Further mathematical connections between the Dark Matter candidate particles, some Ramanujan formulas and the Physics of Black Holes. III

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Abstract

In the present research thesis, we have obtained further interesting new possible mathematical connections concerning some sectors of Ramanujan's mathematics, some sectors of Particle Physics, inherent principally the Dark Matter candidate particles and the physics of black holes (Ramanujan-Nardelli mock formula).

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https://pdfs.semanticscholar.org/ccae/61fedec8e72a2d03066c238115488f9e6d82.pdf.

From:

Probing Dynamics of Boson Stars by Fast Radio Bursts and Gravitational Wave Detection
Gongjun Choi, Hong-Jian He, Enrico D. Schiappacasse

arXiv:1906.02094v2 [astro-ph.CO] 7 Jul 2019

ξ_{DM}	Liouville Potential ($\Lambda = 100$)	Logarithmic Potential ($\Lambda = 100$)
0.1	$3.6\times10^{-12} \lesssim m_\Phi \lesssim 3.6\times10^{-10}$	$8.4\times10^{-13} \lesssim m_\Phi \lesssim 8.4\times10^{-11}$
0.01	$3.6\times10^{-13} \lesssim m_\Phi \lesssim 3.6\times10^{-3}$	$8.4\times10^{-14} \lesssim m_\Phi \lesssim 8.4\times10^{-4}$

Table 2: Allowed mass range of the scalar particle under two benchmark potentials, as inferred from the MACHO mass constraints [48–52] for the DM fraction $\xi_{DM} = 0.1$ and 0.01. Here the unit of the scalar particle mass is eV.

For $10.75 \leqslant g_* \leqslant 106.75$,[8] we may expect the allowed minimum scalar mass for the boson stars with $\xi_{DM} = 10^{-2}$ (or $\xi_{DM} = 10^{-1}$) to be $m_\Phi \gtrsim \mathcal{O}(10^{-10})$eV (or $m_\Phi \gtrsim \mathcal{O}(10^{-8})$eV). In comparison with the MACHO constraints in Table 2, we find that the fraction $\xi_{DM} = 0.01$ is consistent with the current cosmological and astrophysical data for the scalar mass-range $\mathcal{O}(10^{-10})\text{eV} < m_\Phi < \mathcal{O}(10^{-3})\text{eV}$, while the fraction $\xi_{DM} = 0.1$ is excluded because the MACHO and CMB constraints on m_Φ do not overlap. Hence, in the following analyses, we focus on the benchmark case where the boson stars are responsible for 1% of the DM population in the Universe with the mass range $\mathcal{O}(10^{-10})\text{eV} < m_\Phi < \mathcal{O}(10^{-3})\text{eV}$.

[8] To be consistent with the MACHO constraint on the scalar particle mass m_Φ, we have $m_\Phi \gtrsim \mathcal{O}(10^{-13})$eV. The effective number of relativistic degrees of freedom g_* would be $g_*(T \simeq 10\text{MeV}) \sim 10.75$ at the time when $H \simeq m_\Phi \sim \mathcal{O}(10^{-13})$eV holds.

In the previous paper (part II), we have highlighted the following new interesting mathematical connections:

From the above Table 2, we have that:

8.4588897096614e-14 eV

Input interpretation:

convert $8.4588897096614 \times 10^{-14}$ eV/c^2 to kilograms

Result:

$1.5079337817599 \times 10^{-49}$ kg (kilograms)

$1.5079337817599 * 10^{-49}$ kg

Mass = 1.507934e-49

Radius = 2.239058e-76

Temperature = 8.138310e+71

Surface area = 6.299999e-151

Entropy = 2.619130e-82

Lifetime = 2.882686e-163

From the following fourth Ramanujan-Nardelli mock GENERAL FORMULA, we obtain for these other values:

Surface area

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.507934e-49)* sqrt[[-(((((6.299999e-151 * 4*Pi*(2.239058e-76)^3-(2.239058e-76)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.507934\times 10^{-49}}\sqrt{-\frac{\frac{6.299999}{10^{151}}\times 4\pi\left(2.239058\times 10^{-76}\right)^3-\left(2.239058\times 10^{-76}\right)^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.617322087497014110863805772804110302752512432028583797462...

1.61732208…

Entropy

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.507934e-49)* sqrt[[-(((((2.619130e-82 * 4*Pi*(2.239058e-76)^3-(2.239058e-76)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.507934\times 10^{-49}}\sqrt{-\frac{2.619130\times 10^{-82}\times 4\pi\left(2.239058\times 10^{-76}\right)^3-\left(2.239058\times 10^{-76}\right)^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.617322087497014110863805772804110302752512432028583797462...

