson 139.57 MeV

Property:

$$-18+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi$$

is a transcendental number

Alternate forms:

$$\frac{1}{40}\left(\left(25\sqrt{10\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+5\sqrt{106\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+10\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\left(81+5\sqrt{265}\right)}\right)\pi-720\right)$$

$$\frac{-72\sqrt{2}+\sqrt{(2+\sqrt{5})(7+\sqrt{53})}\,(5\sqrt{5}+\sqrt{53}+\sqrt{81-8i}+\sqrt{81+8i})\pi}{4\sqrt{2}}$$

$$-18+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{5\sqrt{5}}{4}+\frac{\sqrt{53}}{4}+\frac{1}{4}\sqrt{81-8i}+\frac{1}{4}\sqrt{81+8i}\right)\pi$$

Series representations:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-18=$$
$$-18+\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{73}{8}+\frac{5\sqrt{265}}{8}}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(73+5\sqrt{265}\right)^{-k_2}+$$
$$\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{81}{8}+\frac{5\sqrt{265}}{8}}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(81+5\sqrt{265}\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-18=$$
$$-18+\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}$$
$$\sqrt{-1+\frac{1}{8}\left(81+5\sqrt{265}\right)}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}$$
$$\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(81+5\sqrt{265}\right)\right)^{-k_2}+$$
$$\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\sqrt{-1+\frac{1}{8}\left(89+5\sqrt{265}\right)}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}$$
$$\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(89+5\sqrt{265}\right)\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-18=$$
$$-18+\pi\sqrt{z_0}^{\,2}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)-z_0\right)^{k_1}$$
$$z_0^{-k_1}\left(\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(81+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}+\right.$$
$$\left.\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(89+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}\right)$$

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

[((((sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[(((sqrt(((1/8(89+5sqrt265))))+sqrt(((1/8(81+5sqrt265))))])))))))*Pi]-29-3

Input:

$$\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29-3$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi-32$$

Decimal approximation:

125.5813072738130674427597074461897576606983478388618984677...

125.5813072738... result very near to the Higgs boson mass 125.18 GeV

Property:

$$-32+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi$$

is a transcendental number

Alternate forms:

$$\frac{1}{40}\left(\left(25\sqrt{10\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+5\sqrt{106\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+10\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\left(81+5\sqrt{265}\right)}\right)\pi-1280\right)$$

$$\frac{-128\sqrt{2}+\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(5\sqrt{5}+\sqrt{53}+\sqrt{81-8i}+\sqrt{81+8i}\right)\pi}{4\sqrt{2}}$$

$$-32+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{5\sqrt{5}}{4}+\frac{\sqrt{53}}{4}+\frac{1}{4}\sqrt{81-8i}+\frac{1}{4}\sqrt{81+8i}\right)\pi$$

Series representations:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29-3=$$

$$-32+\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{73}{8}+\frac{5\sqrt{265}}{8}}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(73+5\sqrt{265}\right)^{-k_2}+$$
$$\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{81}{8}+\frac{5\sqrt{265}}{8}}$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(81+5\sqrt{265}\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29-3=$$

$$-32+\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}$$
$$\sqrt{\frac{73}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-8)^{k_2}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}$$
$$\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(73+5\sqrt{265}\right)^{-k_2}+$$
$$\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{81}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-8)^{k_2}$$
$$(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(81+5\sqrt{265}\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29-3=$$

$$-32+\pi\sqrt{z_0}^{\,2}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)-z_0\right)^{k_1}$$
$$z_0^{-k_1}\left(\frac{\left(-\frac{1}{8}\right)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(81+5\sqrt{265}-8z_0\right)^{k_2}z_0^{-k_2}}{k_2!}+\frac{\left(-\frac{1}{8}\right)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(89+5\sqrt{265}-8z_0\right)^{k_2}z_0^{-k_2}}{k_2!}\right)$$

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

[((((sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[(((sqrt(((1/8(89+5sqrt265)))+sqrt(((1/8(81+5sqrt265))))]))))))*Pi]-29

Input:

$$\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29$$

Result:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi-29$$

Decimal approximation:

128.5813072738130674427597074461897576606983478388618984677...

128.5813072738...

