On the hypothetical Dark Matter candidate particles: New mathematical connections with the physics of black holes and some developments of Ramanujan's Mock Theta Functions

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Abstract

In the present research thesis, we have obtained various interesting new possible mathematical connections concerning some developments of Ramanujan's Mock Theta Functions, some sectors of Particle Physics, concerning principally the Dark Matter candidate particles and the physics of black holes.

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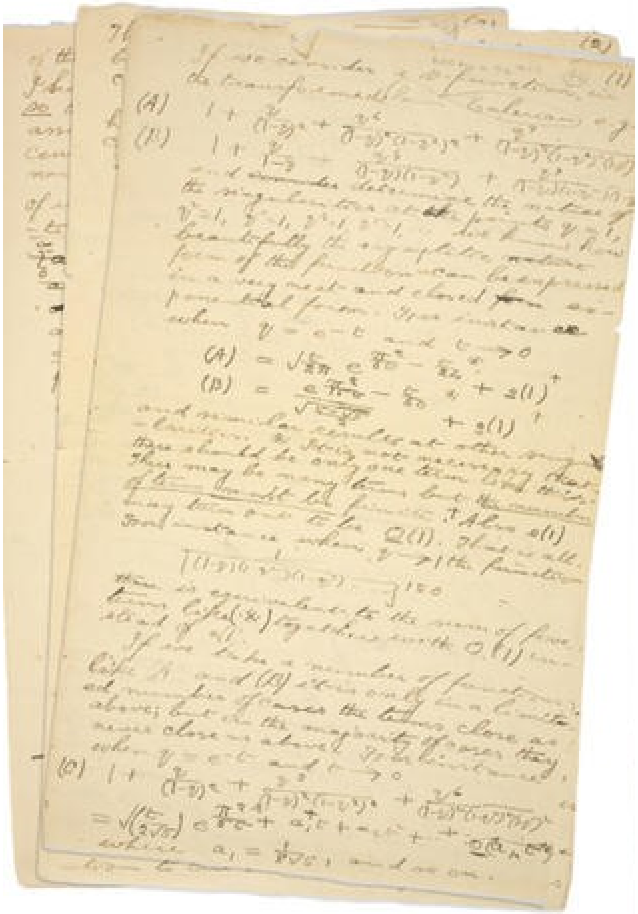
From:

http://unboundintelligence.com/the-genius-of-ramanujan-what-it-takes-to-live-among-common-mortals/



From Wikipedia

Pages from one of Ramanujan's last letters.

From:

Superheavy Gravitinos and Ultra-High Energy Cosmic Rays

Krzysztof A. Meissner and Hermann Nicolai

https://arxiv.org/pdf/1906.07262.pdf

At this stage the gravitino density is still so small that annihilation processes can be neglected. Furthermore, because the color singlet gravitinos in (1) interact only electromagnetically their annihilation cross section is proportional to the inverse mass squared ($\sigma v \sim (\pi\alpha^2\hbar^2/(4M^2c)$ for small initial velocities) [21]. The situation is entirely different for the strongly interacting gravitinos corresponding to the two color triplets in (1); as they are mainly responsible for the effect to be discussed here we will henceforth restrict attention to them only. For strongly interacting particles the annihilation cross section σ varies only very slowly with the energy $\sqrt{s}$, and can be approximated by the formula [16]

$$\langle\sigma\beta\rangle \sim \left[36 - 4\ln\left(\frac{\sqrt{s}}{\Lambda_{QCD}}\right) + 0.84\left(\ln\left(\frac{\sqrt{s}}{\Lambda_{QCD}}\right)\right)^2\right]\text{mb} \quad (2)$$

with $\Lambda_{QCD} = 0.4$ GeV. This formula is non-perturbative in the sense that it does not rely on a perturbative calculation, but is based on fitting a general ansatz consistent with the Froissart bound with experimental data [16]. Putting $\sqrt{s} = 2\gamma m_p$ and $\gamma \sim 1$ we find $\langle\sigma\beta\rangle \sim 32$mb, a value that we will use below (1 mb $\sim 10^{-31}\text{m}^2 \sim$ 2.5 GeV^{-2}).

We have:

32 * 2.5 GeV^{-2}

2.5 * 32 GeV^-2

Input interpretation:

$2.5 \times 32\ \text{GeV}^{-2}$ (reciprocal gigaelectronvolts squared)

Unit conversion:

$3.117 \times 10^{21}\ \text{J}^{-2}$ (reciprocal joules squared)

$3.117 * 10^{21}\ J^{-2}$

Note that:

1/6 * (((3.117×10^21)))^2 reciprocal joules squared

Input interpretation:

$\frac{1}{6}(3.117 \times 10^{21})^2\ \text{J}^{-2}$ (reciprocal joules squared)

Result:

$1.619 \times 10^{42}\ \text{J}^{-2}$ (reciprocal joules squared)

$1.619 * 10^{42}\ J^{-2}$

Unit conversion:

$41566\ \text{eV}^{-2}$ (reciprocal electronvolts squared)

Now:

1Joule

$6.242 \times 10^{18}\ \text{eV}$ (electronvolts)

$1J^{-2}$= (6.242×10^18)^-2 electronvolts

Input interpretation:

$\frac{1}{(6.242 \times 10^{18})^2}\ \text{eV}$ (electronvolts)

Unit conversion:

$4.112 \times 10^{-57}\ \text{J}$ (joules)

From:

$3.117 \times 10^{21}\ \text{J}^{-2}$ (reciprocal joules squared), we obtain:

(3.117×10^21 * 4.112×10^-57) joules

Input interpretation:

$3.117 \times 10^{21} \times 4.112 \times 10^{-57}$ J (joules)

Unit conversions:

8×10^{-17} eV (electronvolts)

$8 * 10^{-17}$eV =

8×10^{-26} GeV (gigaelectronvolts)

$8 * 10^{-26}$ GeV

Note that:

1/ (8 * 10^-17)^1/5 eV

Input interpretation:

$$\frac{1}{\sqrt[5]{\frac{8}{10^{17}}}} \text{ eV (electronvolts)}$$

Result:

1657 eV (electronvolts)

Unit conversions:

1.657 keV (kiloelectronvolts)

2.655×10^{-16} J (joules)

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

Corresponding quantities:

Photon wavelength λ from $E = hc/\lambda$:

748 pm (picometers)

7.48×10^{-10} meters

$7.48 * 10^{-10}$ m

To estimate the present density ρ_0 of strongly interacting (color triplet) gravitinos, we observe that with a gravitino mass close to $M_{\rm PL}$, the usual requirement of thermal equilibrium reads

$$\Gamma = \rho\langle\sigma v\rangle > H = \frac{\pi(k_B T)^2}{3\sqrt{5}\hbar c^2 M_{\rm PL}} \qquad (3)$$