1.61732208…

Lifetime

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.507934e-49)* sqrt[[-(((((2.882686e-163 * 4*Pi*(2.239058e-76)^3-(2.239058e-76)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.507934\times 10^{-49}}\sqrt{-\frac{\frac{2.882686}{10^{163}}\times 4\pi(2.239058\times 10^{-76})^3-(2.239058\times 10^{-76})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.617322087497014110863805772804110302752512432028583797462...

1.61732208…

The most significant and interesting result is that inserting indifferently the values of the temperature, the Entropy (or the inverse), the Surface area (or the inverse) or Lifetime (or the inverse), the result is always very close to the golden ratio!

The fundamental Ramanujan-Nardelli mock formula, which we will use more often during the paper, is however:

Mass = 1.507934e-49

Radius = 2.239058e-76

Temperature = 8.138310e+71

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{M}\sqrt{-\frac{T\times 4\pi r^3-r^2}{G}}}} \quad (1)$$

Result:

$$2.18075\times 10^{-11}\sqrt{\frac{M}{\sqrt{\frac{r^2-4\pi r^3 T}{G}}}}$$

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.507934e-49)* sqrt[[-(((((8.138310e+71 * 4*Pi*(2.239058e-76)^3-(2.239058e-76)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.507934\times 10^{-49}}\sqrt{-\frac{8.138310\times 10^{71}\times 4\pi(2.239058\times 10^{-76})^3-(2.239058\times 10^{-76})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249276203142445357760087938552676720668241543654601222...

1.618249276…..

And for the value of the Ramanujan mock theta function 1.897512108:

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.897512108\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{M}\sqrt{-\frac{T\times 4\pi r^3-r^2}{G}}}} \quad (2)$$

Result:

$$2.21771\times10^{-11}\sqrt{\frac{M}{\sqrt{\frac{r^2-4\pi r^3 T}{G}}}}$$

sqrt[[[[1/(((((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(1.507934e-49)* sqrt[[-(((((8.138310e+71 * 4*Pi*(2.239058e-76)^3-(2.239058e-76)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{1.507934\times10^{-49}}\sqrt{-\frac{8.138310\times10^{71}\times4\pi(2.239058\times10^{-76})^3-(2.239058\times10^{-76})^2}{6.67\times10^{-11}}}\right)}$$

Result:

1.6456708386192450279573544068008195987436467329430272544410...

1.6456708…

which gives results that are very close to golden ratio 1.61803398... and to $\zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

From:

Dense Axion Stars

Eric Braaten, Abhishek Mohapatra, and Hong Zhangz
Department of Physics, The Ohio State University, Columbus, OH 43210, USA

(Dated: September 20, 2016) - arXiv:1512.00108v2 [hep-ph] 16 Sep 2016

5×10^{17} eV and about 8×10^{21} eV [1]. The window for m is therefore from about 10^{-6} eV to about 10^{-2} eV.

If $m = 10^{-4\pm2}$ eV, the critical mass is $6 \times 10^{-14\mp4}\, M_\odot$, which corresponds to $7 \times 10^{56\mp6}$ axions. The radius of the dilute axion star decreases as M increases. The radius R_{99} that encloses 99% of the axions is $9.9/GMm^2$ for small M, and it decreases to $0.55/(Gm^2 f^2)^{1/2}$ at the critical mass [13]. This minimum radius is $3 \times 10^{-4} R_\odot$, where $R_\odot$ is the radius of the sun.

[10]: $M_* = 0.633/(Gm)$, where G is Newton's gravitational constant and m is the mass of the boson. If $m = 10^{-4\pm2}$ eV, the critical mass is $8.4 \times 10^{-7\mp2}\, M_\odot$, where $M_\odot$ is the mass of the sun. (Here and below, the upper and lower error bars in an exponent correspond to increasing and decreasing m by two orders of magnitude from 10^{-4} eV.)

kinetic pressure. For $m = 10^{-4\pm2}$ eV, the second critical mass M'_* is $1.2 \times 10^{-20\mp6} M_\odot$, which corresponds to $1.3 \times 10^{50\mp8}$ axions. The radius R_{99} at the critical point is $2.6 \times 10^{-11\mp2} R_\odot$, which is equal to $9.2(\hbar/mc)$.