Property:

$$-29+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi$$

is a transcendental number

Alternate forms:

$$\frac{1}{40}\left(\left(25\sqrt{10\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+5\sqrt{106\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+10\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\left(81+5\sqrt{265}\right)}\right)\pi-1160\right)$$

$$\frac{-116\sqrt{2}+\sqrt{(2+\sqrt{5})(7+\sqrt{53})}\,(5\sqrt{5}+\sqrt{53}+\sqrt{81-8i}+\sqrt{81+8i})\pi}{4\sqrt{2}}$$

$$-29+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{5\sqrt{5}}{4}+\frac{\sqrt{53}}{4}+\frac{1}{4}\sqrt{81-8i}+\frac{1}{4}\sqrt{81+8i}\right)\pi$$

Series representations:

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29=$$

$$-29+\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{73}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(73+5\sqrt{265}\right)^{-k_2}+$$
$$\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{81}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}8^{k_2}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(81+5\sqrt{265}\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29=$$

$$-29+\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{73}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-8)^{k_2}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(73+5\sqrt{265}\right)^{-k_2}+$$
$$\pi\sqrt{6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)}\sqrt{\frac{81}{8}+\frac{5\sqrt{265}}{8}}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-8)^{k_2}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}\left(6+\sqrt{53}+\frac{1}{2}\sqrt{5}\left(7+\sqrt{53}\right)\right)^{-k_1}\left(81+5\sqrt{265}\right)^{-k_2}$$

$$\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi-29=$$

$$-29+\pi\sqrt{z_0}^2\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)-z_0\right)^{k_1}z_0^{-k_1}\left(\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(81+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}+\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(89+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}\right)$$

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

-7+(11+4)*1/10^2+27*1/2*((([((((sqrt(((2+sqrt5)(1/2(7+sqrt53))))*[(((sqrt(((1/8(89+5 sqrt265))))+sqrt(((1/8(81+5sqrt265))))]))))))*Pi]-29)))

Input:

$$-7+(11+4)\times\frac{1}{10^2}+27\times\frac{1}{2}\left(\sqrt{\left(2+\sqrt{5}\right)\left(\frac{1}{2}\left(7+\sqrt{53}\right)\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29\right)$$

Result:

$$\frac{27}{2}\left(\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi-29\right)-\frac{137}{20}$$

Decimal approximation:

1728.997648196476410477256050523561728419427695824635629314...

1728.9976481964... ≈ 1729

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

Property:

$$-\frac{137}{20}+\frac{27}{2}\left(-29+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{1}{2}\sqrt{\frac{1}{2}\left(81+5\sqrt{265}\right)}+\frac{1}{2}\sqrt{\frac{1}{2}\left(89+5\sqrt{265}\right)}\right)\pi\right)$$

is a transcendental number

Alternate forms:

$$\frac{1}{80}\left(\left(675\sqrt{10\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+135\sqrt{106\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}+270\sqrt{\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\left(81+5\sqrt{265}\right)}\right)\pi-31868\right)$$

$$\frac{-15934\sqrt{2}+135\sqrt{(2+\sqrt{5})(7+\sqrt{53})}\,(5\sqrt{5}+\sqrt{53}+\sqrt{81-8i}+\sqrt{81+8i})\pi}{40\sqrt{2}}$$

$$-\frac{7967}{20}+\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\frac{135\sqrt{5}}{8}+\frac{27\sqrt{53}}{8}+\frac{27}{8}\sqrt{81-8i}+\frac{27}{8}\sqrt{81+8i}\right)\pi$$

Series representations:

$$-7+\frac{11+4}{10^2}+\frac{27}{2}\left(\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29\right)=$$

$$\frac{1}{20}\left(-7967+270\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\sqrt{-1+\frac{1}{8}\left(81+5\sqrt{265}\right)}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(81+5\sqrt{265}\right)\right)^{-k_2}+270\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\sqrt{-1+\frac{1}{8}\left(89+5\sqrt{265}\right)}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\binom{\frac{1}{2}}{k_1}\binom{\frac{1}{2}}{k_2}\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(89+5\sqrt{265}\right)\right)^{-k_2}\right)$$

$$-7+\frac{11+4}{10^2}+\frac{27}{2}\left(\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29\right)=$$