Adopting from now on the usual unit conventions $\hbar = c = k_B = 1$ (hence $2 \cdot 10^{-7}\,{\rm eV}\cdot{\rm m} = 1$), this translates into an equation for the relic abundance ρ_T

$$(32\,{\rm mb})\,\rho_T \equiv (32\,{\rm mb})\,g\left(\frac{mT}{2\pi}\right)^{3/2} {\rm e}^{-m/T} = \frac{T^2}{2M_{\rm PL}} \qquad (4)$$

($g = 4$ for a massive gravitino), or

$$\frac{m}{T} \sim 90 \quad \Rightarrow \quad \rho_T \sim 3\cdot 10^{59}\,{\rm m}^{-3} \qquad (5)$$

The temperature $T \sim 2\cdot 10^{16}$ GeV corresponds to cosmic time $t_T = M_{\rm PL}/T^2 \sim 3\cdot 10^{-39}$ s. The *present* density ρ_0 is obtained from ρ_T by the well known formula

$$\rho_0 = \rho_T\left(\frac{a_T}{a_0}\right)^3 \qquad (6)$$

(since superheavy gravitinos are non-relativistic). Taking the end of the radiation dominated era as 10^{12} s we get

$$\frac{a_T}{a_0} = \left(\frac{3\cdot 10^{-39}}{10^{12}}\right)^{1/2}\left(\frac{10^{12}}{3\cdot 10^{17}}\right)^{2/3} \sim 10^{-29} \qquad (7)$$

where the two factors correspond to the radiation dominated and matter dominated eras, respectively. Thus

$$\rho_0 \sim 5\cdot 10^{-28}\,{\rm m}^{-3} \quad \left(\sim 10^{-9}\,{\rm GeV}\cdot{\rm m}^{-3}\right) \qquad (8)$$

Assuming now (as before) that the star 'swallows' all gravitinos within a radius of two lightyears we get for the total number of color triplet gravitinos inside the star

$$N_g \sim 2\cdot 10^{22} \qquad (9)$$

We have:

$\rho_0 = 5 * 10^{-28}$ m^{-3}

For:

$$E_P = \sqrt{\frac{\hbar c^5}{G}} \approx 1{,}956 \times 10^9 \text{ J} \approx 1{,}22 \times 10^{19} \text{ GeV}$$

We obtain:

5 * 10^-28 m^-3 * (1.22*10^19 GeV)

Input interpretation:

5×10^{-28} m^{-3} (reciprocal cubic meters) × 1.22×10^{19} GeV (gigaelectronvolts)

Result:

6.1×10^{-9} GeV/m^3 (gigaelectronvolts per cubic meter)

$6.1 * 10^{-9}$ GeV * m^{-3} (Dark Matter density)

We have that:

((6.1 * 10^-9)^1/4)) / (9*10^16) GeV

where $9 * 10^{16} = c^2$ (speed of light)

Input interpretation:

$$\frac{\sqrt[4]{\frac{6.1}{10^9}}}{9 \times 10^{16}} \text{ GeV (gigaelectronvolts)}$$

Result:

9.82×10^{-20} GeV (gigaelectronvolts)

Unit conversions:

9.82×10^{-11} eV (electronvolts)

1.573×10^{-29} J (joules)

$1.573 * 10^{-29}$ J

Corresponding quantities:

Electromagnetic wave frequency ν from $E = h\nu$:

24 kHz (kilohertz)

Photon wavelength λ from $E = hc/\lambda$:

13 km (kilometers)

Note that:

1/((((((6.1 * 10^-9)^1/4)) / (9*10^16))))) GeV (inverse of density/c^2)

Input interpretation:

$$\frac{1}{\frac{\sqrt[4]{\frac{6.1}{10^9}}}{9\times 10^{16}}} \text{ GeV (gigaelectronvolts)}$$

Result:

1.018×10^{19} GeV (gigaelectronvolts)

$1.018 * 10^{19}$GeV

Unit conversions:

1.018×10^{28} eV (electronvolts)

1.632 GJ (gigajoules)

1.632×10^{9} J (joules)

1.632×10^{16} ergs
(unit officially deprecated)

$1.632 * 10^9$ J

Corresponding quantities:

Relativistic mass m from $E = mc^2$:

18 µg (micrograms)

Spectroscopic wavenumber $\tilde{\nu}$ from $\tilde{\nu} = E/(hc)$:

8.214×10^{33} m^{-1} (reciprocal meters)

$8.214 * 10^{33}$ m^{-1}

From this result, we obtain:

(8.214×10^33)^1/165 reciprocal meters

Input interpretation:

$\sqrt[165]{8.214\times 10^{33}}$ m^{-1} (reciprocal meters)

Result:

1.605 m^{-1} (reciprocal meters)

Corresponding quantities:

Energy E from $E = \hbar c k$:

5.1×10^{-26} J (joules)

3.2×10^{-7} eV (electronvolts)

From this corresponding quantity, i.e. 3.2 * 10^{-7} eV, we obtain, multiplying by 52:

52 * 3.2×10^-7 electronvolts

Input interpretation:

$52\times 3.2\times 10^{-7}$ eV (electronvolts)

Unit conversions:

0.01664 meV (millielectronvolts)

2.666×10^{-24} J (joules)

From 0.01664 meV, we have:

Input interpretation:

0.01664 meV (millielectronvolts)

Unit conversions:

1.664×10^{-5} eV (electronvolts)

2.666×10^{-24} J (joules)

$1.664 * 10^{-5}$ eV is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164{,}2696$ i.e. 1,65578...

Now:

(6.1 * 10^-9) GeV * m^-3 * (4×10^80) cubic meters

where:

volume of the observable universe ≈

≈ 4×10^{80} m^3 (cubic meters)

6.1×10^{-9} GeV/m^3 (gigaelectronvolts per cubic meter) × 4×10^{80} m^3 (cubic meters)

2.44×10^{72} GeV (gigaelectronvolts)

$2.44 * 10^{72}$ GeV (Dark Matter mass of observable universe)

Unit conversions:

2.44×10^{81} eV (electronvolts)

$2.44 * 10^{81}$eV

3.909×10^{62} J (joules)

Now, we have that:

10^3*(2.44 * 10^72)^1/288 GeV

Input interpretation:

$10^3 \sqrt[288]{2.44\times10^{72}}$ GeV (gigaelectronvolts)

Result:

1784 GeV (gigaelectronvolts)

Unit conversions:

1.784 TeV (teraelectronvolts)

1.784×10^{12} eV (electronvolts)

1784 GeV result in the range of the hypothetical mass of Gluino (**1760 ± 15 MeV-1785.16 GeV**).

And:

((((10^3*(2.44 * 10^72)^1/288))))^1/15 GeV

Input interpretation:

$\sqrt[15]{10^3 \sqrt[288]{2.44\times 10^{72}}}$ GeV (gigaelectronvolts)

Result:

1.647 GeV (gigaelectronvolts)

1.647 GeV

Unit conversions:

1.647×10^9 eV (electronvolts)