Dense axion stars with sufficiently large masses could be observed through gravitational microlensing. The possibility that most of the dark matter in the Milky Way is made up of massive compact halo objects (such as axion stars) with masses in the range between $2 \times 10^{-9} M_\odot$ and $15 M_\odot$ has been excluded [18, 19]. Thus most of axion dark matter must be in the form of gases of axions or dilute axion stars or dense axion stars with mass less than $2 \times 10^{-9} M_\odot$. To obtain quantitative constraints on axions from microlensing, it would be necessary to know the fraction of axions that are bound in axion stars as well as the mass distributions of dilute axion stars and of dense axion stars.

Thence, we have:

m = 10^{-4} eV;

M = 1.2 * 10^{-14} solar masses

m = 10^{-4} eV;

M = 6 * 10^{-14} solar masses

M = 2 * 10^{-9} solar masses

For M = 1.2 * 10^{-14} solar masses, we have:

Input interpretation:

$1.2 \times 10^{-14} \times 1.9891 \times 10^{30}$

Result:

23869200000000000

Scientific notation:

2.38692×10^{16}

2.38992 * 10^{16} kg

We have also the following Ramanujan mock theta function:

f(q) = 1.22734321771259...

For M = 1.22734321771259e-14 solar masses, we have:

M = 2.441308394352112769 × 10^{16} kg

Thence:

Mass = 2.441308e+16

Radius = 3.624980e-11

Temperature = 5026827

Entropy = 6.864954e+48

Surface area = 1.651281e-20

Lifetime = 1.223258e+33

Surface gravity = 1.239669e+27

Surface tides = 6.839592e+37

Luminosity = 0.5978944

For the Ramanujan-Nardelli GENERAL FORMULA (1), we obtain:

Temperature value

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-(((((5026827 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{5026827\times 4\pi\left(3.624980\times 10^{-11}\right)^3-\left(3.624980\times 10^{-11}\right)^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618249219403644251395381656372074569607992593101913492934...

1.6182492…

Inverse entropy value

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-(((((1/6.864954e+48 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\middle/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{\frac{1}{6.864954\times 10^{48}}\times 4\pi\left(3.624980\times 10^{-11}\right)^3-\left(3.624980\times 10^{-11}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322030769452137508006300785617155625088410577238711837...

1.617322…

Surface area value

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-((((1.651281e-20 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{1.651281\times 10^{-20}\times 4\pi\,(3.624980\times 10^{-11})^3-(3.624980\times 10^{-11})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322030769452137508006300788658551648491312175740351438...

1.617322…

Inverse lifetime value

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-((((1/1.223258e+33 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{\frac{1}{1.223258\times 10^{33}}\times 4\pi\,(3.624980\times 10^{-11})^3-(3.624980\times 10^{-11})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322030769452137508006300785617155625088561145669845694...

1.617322…

Inverse surface gravity value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-((((1/1.239669e+27 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{\frac{1}{1.239669\times 10^{27}}\times 4\pi\left(3.624980\times 10^{-11}\right)^3-\left(3.624980\times 10^{-11}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322030769452137508006300785617155773663585024562148636...

1.617322…

Inverse surface tides value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-((((1/6.839592e+37 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.441308\times 10^{16}}\sqrt{-\frac{\frac{1}{6.839592\times 10^{37}}\times 4\pi\left(3.624980\times 10^{-11}\right)^3-\left(3.624980\times 10^{-11}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322030769452137508006300785617155625088410579931621560...

1.617322…

Inverse luminosity value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.441308e+16)* sqrt[[-((((1/0.5978944 * 4*Pi*(3.624980e-11)^3-(3.624980e-11)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{4 \times 1.962364415 \times 10^{19}}{5 \times 0.0864055^2} \times \frac{1}{2.441308 \times 10^{16}} \sqrt{-\frac{\frac{1}{0.5978944} \times 4\pi (3.624980 \times 10^{-11})^3 - (3.624980 \times 10^{-11})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.6173220310775066000011216811557059846049341659714783431 12...