$$\frac{1}{20}\left(-7967+270\,\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\sqrt{-1+\frac{1}{8}\left(81+5\sqrt{265}\right)}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(81+5\sqrt{265}\right)\right)^{-k_2}+270\,\pi\sqrt{-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\sqrt{-1+\frac{1}{8}\left(89+5\sqrt{265}\right)}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!\,k_2!}(-1)^{k_1+k_2}\left(-\frac{1}{2}\right)_{k_1}\left(-\frac{1}{2}\right)_{k_2}\left(-1+\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)\right)^{-k_1}\left(-1+\frac{1}{8}\left(89+5\sqrt{265}\right)\right)^{-k_2}\right)$$

$$-7+\frac{11+4}{10^2}+\frac{27}{2}\left(\sqrt{\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)}\left(\left(\sqrt{\frac{1}{8}\left(89+5\sqrt{265}\right)}+\sqrt{\frac{1}{8}\left(81+5\sqrt{265}\right)}\right)\pi\right)-29\right)=\frac{1}{20}\left(-7967+270\,\pi\sqrt{z_0}^{\,2}\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{1}{k_1!}(-1)^{k_1}\left(-\frac{1}{2}\right)_{k_1}\left(\frac{1}{2}\left(2+\sqrt{5}\right)\left(7+\sqrt{53}\right)-z_0\right)^{k_1}z_0^{-k_1}\left(\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(81+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}+\frac{(-1)^{k_2}\left(-\frac{1}{2}\right)_{k_2}\left(\frac{1}{8}\left(89+5\sqrt{265}\right)-z_0\right)^{k_2}z_0^{-k_2}}{k_2!}\right)\right)$$

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

Observations

Figs.

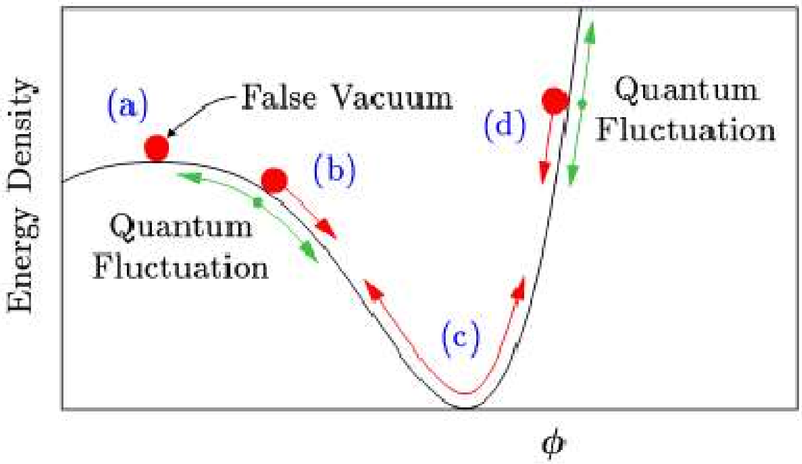
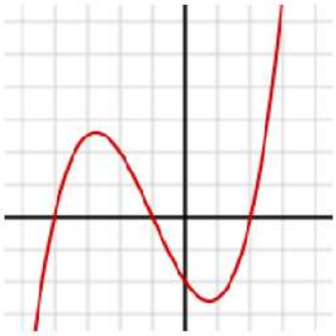


FIG. 1: In simple inflationary models, the universe at early times is dominated by the potential energy density of a scalar field, ϕ. Red arrows show the classical motion of ϕ. When ϕ is near region (a), the energy density will remain nearly constant, $\rho \cong \rho_f$, even as the universe expands.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



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

The ratio between M_0 and q

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

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

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

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

1.7320507879051944207039476256710181600835665488020824605 20...

1.7320507879

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

We note that:

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

i is the imaginary unit

$i\sqrt{3}$

1.7320508075688772935274463415058723669428052538103806280558... i

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

1.73205

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

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

We have that the previous result

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

$=$ 1.7320508075688772935274463415058723669428052538103806280558... i

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

can be related with:

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

Considering:

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

$= i\sqrt{3} =$ 1.7320508075688772935274463415058723669428052538103806280558... i

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

Thence:

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

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

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

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

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

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

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

From Wikipedia

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

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

Note that:

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

Hence

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

so that

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

Hence

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

Thence:

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

And

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

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

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

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

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

The beginning of the sequence is thus:

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

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

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

The sequence of Lucas numbers is:

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

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

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

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

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

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

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