2.639×10^{-10} J (joules)

Corresponding quantities:

Spectroscopic wavenumber $\tilde{\nu}$ from $\tilde{\nu} = E/(hc)$:

1.329×10^{15} m^{-1} (reciprocal meters)

In Joules, we obtain:

5 * 10^-28 m^-3 * (1.956*10^9 Joules)

Input interpretation:

5×10^{-28} m^{-3} (reciprocal cubic meters)$\times 1.956\times 10^9$ J (joules)

Result:

9.78×10^{-19} J/m^3 (joules per cubic meter)

9.78×10^{-19} kg/(m s^2) (kilograms per meter per second squared)

$9.78 * 10^{-19}$ kg/(m s^2)

And:

5 * 10^-28 m^-3 * (1.956*10^9 Joules) * (4 * 10^80) cubic meters

Input interpretation:

5×10^{-28} m^{-3} (reciprocal cubic meters) $\times$
1.956×10^{9} J (joules) $\times$ 4×10^{80} m^{3} (cubic meters)

Result:

3.912×10^{62} J (joules)

$3.912 * 10^{62}$ J

Unit conversions:

3.912×10^{69} ergs
(unit officially deprecated)

9.35×10^{52} tons of TNT

2.442×10^{81} eV (electronvolts)

$2.442 * 10^{81}$ eV

This result is a multiple near to the rest mass of charmed Sigma baryon 2452.9

Now, we have that:

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Planck mass charged gravitino dark matter

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extremely small. Indeed, the most stringent cosmological bound on the charge of DM particles of mass m is [26–28]

$$|q| \lesssim 7.6 \times 10^{-10} \left(\frac{m}{1\ \mathrm{TeV}}\right)^{\frac{1}{2}} \tag{3}$$

within the 90% confidence limit. For the DM candidates usually discussed (axion-like or WIMP-like, or any kind of new particle associated with low-energy supersymmetry) which are assumed to have masses $\lesssim \mathcal{O}(1\ \mathrm{TeV})$ this implies that the allowed charges are $\lesssim \mathcal{O}(10^{-10})$. This completely excludes charged DM of any conventional type. [A possible way out here would be to invoke new U(1) gauge interactions but there is neither observational evidence nor any compelling theoretical reason for them.] Remarkably, however, if we assume that the DM particle has a Planck-scale mass, then the admissible charge comes out to be of order unity: for $m \sim 10^{19}$ GeV the above formula gives

$$|q| \lesssim 7.6 \times 10^{-2}. \tag{4}$$

Taking into account the theoretical uncertainties and model dependencies, this value is quite compatible with charges of order one!

From (3) and (4), we obtain:

(((7.6*10^-2)^2 * 1000))) / (((7.6 * 10^-10)^2))) GeV

Input interpretation:

$$\frac{(7.6 \times 10^{-2})^2 \times 1000}{\left(\frac{7.6}{10^{10}}\right)^2} \text{ GeV (gigaelectronvolts)}$$

Result:

1×10^{19} GeV (gigaelectronvolts)

$1 * 10^{19}$GeV

Unit conversions:

1×10^{28} eV (electronvolts)

1.602 GJ (gigajoules)

1.602×10^9 J (joules)

$1.602 * 10^9$ J

If $m \approx 10^{19}$ GeV, we obtain:

10^{19} GeV (gigaelectronvolts)

Unit conversions:

$= 1 \times 10^{28}$ eV (electronvolts)

1.602 GJ (gigajoules)

$= 1.602 \times 10^9$ J (joules)

$m \approx 10^{19}$ GeV → $m \approx 1.602 * 10^9$ J

From (3) and (4), we obtain:

(7.6 * 10^-10) * (10^19/1000)^1/2 GeV

Input interpretation:

$$\frac{7.6}{10^{10}} \sqrt{\frac{10^{19}}{1000}} \text{ GeV (gigaelectronvolts)}$$

Result:

0.076 GeV (gigaelectronvolts)

q = 0.076 GeV

Unit conversions:

76 MeV (megaelectronvolts)

7.6×10^7 eV (electronvolts)

1.218×10^{-11} J (joules)

q = 0.076 GeV → $q = 1.218 * 10^{-11}$ J

We note that:

Corresponding quantities:

Relativistic mass m from $E = mc^2$:

1.4×10^{-25} grams

1.4×10^{-28} kg (kilograms)

Thermodynamic temperature T from $E = kT$:

8.819×10^{11} K (kelvins)

Spectroscopic wavenumber $\bar{\nu}$ from $\bar{\nu} = E/(hc)$:

6.13×10^{13} m^{-1} (reciprocal meters)

Now, from the ratio charge/mass, we obtain:

(0.076/10^19)GeV

Input interpretation:

$\frac{0.076}{10^{19}}$ GeV (gigaelectronvolts)

Result:

7.6×10^{-21} GeV (gigaelectronvolts)

$7.6 * 10^{-21}$GeV

Unit conversions:

7.6×10^{-12} eV (electronvolts)

1.218×10^{-30} J (joules)

1/ (7.6×10^-21)^1/93 gigaelectronvolts

Input interpretation:

$\frac{1}{\sqrt[93]{7.6\times10^{-21}}}$ GeV (gigaelectronvolts)

Result:

1.646 GeV (gigaelectronvolts)

1.646 GeV $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Unit conversions:

1.646×10^9 eV (electronvolts)

2.637×10^{-10} J (joules)

Corresponding quantities:

Spectroscopic wavenumber $\tilde{\nu}$ from $\tilde{\nu} = E/(hc)$:

1.327×10^{15} m^{-1} (reciprocal meters)

Now, we note that, from the following energy value, we obtain:

2sqrt((((6*(((1/ (7.6×10^-21)^1/93))))))) gigaelectronvolts

Input interpretation:

$$2 \times \sqrt{6 \times \frac{1}{\sqrt[93]{7.6 \times 10^{-21}}}}$$ GeV (gigaelectronvolts)

Result:

6.285 GeV (gigaelectronvolts)

6.285 GeV

Unit conversions:

6.285×10^9 eV (electronvolts)

Corresponding quantities:

Thermodynamic temperature T from $E = kT$:

7.293×10^{13} K (kelvins)

6.285 GeV = $7.293 * 10^{13}$ K

Corresponding quantities:

Thermodynamic energy E from $E = kT$:

6.3 GeV (gigaelectronvolts)

Approximate luminous exitance from a planar blackbody radiator perpendicular to its surface:

1.489×10^{21} lx (lux)

Or:

729.3×10^11 kelvins

Input interpretation:

729.3×10^{11} K (kelvins)

$729.3 * 10^{11}$ K

Unit conversions:

7.293×10^{13} °C (degrees Celsius)

Corresponding quantities:

Thermodynamic energy E from $E = kT$:

6.3 GeV (gigaelectronvolts)

From the value $729.3 * 10^{11}$ K, we obtain:

Input interpretation:

172930000000000 K (kelvins)

Unit conversions:

1.7293×10^{14} °C (degrees Celsius)

3.1127×10^{14} °F (degrees Fahrenheit)

3.1127×10^{14} °R (degrees Rankine)

1.3834×10^{14} °Ré (degrees Réaumur)

9.0788×10^{13} °Rø (degrees Rømer)

Interpretation:

temperature

Basic unit dimensions:

[temperature]

Corresponding quantities:

Thermodynamic energy E from $E = kT$:

15 GeV (gigaelectronvolts)

Approximate luminous exitance from a planar blackbody radiator perpendicular to its surface:

3.531×10^{21} lx (lux)

Acceleration a needed to achieve given temperature as an Unruh temperature from $T = \hbar a/(2\pi c k)$:

4.265×10^{34} m/s^2 (meters per second squared)

Gravitational acceleration g needed to achieve given temperature as a Hawking temperature from $T = \hbar g/(2\pi c k)$:

4.265×10^{34} m/s^2 (meters per second squared)

((10^3 + 729.3)*10^11) kelvins

$1.729 * 10^{14}$ K

$4.265 * 10^{34}$ m/s^2 (Surface Gravity)

And, from the value $4.265 * 10^{33}$ m/s^2, we obtain:

4.265×10^34 meters per second squared

Input interpretation:

4.265×10^{34} m/s^2 (meters per second squared)

Interpretations:

acceleration

Basic unit dimensions:

[length] [time]$^{-2}$

Corresponding quantities:

Unruh temperature T from $T = \hbar a/(2\pi c k)$:

1.729×10^{14} K (kelvins)

Gravitational field strength:

4.265×10^{34} N/kg (newtons per kilogram)

Hawking temperature T from $T = \hbar g/(2\pi c k)$:

1.729×10^{14} K (kelvins)

Or, equivalently:

Input interpretation:

1729×10^{11} K (kelvins)

Unit conversions:

1.729×10^{14} °C (degrees Celsius)

We note that, from this value, can be obtained:

(1729)^1/15 *10^11 kelvins

Input interpretation:

$\sqrt[15]{1729} \times 10^{11}$ K (kelvins)

Result:

1.644×10^{11} K (kelvins)

Where 1.644 $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Unit conversions:

1.6438×10^{11} °C (degrees Celsius)

2.9589×10^{11} °F (degrees Fahrenheit)

2.9589×10^{11} °R (degrees Rankine)

1.3151×10^{11} °Ré (degrees Réaumur)

8.63×10^{10} °Rø (degrees Rømer)

Interpretation:

temperature

Basic unit dimensions:

[temperature]

Corresponding quantities:

Thermodynamic energy E from $E = kT$:

14 MeV (megaelectronvolts)

Approximate luminous exitance from a planar blackbody radiator perpendicular to its surface:

3.356×10^{18} lx (lux)

Acceleration a needed to achieve given temperature as an Unruh temperature from $T = \hbar a/(2\pi ck)$:

4.054×10^{31} m/s^2 (meters per second squared)

Gravitational acceleration g needed to achieve given temperature as a Hawking temperature from $T = \hbar g/(2\pi ck)$:

4.054×10^{31} m/s^2 (meters per second squared)

From Wikipedia:

Un buco nero emette una radiazione termica a una temperatura

$$T_H = \frac{\hbar}{ck_B}\frac{\kappa}{2\pi},$$

ove $\hbar$ è la costante di Planck ridotta (pari ad $h/2\pi$), c è la velocità della luce, k_B è la costante di Boltzmann e k è la gravità di superficie dell'orizzonte degli eventi. In particolare la radiazione proveniente dal buco nero di Schwarzschild è una radiazione di corpo nero con una temperatura pari a

$$T = \frac{\hbar c^3}{8\pi GMk_B}$$

dove G è la costante gravitazionale ed M è la massa del buco nero.

Now:

From http://xaonon.dyndns.org/hawking/

Inserting the values of temperature and surface gravity that we have obtained in the table we have also the others.

From:

$$T = \frac{1}{M} \cdot \frac{\hbar c^3}{8k\pi G}$$

we obtain M:$M = \frac{\hbar c^3}{8\pi G}$

((((1.054571*10^-34 * (3*10^8)^3))) / ((8*Pi*6.67*10^-11*1.380649*10^-23*1729*10^11)))

Input interpretation:

$$\frac{1.054571\times10^{-34}\,(3\times10^{8})^{3}}{8\,\pi\times6.67\times10^{-11}\times1.380649\times10^{-23}\times1729\times10^{11}}$$

Result:

$7.1153393720961238839420006567495906655307677537260021 5... \times 10^{8}$ (Mass)

((7.115339372*10^8)^2*4*Pi*6.67*10^-11)))/(((1.054571*10^-34*(3*10^8)*ln10)))

Input interpretation:

$$\frac{(7.115339372\times10^{8})^{2}\times4\,\pi\times6.67\times10^{-11}}{1.054571\times10^{-34}\times3\times10^{8}\,\log(10)}$$

$\log(x)$ is the natural logarithm

Result:

$5.82524... \times 10^{33}$

S = 5.8252446283… * 10^{33} (Entropy)

((((7.115339372*10^8)^2*16*Pi*(6.67*10^-11)^2)))/(((3*10^8))^4)))))

Input interpretation:

$$\frac{(7.115339372\times10^{8})^{2}\times16\,\pi\,(6.67\times10^{-11})^{2}}{(3\times10^{8})^{4}}$$

Result:

$1.39774... \times 10^{-35}$

A = 1.397744338 * 10^{-35} (Surface Area)

(((7.115339372*10^8)*2*6.67*10^-11))) / ((3*10^8))^2

Input interpretation:

$$\frac{7.115339372\times 10^{8}\times 2\times 6.67\times 10^{-11}}{(3\times 10^{8})^{2}}$$

Result:

$1.0546514135831111111111111111111111111111111 \times 10^{-18}$

R = 1.05465141358311… * 10^{-18} (Radius)

Now, from the temperature and the radius of BH, we obtain the charge Q:

$$\begin{aligned} T &= \frac{1}{4\pi} f'(r_+) \\ &= \frac{1}{4\pi}\left(\frac{2GM}{r_+^2} - \frac{2GQ^2}{r_+^3}\right) \\ &= \frac{1}{4\pi}\left(\frac{1}{r_+} - \frac{GQ^2}{r_+^3}\right) \end{aligned}$$

For T = 1729 * 10^{11} K, r = 1.0546514135831 * 10^{-18}, G = 6.67 * 10^{-11}, we obtain:

From the charge Q, with the following computations we obtain:

sqrt((((((((((((1729*10^11 * (4*Pi*1.054651*10^-18)^3)))+(1.054651*10^-18)^2)))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\sqrt{\frac{1729\times 10^{11}\,(4\,\pi\times 1.054651\times 10^{-18})^{3}+(1.054651\times 10^{-18})^{2}}{6.67\times 10^{-11}}}$$