1.617322…

From:

- $m \in [10^{-24}, 10^{-22}]$ eV is the ultra-light boson mass

M [$M_\odot$]	m_c [eV]	R_{TA} [kpc]	$R^{\mathcal{G}}_{vir}$ [kpc]	$R^{\mathcal{G}+\mathcal{Q}}(t^{\mathcal{G}}_{vir})$ [kpc]	τ
$1.5 \cdot 10^7$	$3.35 \cdot 10^{-23}$	14.33	7.16	14.32	1.99
$8.5 \cdot 10^7$	$1.05 \cdot 10^{-23}$	25.54	12.77	25.63	2.01
$5.0 \cdot 10^8$	$3.25 \cdot 10^{-24}$	46.10	23.06	46.60	2.02
$8.5 \cdot 10^{11}$	$2.25 \cdot 10^{-25}$	549.5	274.79	556.19	2.02

Table 4.1: Four dark matter halos with the correspondent mass M, turn-around radius R_{TA}, virial radius in standard spherical collapse model $R^{\mathcal{G}}_{vir}$, the radius in spherical collapse model with FDM at $t^{\mathcal{G}}_{vir}$ $R^{\mathcal{G}+\mathcal{Q}}(t^{\mathcal{G}}_{vir})$ with the initial condition $\delta_{in} = 9 \cdot 10^{-4}$ at $z = 1100$. Every halo is assumed to virialize at $t_{vir} = 13.34$ Gyr in a EdS Universe. $\tau = R^{\mathcal{G}+\mathcal{Q}}(t^{\mathcal{G}}_{vir})/R^{\mathcal{G}}_{vir}$ and m_c is the threshold value for the fuzzy dark matter mass beyond which no collapse can happen because $\mathcal{G}(R) = \mathcal{Q}(R)|_{m=m_c}$.

For:

8.5e+11 * 1.9891e+30

Input interpretation:

$8.5 \times 10^{11} \times 1.9891 \times 10^{30}$

Scientific notation:

1.690735×10^{42}

Mass = 1.690735e+42

Radius = 2.510490e+15

Surface area = 7.920033e+31

Surface gravity =17.89999

Surface tides = 1.426016e-14

Entropy = 3.292635e+100

Temperature = 7.258401e-20

Luminosity = 1.246575e-52

Lifetime = 4.063283e+110

From the Ramanujan-Nardelli mock formula:

Temperature

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-(((((7.258401e-20 * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.690735\times 10^{42}}\sqrt{-\frac{7.258401\times 10^{-20}\times 4\pi\left(2.510490\times 10^{15}\right)^3-\left(2.510490\times 10^{15}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249382809930675472740391923724927535178658241689115373...

1.6182492…

Inverse surface area value

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-(((((1/7.920033e+31 * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.690735\times 10^{42}}\sqrt{-\frac{\frac{1}{7.920033\times 10^{31}}\times 4\pi\,(2.510490\times 10^{15})^3-(2.510490\times 10^{15})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322194296613807270024887394442233772290343810778251249...

1.617322…

Inverse surface gravity value multiplied by 1.962364415e+19

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-((((1/(1.962364415e+19*17.89999) * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.690735\times 10^{42}}\sqrt{-\frac{\frac{1}{1.962364415\times 10^{19}\times 17.89999}\times 4\pi\,(2.510490\times 10^{15})^3-(2.510490\times 10^{15})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617358510199467567740809872066830350378809546019676726021...

1.6173585…

Surface tides value multiplied by inverse of 1.962364415e+19

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-((((1/1.962364415e+19*1.426016e-14) * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.690735\times 10^{42}}\sqrt{\left(-\frac{1}{6.67\times 10^{-11}}\left(\left(\frac{1}{1.962364415\times 10^{19}}\times 1.426016\times 10^{-14}\right)\times 4\pi\,(2.510490\times 10^{15})^3-(2.510490\times 10^{15})^2\right)\right)}\right)\right)}$$

Result:

1.617322194296613655483006434510294947951143903423318380386...

1.617322…

Inverse entropy value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-((((1/(3.292635e+100) * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{1.690735\times10^{42}}\sqrt{-\frac{\frac{1}{3.292635\times10^{100}}\times4\pi\left(2.510490\times10^{15}\right)^3-\left(2.510490\times10^{15}\right)^2}{6.67\times10^{-11}}}\right)}$$

Result:

1.617322194296613646213648486530696010933625358746691650826...

1.617322…

Luminosity value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-((((1.246575e-52 * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1/\left(\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{1.690735\times10^{42}}\sqrt{-\frac{1.246575\times10^{-52}\times4\pi\left(2.510490\times10^{15}\right)^3-\left(2.510490\times10^{15}\right)^2}{6.67\times10^{-11}}}\right)}$$

Result:

1.617322194296613646213648486530696012523721295221122105511...