Result:

$1.50699... \times 10^{-13}$

1.50699... * 10^{-13}

From the ratio mass/charge, we obtain:

((7.1153 * 10^8)) / sqrt(((((((((((((1729*10^11*(4*Pi*1.054651*10^-18)^3)))+(1.054651*10^-18)^2)))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\frac{7.1153\times 10^{8}}{\sqrt{\frac{1729\times 10^{11}\,(4\,\pi\times 1.054651\times 10^{-18})^{3}+(1.054651\times 10^{-18})^{2}}{6.67\times 10^{-11}}}}$$

Result:

$4.72152... \times 10^{21}$

$4.72152... * 10^{21}$

Multiplying mass and charge, from the inverse, we obtain:

24+1/8 * 1/ ((((((((7.1153 * 10^8)) * sqrt(((((((((((((1729*10^11*(4*Pi*1.054651*10^-18)^3)))+(1.054651*10^-18)^2)))))) / ((6.67*10^-11))))))))))))

Input interpretation:

$$24+\frac{1}{8}\times\frac{1}{(7.1153\times 10^{8})\sqrt{\frac{1729\times 10^{11}\,(4\,\pi\times 1.054651\times 10^{-18})^{3}+(1.054651\times 10^{-18})^{2}}{6.67\times 10^{-11}}}}$$

Result:

1189.75...

1189.75... result very near to the rest mass of Sigma baryon 1189.37

Now:

1.729*10^14 K = celsius

Input interpretation:

convert 1.729×10^{14} K (kelvins) to degrees Celsius

Result:

1.729×10^{14} °C (degrees Celsius)

1.729×10^14 degrees Celsius = J

Input interpretation:

convert 1.729×10^{14} °C (degrees Celsius) to joules

Result:

°C (degrees Celsius) and J (joules) are not compatible.

Corresponding quantity for 1.729×10^14 °C:

Thermodynamic energy E from $E = kT$:

2.4×10^{-9} J (joules)

15 GeV (gigaelectronvolts)

$2.4 * 10^{-9}$ J

Thence:

sqrt(((((((((((((2.4*10^-9) *(4*Pi*1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\sqrt{\frac{2.4\times 10^{-9}\,(4\,\pi\times 1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{6.67\times 10^{-11}}}$$

Result:

$1.29136... \times 10^{-13}$

$1.29136... * 10^{-13}$

we know that: 1 kgf = 9.8066 J/m:

sqrt (((((((((((((2.4*10^-9) *(4*Pi*1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / ((6.67*10^-11) (1/(((9.8066)))^2))))

Input interpretation:

$$\sqrt{\frac{2.4\times 10^{-9}\,(4\,\pi\times 1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{6.67\times 10^{-11}\times \frac{1}{9.8066^2}}}$$

Result:

$1.26638... \times 10^{-12}$

$1.26638...*10^{-12}$

Or:

Input interpretation:

$$\sqrt{\frac{2.4\times 10^{-9}\times 4\,\pi\,(1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{6.67\times 10^{-11}\times \frac{1}{9.8066^2}}}$$

Result:

$1.26638... \times 10^{-12}$

$1.26638... * 10^{-12}$

And:

(1.0061571663 *5 * 4.929062*10^6) 1 / sqrt (((((((((((((2.4*10^-9) *(4*Pi*1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / ((6.67*10^-11) (1/(((9.8066)))^2))))

Input interpretation:

$$\left(1.0061571663\times 5\times 4.929062\times 10^{6}\right)\times \frac{1}{\sqrt{\frac{2.4\times 10^{-9}\left(4\pi\times 1.054651\times 10^{-18}\right)^{3}+\left(1.054651\times 10^{-18}\right)^{2}}{6.67\times 10^{-11}\times \frac{1}{9.8066^{2}}}}}$$

Result:

$1.95810... \times 10^{19}$

Or:

Input interpretation:

$$\left(1.0061571663\times 5\times 4.929062\times 10^{6}\right)\times \frac{1}{\sqrt{\frac{2.4\times 10^{-9}\times 4\pi\left(1.054651\times 10^{-18}\right)^{3}+\left(1.054651\times 10^{-18}\right)^{2}}{6.67\times 10^{-11}\times \frac{1}{9.8066^{2}}}}}$$

Result:

$1.95810... \times 10^{19}$

$1.95810...*10^{19}$ GeV

Now:

6.67 N m = GeV

Result:

4.163×10^{10} GeV (gigaelectronvolts)

$4.163 * 10^{10}$GeV

Additional conversions:

41.63 EeV (exaelectronvolts)

1 Kg = GeV

Result:

5.61×10^{26} GeV/c^2

5.61 * 10^{26}GeV/c^2

Corresponding quantity for 1.729×10^14 °C:

Thermodynamic energy E from $E = kT$:

2.4×10^{-9} J (joules)

15 GeV (gigaelectronvolts)

2.4 * 10^{-9} J

we obtain:

sqrt ((((((((((((15)GeV * 4*Pi*(1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / (((((4.163 * 10^10)m GeV / (5.61 * 10^26)Kg GeV/c^2))))))))

Input interpretation:

$$\sqrt{\frac{15 \text{ GeV (gigaelectronvolts)} \times 4\pi(1.054651\times10^{-18})^3 + (1.054651\times10^{-18})^2}{4.163\times10^{10} \text{ meters} \times \frac{\text{GeV (gigaelectronvolt)}}{5.61\times10^{26}\text{ kg (kilograms)}} \text{ GeV}/c^2}}$$

Result:

2900 $m^{-1/2}$ (meters to the minus one half)

Or:

Input interpretation:

$$\sqrt{\frac{15 \text{ GeV (gigaelectronvolts)} (4\pi\times1.054651\times10^{-18})^3 + (1.054651\times10^{-18})^2}{4.163\times10^{10} \text{ meters} \times \frac{\text{GeV (gigaelectronvolt)}}{5.61\times10^{26}\text{ kg (kilograms)}} \text{ GeV}/c^2}}$$

Result:

2900 $m^{-1/2}$ (meters to the minus one half)

1.1424432/86 * 4.04437*10^14*3.07735*10^13 * 1/ [((((((((15)GeV * 4*Pi*(1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / (((((4.163 * 10^10)m GeV / (5.61 * 10^26)Kg GeV/c^2))))))))))]

Where 1.1424432, 4.04437*10^{14} and 3.07735*10^{13} are Ramanujan mock theta functions

Input interpretation:

$$\frac{1.1424432}{86} \times 4.04437 \times 10^{14} \times 3.07735 \times 10^{13} \times \frac{1}{\frac{15\text{ GeV (gigaelectronvolts)} \times 4\pi\,(1.054651 \times 10^{-18})^3 + (1.054651 \times 10^{-18})^2}{4.163 \times 10^{10}\text{ meters} \times \frac{\text{GeV (gigaelectronvolt)}}{5.61 \times 10^{26}\text{ kg (kilograms)}}\text{ GeV}/c^2}}$$