1.617322…

Inverse lifetime value

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.690735e+42)* sqrt[[-((((1/4.063283e+110 * 4*Pi*(2.510490e+15)^3-(2.510490e+15)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{1.690735\times 10^{42}}\sqrt{-\frac{\frac{1}{4.063283\times 10^{110}}\times 4\,\pi\,(2.510490\times 10^{15})^3-(2.510490\times 10^{15})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.6173221942966136462136484865306960109336253587466916650826...

1.617322…

For the ultra light boson mass corresponding to the analyzed value of fuzzy DM, i.e.

$8.5 \cdot 10^{11}$ $2.25 \cdot 10^{-25}$

we have that $2.25 * 10^{-25}$ eV = Kg

Input interpretation:

convert 2.25×10^{-25} eV/c^2 to kilograms

Result:

4.011×10^{-61} kg (kilograms)

4.011e-61 Kg

Thence, we obtain, the following values:

Quantity	Value	Units
Mass	4.011000e-61	kilograms
Radius	5.955739e-88	meters
Surface area	4.457396e-174	square meters
Surface gravity	7.545286e+103	meters/second²
Surface tides	2.533787e+191	meters/second² / meter
Entropy	1.853096e-105	*(dimensionless)*
Temperature	3.059594e+83	Kelvin
Luminosity	2.214952e+153	watts
Lifetime	5.425109e-198	seconds

For the Ramanujan-Nardelli mock general formula, we obtain:

For the temperature value 3.059594e+83, we have:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((3.059594e+83 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.011\times 10^{-61}}\sqrt{-\frac{3.059594\times 10^{83}\times 4\pi\left(5.955739\times 10^{-88}\right)^3-\left(5.955739\times 10^{-88}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.6182493034168610252237984571990680143619167166161140343 58...

1.6182493….

And for the value of the Ramanujan mock theta function 1.897512108:

sqrt[[[[1/(((((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((3.059594e+83 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.011\times10^{-61}}\sqrt{-\frac{3.059594\times10^{83}\times4\pi\,(5.955739\times10^{-88})^3-(5.955739\times10^{-88})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.6456708662941055923036438864430648330778461338535113024 27...

1.64567086…

For the inverse surface tides value 2.533787e+191, we have:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((1/2.533787e+191 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.011\times10^{-61}}\sqrt{-\frac{\frac{1}{2.533787\times10^{191}}\times4\pi\,(5.955739\times10^{-88})^3-(5.955739\times10^{-88})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.617322114939689118509645827445408003448032435118302436556...

1.6173221149…..

For the entropy value 1.853096e-105, we have:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((1.853096e-105 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.011\times 10^{-61}}\sqrt{-\frac{\frac{1.853096}{10^{105}}\times 4\pi\left(5.955739\times 10^{-88}\right)^3-\left(5.955739\times 10^{-88}\right)^2}{6.67\times 10^{-11}}}}}$$

Result:

1.617322114939689118509645827445408003448032435118302436556...

1.6173221149…

For the value of surface area 4.457396e-174, we obtain:

sqrt[[[[1/((((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((4.457396e-174 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.011\times 10^{-61}}\sqrt{-\frac{\frac{4.457396}{10^{174}}\times 4\pi\left(5.955739\times 10^{-88}\right)^3-\left(5.955739\times 10^{-88}\right)^2}{6.67\times 10^{-11}}}}}$$

Result:

1.617322114939689118509645827445408003448032435118302436556...

1.6173221149…..

For the inverse surface gravity value 7.545286e+103, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((1/7.545286e+103 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.011\times 10^{-61}}\sqrt{-\frac{\frac{1}{7.545286\times 10^{103}}\times 4\,\pi\,(5.955739\times 10^{-88})^3-(5.955739\times 10^{-88})^2}{6.67\times 10^{-11}}}\right)}$$

Result:

1.617322114939689118509645827445408003448032435118302436556...

1.6173221149…

And for the lifetime value 5.425109e-198, we obtain:

sqrt[[[[1/(((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((5.425109e-198 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{4.011\times 10^{-61}}\sqrt{-\frac{\frac{5.425109}{10^{198}}\times 4\,\pi\,(5.955739\times 10^{-88})^3-(5.955739\times 10^{-88})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.617322114939689118509645827445408003448032435118302436556...

1.6173221149….

From the previous formula, we obtain also the following results:

144-5+10^3*sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((3.059594e+83 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$144-5+10^3\sqrt{\left(1\Big/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.011\times10^{-61}}\sqrt{-\frac{3.059594\times10^{83}\times4\pi(5.955739\times10^{-88})^3-(5.955739\times10^{-88})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1784.670866294105592303643886443064833077846133853511302427...

1784.67086…

And:

89-5+10^3*sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(4.011e-61)* sqrt[[-((((3.059594e+83 * 4*Pi*(5.955739e-88)^3-(5.955739e-88)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$89-5+10^3\sqrt{\left(1\Big/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{4.011\times10^{-61}}\sqrt{-\frac{3.059594\times10^{83}\times4\pi(5.955739\times10^{-88})^3-(5.955739\times10^{-88})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1729.670866294105592303643886443064833077846133853511302427...

1729.67086….

1784.67086 and 1729.67086, results in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV). Further, 1729.67 is very near to the Hardy-Ramanujan number that is 1729

Now, we have the following values:

M [$M_\odot$]	m_c [eV]
$1.5 \cdot 10^7$	$3.35 \cdot 10^{-23}$

For 1.5e+7 * 1.9891e+30, we have that:

Input interpretation:

$1.5 \times 10^7 \times 1.9891 \times 10^{30}$

Scientific notation:

2.98365×10^{37}

2.98365e+37 kg

We obtain the following values:

Quantity	Value	Units
Mass	2.983650e+37	kilograms
Radius	4.430277e+10	meters
Surface area	2.466446e+22	square meters
Surface gravity	1014333	meters/second²
Surface tides	0.00004579094	meters/second² / meter
Entropy	1.025388e+91	*(dimensionless)*
Temperature	4.113094e-15	Kelvin
Luminosity	4.002892e-43	watts
Lifetime	2.233028e+96	seconds

For the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-((((4.113094e-15 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{4.113094\times 10^{-15}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618249286254215771639386692024206995500843624045567850419...

1.6182492…

And:

sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-((((4.113094e-15 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.897512108\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{4.113094\times 10^{-15}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.645670848840635831662562267287093239943673885780763127996...

1.64567…. result very near to the value of ζ(2) = 1.64493...

For the inverse value of surface area 2.466446e+22, we obtain:

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{\frac{1}{2.466446\times 10^{22}}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322097671892838404975738529822032469088532828682143541...

1.617322...

For the inverse value of surface gravity 1014333 multiplied by the inverse of 1.962364415 $*10^{19}$, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-(((((1/1.962364415e+19)/1014333 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{\frac{\frac{1}{1.962364415\times 10^{19}}}{1014333}\times 4\pi\left(4.430277\times 10^{10}\right)^3-\left(4.430277\times 10^{10}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322097662777617704364651257066448837944285949706833975...

1.617322…

For the surface tides value 0.00004579094, multiplied by the inverse of 1.962364415 $*10^{19}$, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-(((((1/1.962364415e+19*0.00004579094 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{\left(-\frac{1}{6.67\times 10^{-11}}\left(\frac{1}{1.962364415\times 10^{19}}\times 0.00004579094\times 4\pi\left(4.430277\times 10^{10}\right)^3-\left(4.430277\times 10^{10}\right)^2\right)\right)}\right)\right)}$$

Result:

1.617322097663291572329823152152877046870022544850349427067...

1.617322…

For the inverse value of entropy 1.025388e+91, we obtain:

sqrt[[[[1/((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-(((((1/1.025388e+91 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{\frac{1}{1.025388\times 10^{91}}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322097662766308890411767023934234934609437812267396857...

1.617322…

For the luminosity value 4.002892e-43, we obtain:

sqrt[[[[1/((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-(((((4.002892e-43 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{4.002892\times 10^{-43}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322097662766308890411767024024340402655165655390908852...

1.617322…

For the inverse value of lifetime 2.233028e+96, we obtain:

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{\frac{1}{2.233028\times 10^{96}}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322097662766308890411767023934234934609437812267396857...

1.617322...

Now, from the previous formula, we obtain:

144-5+10^3

sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-((((4.113094e-15 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$144-5+10^3\sqrt{\left(1/\left(\frac{4\times 1.897512108\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{2.983650\times 10^{37}}\sqrt{-\frac{4.113094\times 10^{-15}\times 4\pi\,(4.430277\times 10^{10})^3-(4.430277\times 10^{10})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1784.670848840635831662562267287093239943673885780763127996...

1784.67084…

And:

89-5+10^3

sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-((((4.113094e-15 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$89-5+10^3\sqrt{\left(1/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{2.983650\times10^{37}}\sqrt{-\frac{4.113094\times10^{-15}\times4\pi(4.430277\times10^{10})^3-(4.430277\times10^{10})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1729.670848840635831662562267287093239943673885780763127996...