Result:

1.966×10^{19} meters

$1.966 * 10^{19}$

Or:

Input interpretation:

$$\frac{1.1424432}{86} \times 4.04437 \times 10^{14} \times 3.07735 \times 10^{13} \times \frac{1}{\frac{15\text{ GeV (gigaelectronvolts)}\,(4\pi \times 1.054651 \times 10^{-18})^3 + (1.054651 \times 10^{-18})^2}{4.163 \times 10^{10}\text{ meters} \times \frac{\text{GeV (gigaelectronvolt)}}{5.61 \times 10^{26}\text{ kg (kilograms)}}\text{ GeV}/c^2}}$$

Result:

1.966×10^{19} meters

6.67 Joule **41630845020000000000** Elettronvolt

41630845020 = 4.1630845020 * 10^{10} GeV;

1 Kg = 9.80665002864 N (J m)

9.80665 Joule per metro = **1** Chilogrammo-forza

1 Kg = 5.60958616722e+29 eV

5,609 586 167 22×10^29 Megaelettronvolt [MeV]

= **5,609 586 167 22×10^26 Gigaelettronvolt [GeV]**

Thence:

G = (4.1630845020 * 10^10)mGeV / (5.609586167 * 10^26) GeV/c^2

we obtain:

sqrt ((((((((((((15)GeV *4*Pi*(1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / (((((4.1630845020 * 10^10)m GeV / (5.609586167 * 10^26) GeV/c^2))))))))

Input interpretation:

$$\sqrt{\frac{15\text{ GeV (gigaelectronvolts)}\times 4\pi\,(1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{4.1630845020\times 10^{10}\text{ meters}\times\frac{\text{GeV (gigaelectronvolt)}}{5.609586167\times 10^{26}\text{ GeV}/c^2}}}$$

Result:

$5.169\times 10^{-24}\sqrt{\text{kg}}/\sqrt{\text{m}}$ (square root kilograms per square root meter)

$5.169 * 10^{-24}$

Or:

Input interpretation:

$$\sqrt{\frac{15\text{ GeV (gigaelectronvolts)}\,(4\pi\times 1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{4.1630845020\times 10^{10}\text{ meters}\times\frac{\text{GeV (gigaelectronvolt)}}{5.609586167\times 10^{26}\text{ GeV}/c^2}}}$$

Result:

$5.169\times 10^{-24}\sqrt{\text{kg}}/\sqrt{\text{m}}$ (square root kilograms per square root meter)

And:

(((1/((33021.10/(2.7399+0.61803398)))) * 1/ sqrt ((((((((((((15)GeV *4*Pi*(1.054651*10^-18)^3 + (1.054651*10^-18)^2)))))))) / (((((4.1630845020 * 10^10)m GeV / (5.609586167 * 10^26) GeV/c^2))))))))

Input interpretation:

$$\frac{1}{\frac{33021.10}{2.7399+0.61803398}}\times\frac{1}{\sqrt{\frac{15\text{ GeV (gigaelectronvolts)}\times 4\pi\,(1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{4.1630845020\times 10^{10}\text{ meters}\times\frac{\text{GeV (gigaelectronvolt)}}{5.609586167\times 10^{26}\text{ GeV}/c^2}}}}$$

Result:

$1.967\times 10^{19}\sqrt{\text{m}}/\sqrt{\text{kg}}$ (square root meters per square root kilogram)

1.967×10^{19} GeV $m^{1/2}/kg^{1/2}$

Or:

Input interpretation:

$$\frac{1}{\frac{33021.10}{2.7399+0.61803398}}\times\frac{1}{\sqrt{\frac{15\text{ GeV (gigaelectronvolts)}\,(4\pi\times 1.054651\times 10^{-18})^3+(1.054651\times 10^{-18})^2}{4.1630845020\times 10^{10}\text{ meters}\times\frac{\text{GeV (gigaelectronvolt)}}{5.609586167\times 10^{26}\text{ GeV}/c^2}}}}$$

Result:

$1.967\times10^{19}\sqrt{m}/\sqrt{kg}$ (square root meters per square root kilogram)

The mean of the three values in blue is 1,96357166 * 10^{19} GeV. We note that:

1963.57 * 10^19 MeV

Input interpretation:

1.96357×10^{22} MeV (megaelectronvolts)

Unit conversions:

1.9636×10^{28} eV (electronvolts)

1963.57 *10^{19} MeV is a multiple very near to the rest mass of the strange D meson 1968.49 MeV

Furthermore, 1,96357166666666.... is very nearly to the result of the following Ramanujan mock theta function: χ(q) = 1.962364415...

Remarkably, however, if we assume that the DM particle has a Planck scale mass, then the admissible charge comes out to be of order unity: for m ≈ 10^{19} GeV .

Now, we have that:

From:

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GRAVITATIONALLY COLLAPSED OBJECTS OF VERY LOW MASS

Stephen Hawking

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electrostatic energy will be of the order of $Z^2e^2V^{-1/3}$. For the region to be able to collapse against electrical repulsion this energy must be less than the gravitational energy $GM^2V^{-1/3}$, i.e. $|Z|$ must be less than $M(G/e^2)^{1/2} = 5 \times 10^5 M$. If this is the case the region can collapse to a 'black hole' which resembles the Reissner–Nordstrom solution with charge Ze. The charge would be later reduced if particles of the opposite charge were to fall into the black hole. This process of neutralization would continue until the temperature fell to the point where the wavelength of the particles was greater than the radius of the hole. If one assumes that the electrostatic energy of the collapsed object at this time was of the order of kT, one has

$$\frac{Z^2e^2c^2}{2GM} \sim \frac{hc^3}{2GM}$$

and so $Z^2 \sim (hc/e^2) \sim 900$. Thus one might expect values of $|Z|$ of up to 30.

A charged collapsed object would behave in many respects like an ordinary atomic nucleus with the same value of Z. If it travelled at high velocity through matter, it would induce ionization and excitation and would lose energy at a rate of the order of $4\pi Z^2e^4\, d/m_em_pv^2$ per unit distance (**8**) where m_p and m_e are the proton and electron masses respectively. This is a factor $Z^2e^4/G^2M^2m_em_p = (Z^2/M^2) \times 10^{18}$ times greater than the energy loss by purely gravitational scattering. Such an object would produce a track in a bubble chamber similar to that of an atomic nucleus of the same charge. It could however be distinguished from such a particle by the fact that it did not undergo any detectable deflection in a magnetic field. If one suppose that most of the mass of the Universe was in the form of charged collapsed objects of mass 10^{-5} g, travelling at 10 000 km s^{-1}, one would expect one such object a year to strike each 150 square metres of bubble chamber. In any analysis of bubble chamber photographs there are always a few tracks which remain unidentified. It is therefore quite possible that a collapsed object could have been observed but not have been recognized.