1729.67084…

1784.67084 and 1729.67084, results in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV). Further, 1729.67 is very near to the Hardy-Ramanujan number that is 1729

From the formula concerning ζ(2), we obtain also:

(1.897512108/1.602176634)*10^19 sqrt[[[[1/(((((4*1.897512108e+19)/(5*0.0864055^2)))*1/(2.983650e+37)* sqrt[[-((((4.113094e-15 * 4*Pi*(4.430277e+10)^3-(4.430277e+10)^2))))) / ((6.67*10^-11))]]]]]

Where $1.602176634 * 10^{-19}$ is the elementary charge

Input interpretation:

$$\frac{1.897512108}{1.602176634}\times10^{19}\sqrt{\left(1/\left(\frac{4\times1.897512108\times10^{19}}{5\times0.0864055^2}\times\frac{1}{2.983650\times10^{37}}\sqrt{-\frac{4.113094\times10^{-15}\times4\pi(4.430277\times10^{10})^3-(4.430277\times10^{10})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

$1.94902...\times10^{19}$

$1.94902…*10^{19}$ practically near to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV (Planck mass = $1,2209 \times 10^{19}$ GeV/c^2 = 21,76 µg Wikipedia)

Now, we have for 3.35e-23 eV = kg:

Input interpretation:

convert 3.35×10^{-23} eV/c^2 to kilograms

Result:

5.972×10^{-59} kg (kilograms)

5.972e-59 kg

Quantity	Value	Units
Mass	5.972000e-59	kilograms
Radius	8.867533e-86	meters
Surface area	9.881333e-170	square meters
Surface gravity	5.067673e+101	meters/second²
Surface tides	1.142972e+187	meters/second² / meter
Entropy	4.108016e-101	*(dimensionless)*
Temperature	2.054928e+81	Kelvin
Luminosity	9.991486e+148	watts
Lifetime	1.790647e-191	seconds

For the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.972000e-59)* sqrt[[-(((((2.054928e+81*4*Pi*(8.867533e-86)^3-(8.867533e-86)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.972000\times 10^{-59}}\sqrt{-\frac{2.054928\times 10^{81}\times 4\pi\,(8.867533\times 10^{-86})^3-(8.867533\times 10^{-86})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.6182492679680977310289908858063506308701430232605935 13477...

1.6182492…

For the entropy value 4.108016e-101, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.972000e-59)* sqrt[[-(((((4.108016e-101*4*Pi*(8.867533e-86)^3-(8.867533e-86)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.972000\times 10^{-59}}\sqrt{-\frac{\frac{4.108016}{10^{101}}\times 4\pi\,(8.867533\times 10^{-86})^3-(8.867533\times 10^{-86})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322079585453483116052482671065403625377060010438251084...

1.617322…

For the lifetime value 1.790647e-191, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(5.972000e-59)* sqrt[[-(((((1.790647e-191*4*Pi*(8.867533e-86)^3-(8.867533e-86)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.972000\times 10^{-59}}\sqrt{-\frac{\frac{1.790647}{10^{191}}\times 4\pi\,(8.867533\times 10^{-86})^3-(8.867533\times 10^{-86})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.617322079585453483116052482671065403625377060010438251084...

1.617322…

From the previous formula concerning ζ(2), we obtain also:

144-5+10^3sqrt[[[[1/(((((4*1.897364415e+19)/(5*0.0864055^2)))*1/(5.972000e-59)* sqrt[[-(((((4.108016e-101*4*Pi*(8.867533e-86)^3-(8.867533e-86)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$144-5+10^3\sqrt{\left(1\Bigg/\left(\frac{4\times 1.897364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.972000\times 10^{-59}}\sqrt{-\frac{\frac{4.108016}{10^{101}}\times 4\pi\,(8.867533\times 10^{-86})^3-(8.867533\times 10^{-86})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1783.791942965635798600072102076067372875606676365670197957...

1783.79194…

And:

89-5+10^3sqrt[[[[1/(((((4*1.897364415e+19)/(5*0.0864055^2)))*1/(5.972000e-59)* sqrt[[-(((((4.108016e-101*4*Pi*(8.867533e-86)^3-(8.867533e-86)^2))))) / ((6.67*10^-11))]]]]]

Input interpretation:

$$89-5+10^3\sqrt{\left(1\Bigg/\left(\frac{4\times 1.897364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{5.972000\times 10^{-59}}\sqrt{-\frac{\frac{4.108016}{10^{101}}\times 4\pi\,(8.867533\times 10^{-86})^3-(8.867533\times 10^{-86})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1728.791942965635798600072102076067372875606676365670197957...

1728.79194…

1783.79194 and 1728.79194, results in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino ("glueball" =1760 ± 15 MeV; gluino = 1785.16 GeV). Further, 1729.67 is very near to the Hardy-Ramanujan number that is 1729

Now, we take as radius the Cartesian product of the von Koch curve and the Cantor set 1.8928:

Mass = 1.274740e+27

Radius = 1.892800

Temperature = 0.00009627084

For the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/((((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(1.274740e+27)* sqrt[[-(((((0.00009627084*4*Pi*(1.8928)^3-(1.8928)^2))))) / ((6.674*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times1.962364415\times10^{19}}{5\times0.0864055^2}\times\frac{1}{1.274740\times10^{27}}\sqrt{-\frac{0.00009627084\times4\,\pi\times1.8928^3-1.8928^2}{6.674\times10^{-11}}}}}$$

Result:

1.618491644687715907697822905369705731094764950395738704678...

1.61849164…

Now, we take as radius of the Boundary of the tame twindragon 1.2108:

Mass = 8.154351e+26

Radius = 1.2108

Temperature = 0.0001504967

For the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(8.154351e+26)* sqrt[[-(((((0.0001504967*4*Pi*(1.2108)^3-(1.2108)^2))))) / ((6.674*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^2}\times\frac{1}{8.154351\times 10^{26}}\sqrt{-\frac{0.0001504967\times 4\,\pi\times 1.2108^3-1.2108^2}{6.674\times 10^{-11}}}}}$$

Result:

1.618491835994945495123165523181181951781918897287043636407...

1.618491835…

From:

Rotating Charged Black String and Three Dimensional Black Holes
Josè P.S. Lemos, Vilson T. Zanchin - https://core.ac.uk/download/pdf/25187356.pdf

We calculate:

$$r_{\rm CTC}=\left(\frac{a^2\alpha^2 b}{1-\frac{3}{2}a^2\alpha^2}\right)^{\frac{1}{3}}\frac{\sqrt{2\sqrt{\overline{s}^2+4\overline{q}^2}-\overline{s}}-\sqrt{\overline{s}}}{2\alpha}$$

That is the radius of CTC.

We obtain from:

$\alpha^2 a^2 = 0{,}61803398;\quad \alpha a = 0{,}78615136;\quad \alpha = 1$

$\alpha^2 a^2 = 1^2\cdot\cong 0{,}78615136^2 = 0{,}61803398$

$$r_{CTC}=\left(\frac{0{,}61803398\cdot 0{,}29179612}{0{,}07294903}\right)^{\frac{1}{3}}$$

$$\frac{\sqrt{2\sqrt{0{,}003898827+16{,}011324736}+0{,}06244059}-0{,}2498811517i}{2}=$$

$$r_{CTC}=1{,}35214764148\left(\frac{2{,}84011365545116-0{,}2498811517i}{2}\right)=$$

= 1,92012649 – 0,1689381i = 3,68688573759 + 0,02854008163 = 3,71542582…

or:

$$r_{CTC}=\ 1{,}35214764148^{2}(2{,}016561393897387+0{,}01561014749372960)=$$

$$r_{CTC}=1{,}828303244359926\cdot 2{,}0321715413911166=3{,}71542582\,...$$

Now, we take the radius of Close Time-like Curve (CTC) 3.71542582 :

Mass = 2.502220e+27

Radius = 3.715426

Temperature = 0.00004904457

For the Ramanujan-Nardelli mock formula, we obtain:

sqrt[[[[1/(((((4*1.962364415e+19)/(5*0.0864055^2)))*1/(2.502220e+27)* sqrt[[-(((((0.00004904457*4*Pi*(3.715426)^3-(3.715426)^2))))) / ((6.674*10^-11))]]]]]

Input interpretation:

$$\sqrt{\frac{1}{\frac{4\times 1.962364415\times 10^{19}}{5\times 0.0864055^{2}}\times\frac{1}{2.502220\times 10^{27}}\sqrt{-\frac{0.00004904457\times 4\,\pi\times 3.715426^{3}-3.715426^{2}}{6.674\times 10^{-11}}}}}$$

Result:

1.6184916237557444376518084320315548322962980479422575126 24…

1.618491623…

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