For:

$$Z^2 \sim (hc/e^2) \sim 900.$$

with the values of h, c and e:

$$h = 6{,}626\ 070\ 15 \times 10^{-34}\ \mathbf{J \cdot s}$$

$$\hbar = 6{,}582\ 119\ 28(15) \times 10^{-16}\ \mathbf{eV \cdot s}$$

$$c = 3 \times 10^8 = 300\ 000\ 000\ \mathrm{m/s},$$

$$e = 1{,}602\ 176\ 634 \cdot 10^{-19}\ \mathbf{C}$$

We obtain, the following solutions:

$$Z^2 \sim (hc/e^2)$$

(((6.62607015 * 10^-34) J s * (3 * 10^8) m/s))) / ((1.602176634 * 10^-19))^2 C

Input interpretation:

$$\frac{\frac{6.62607015}{10^{34}} J\,(s\,(3\times 10^8)) \times \frac{m}{s}}{\left(\frac{1.602176634}{10^{19}}\right)^2}\ C$$

Result:

$7.74384\times 10^{12}\ C\,J\,m$

$7.74384 * 10^{12}$

Indefinite integral:

$$\int \frac{(6.62607015\,J\,(s\,(3\times 10^8))\,m)\,C}{(10^{34}\ s)\left(\frac{1.602176634}{10^{19}}\right)^2}\,ds = 7.74384\times 10^{12}\ C\,J\,m\,s + \text{constant}$$

Or:

For:

$$\hbar = 6{,}582\,119\,28(15)\times 10^{-16}\ \mathrm{eV\cdot s}$$

((((6.5821192815 * 10^-16) * (3 * 10^8)))) / ((1.602176634 * 10^-19))^2))))

Input interpretation:

$$\frac{\frac{6.5821192815}{10^{16}}\,(3\times 10^8)}{\left(\frac{1.602176634}{10^{19}}\right)^2}$$

Result:

$7.6924771625396338371212729091964953287488681904694178\ldots\times 10^{30}$

$Z^2 = 7.6924771625\ldots * 10^{30}$ eV m/Coulomb

Input interpretation:

convert $7.6924771625\times 10^{30}$ eV (electronvolts) to gigaelectronvolts

Result:

7.6924771625 × 10^{21} GeV (gigaelectronvolts)

7.6924771625 * 10^{21} GeV

And:

1/2 (7.6924771625×10^21) / (2498.279 * 0.08094974) gigaelectronvolts

Where 2498.279 and 0.08094974 are two Ramanujan's mock theta functions:

Input interpretation:

$$\frac{1}{2} \times \frac{7.6924771625 \times 10^{21}}{2498.279 \times 0.08094974} \text{ GeV (gigaelectronvolts)}$$

Result:

1.90187 × 10^{19} GeV (gigaelectronvolts)

1.90187 * 10^{19} GeV (result 8)

Now, from:

$$Z^2e^4/G^2M^2m_em_p = (Z^2/M^2) \times 10^{18}$$

And:

Quantity	Value	Units	Expression
Mass	7.095930e+9	kilograms	M
Radius	1.053640e-17	meters	$R = M \cdot \frac{2G}{c^2}$
Surface area	1.395065e-33	square meters	$A = M^2 \cdot \frac{16\pi G^2}{c^4}$
Surface gravity	4.265000e+33	meters/second²	$\kappa = \frac{1}{M} \cdot \frac{c^4}{4G}$
Surface tides	8.095743e+50	meters/second² / meter	$d\kappa_R = \frac{1}{M^2} \cdot \frac{c^6}{4G^2}$
Entropy	5.799775e+35	*(dimensionless)*	$S = M^2 \cdot \frac{4\pi G}{\hbar c \ln 10}$
Temperature	1.729447e+13	Kelvin	$T = \frac{1}{M} \cdot \frac{\hbar c^3}{8k\pi G}$
Luminosity	7.077030e+12	watts	$L = \frac{1}{M^2} \cdot \frac{\hbar c^6}{15360\pi G^2}$
Lifetime	3.003851e+13	seconds	$t = M^3 \cdot \frac{5120\pi G^2}{\hbar c^4}$

We obtain, for M = 7.095930*10^9 Kg (for a Temperature of 1.729447*10^{13} K)

(((((10^18 * (((6.62607015 * 10^-34) J s * (3 * 10^8) m/s))) / ((1.602176634 * 10^-19))^2 C))))) / ((7.095930*10^9)))^2 Kg

Input interpretation:

$$\frac{\frac{10^{18}\,(6.62607015\times10^{-34}\ \text{J s (joule seconds)}\times3\times10^{8}\ \text{m/s (meters per second)})}{\left(\frac{1.602176634}{10^{19}}\right)^2\ {}^\circ\text{C (degrees Celsius)}}}{(7.095930\times10^{9})^2\ \text{kg (kilograms)}}$$

Result:

1.537935×10^{11} m³/(s² K) (meters cubed per second squared kelvin)

1.537935 * 10^{11}

Or:

10^18 * (((((((6.5821192815 * 10^-16) eV s * (3 * 10^8) m/s))) / ((1.602176634 * 10^-19))^2 C))))) / ((7.095930*10^9)))^2 Kg

Input interpretation:

$$10^{18} \times \frac{\frac{6.5821192815 \times 10^{-16} \text{ eV s (electronvolt seconds)} \times 3 \times 10^{8} \text{ m/s (meters per second)}}{\left(\frac{1.602176634}{10^{19}}\right)^{2} \text{ C (coulombs)}}}{(7.095930 \times 10^{9})^{2} \text{ kg (kilograms)}}$$

Result:

2.447698×10^{10} m³/(s³A) (meters cubed per second cubed ampere)

$2.447698 * 10^{10}$

Or, equivalently:

10^18 * (((((((6.5821192815 * 10^-16) * (3 * 10^8)))) / ((1.602176634 * 10^-19))^2))))) / ((7.095930*10^9)))^2

Input interpretation:

$$10^{18} \times \frac{\frac{\frac{6.5821192815}{10^{16}} (3 \times 10^{8})}{\left(\frac{1.602176634}{10^{19}}\right)^{2}}}{(7.095930 \times 10^{9})^{2}}$$

Result:

$1.5277333890524185187994584990142212034725125747791592... \times 10^{29}$

$1.527733389... * 10^{29}$eV m / C / Kg

We have also that:

Input interpretation:

convert $1.527733389 \times 10^{29}$ eV (electronvolts) to gigaelectronvolts

Result:

$1.52773339 \times 10^{20}$ GeV (gigaelectronvolts)

$1.52773339 * 10^{20}$ GeV

1/89 * 1/0.0864055 * (1.52773339×10^20) gigaelectronvolts

Where 0.0864055 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{89} \times \frac{1}{0.0864055} \times 1.52773339 \times 10^{20} \text{ GeV (gigaelectronvolts)}$$

Result:

1.98663×10^{19} GeV (gigaelectronvolts)

$1.98663 * 10^{19}$ GeV

Now, the mass M in GeV or in eV is:

7.095930*10^9 Kg = GeV

Result:

3.980526×10^{36} GeV/c^2

$3.980526 * 10^{36}$GeV/c^2

Or:

3.980526×10^{45} eV/c^2

$M = 3.980526 * 10^{45}$ eV/c^2

Thence, we have that:

10^18 * (((((((6.5821192815 * 10^-16) eV s * (3 * 10^8) m/s))) / ((1.602176634 * 10^-19))^2 Coulomb))))) / ((3.980526 * 10^45)))^2 eV

Input interpretation:

$$10^{18} \times \frac{\dfrac{6.5821192815 \times 10^{-16} \text{ eV s (electronvolt seconds)} \times 3 \times 10^{8} \text{ m/s (meters per second)}}{\left(\dfrac{1.602176634}{10^{19}}\right)^2 \text{ C (coulombs)}}}{(3.980526 \times 10^{45})^2 \text{ eV (electronvolts)}}$$

Result:

4.85496×10^{-43} m/(s A) (meters per second ampere)

$4.85496 * 10^{-43}$

And:

1/(((4.85496×10^-43)))^1/196

Input interpretation:

$$\frac{1}{\sqrt[196]{4.85496\times 10^{-43}}} \text{ m/(s A) (meters per second ampere)}$$

Result:

1.6439432 m/(s A) (meters per second ampere)

$$1.6439432 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$$

And:

(1.40643658+2*0.0864055) * 0.00864055 sqrt((((1/(((4.85496×10^-43))))))) meters per second ampere

Where 1.40643658 and 0.0864055 are Ramanujan's mock theta functions

Input interpretation:

$$(1.40643658 + 2\times 0.0864055)\times 0.00864055\times \sqrt{\frac{1}{4.85496\times 10^{-43}}} \text{ m/(s A) (meters per second ampere)}$$

Result:

1.958×10^{19} m/(s A) (meters per second ampere)

$1.958 * 10^{19}$

Now, from:

$$Z^2e^4/G^2M^2m_em_p = (Z^2/M^2)\times 10^{18}$$

We have that:

$$Z^2e^4/G^2M^2m_em_p$$

$Z^2 = 7.6924771625\ldots * 10^{30}$ eV m/Coulomb

e^4 = ((1.602176634 * 10^-19))^4 Coulomb

$M^2 = ((3.980526 * 10^{45}))$^2 eV/c^2

$m_e = 0.510998950$ MeV/c^2

$m_p = 938.272088$ MeV/c^2

((((7.6924771625 * 10^30) eV m/Coulomb * ((1.602176634 * 10^-19))^4 Coulomb))) / (((6.67*10^-11)^2 N m^2 / Kg^2 * ((3.980526 * 10^45))^2 eV/c^2 * 0.510998950 * 938.272088 MeV/c^2)))

Input interpretation:

$$\left(7.6924771625\times10^{30}\text{ eV (electronvolts) m/C (meter per coulomb)}\times\left(\frac{1.602176634}{10^{19}}\right)^4\text{ C (coulombs)}\right)/\left((6.67\times10^{-11})^2\text{ N m}^2/\text{kg}^2\text{ (newton square meters per kilogram squared)}\times(3.980526\times10^{45})^2\text{ eV}/c^2\times0.510998950\times938.272088\text{ MeV}/c^2\right)$$

Result:

7.561×10^{-72}

$7.561 * 10^{-72}$

We note that:

[((((7.6924771625 * 10^30) eV m/Coulomb * ((1.602176634 * 10^-19))^4 Coulomb))) / (((6.67*10^-11)^2 N m^2 / Kg^2 * ((3.980526 * 10^45))^2 eV/c^2 * 0.510998950 * 938.272088 MeV/c^2)))]^1/4

Input interpretation:

$$\left(\left(7.6924771625\times10^{30}\text{ eV (electronvolts) m/C (meter per coulomb)}\times\left(\frac{1.602176634}{10^{19}}\right)^4\text{ C (coulombs)}\right)/\left((6.67\times10^{-11})^2\text{ N m}^2/\text{kg}^2\text{ (newton square meters per kilogram squared)}\times(3.980526\times10^{45})^2\text{ eV}/c^2\times0.510998950\times938.272088\text{ MeV}/c^2\right)\right)\text{^}(1/4)$$

Result:

1.65825×10^{-18}

$1.65825 * 10^{-18}$

And:

0.08185^2 * 1/(5.74958*10^-40)*(1.65825×10^-18)

Where 0.08185 and $5.74958 * 10^{-40}$ are Ramanujan mock theta functions

Input interpretation:

$$0.08185^2 \times \frac{1}{5.74958 \times 10^{-40}} \times 1.65825 \times 10^{-18}$$

Result:

$1.932196327492616852013538380194727267035157350623871 6... \times 10^{19}$

$1.932196327... * 10^{19}$

The precedent mean is $1{,}96357166 * 10^{19}$. If we add the new results 1.932196327, 1.958, 1.98663 and 1.90187 the new average is:

$1{,}9484535974 * 10^{19}$ GeV and $1.94831145682857 * 10^{19}$ GeV

And we obtain, in conclusion:

(1.948... * 10^19)^1/89 GeV

Input interpretation:

$\sqrt[89]{1.94831145682857 \times 10^{19}}$ GeV (gigaelectronvolts)

Result:

1.647167386052786 GeV (gigaelectronvolts)

1.64717 GeV

Unit conversions:

$1.647167386052786 \times 10^9$ eV (electronvolts)

And:

2*(((((6*(1.94831145682857 * 10^19)^1/89)))))^1/2 GeV

Input interpretation:

$$2\sqrt{6\sqrt[89]{1.94831145682857\times10^{19}}}\ \text{GeV (gigaelectronvolts)}$$

Result:

6.287449185899386 GeV (gigaelectronvolts)

Unit conversions:

$6.287449185899386\times10^{9}$ eV (electronvolts)

6.28744… * $10^9 \approx 2\pi$ (multiple)

Now, we have that:

12^3+(1.94831145682857 * 10^19)^1/89 GeV

Input interpretation:

$$12^3+\sqrt[89]{1.94831145682857\times10^{19}}\ \text{GeV (gigaelectronvolts)}$$

Result:

1729.647167386052786 GeV (gigaelectronvolts)

1729.64717....

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

Now:

Input interpretation:

convert 1729.64717 GeV/c^2 to kilograms

Result:

3.0833756×10^{-24} kg (kilograms)

3.0833756... * 10^{-24}Kg that correspond a temperature of 3.980065 * 10^{46} Kelvin (see Hawking Radiation Calculator) and to the Entropy of 1.095078 * 10^-31. We obtain:

colog(1.095078 * 10^-31)

Input interpretation:

$$-\log\left(\frac{1.095078}{10^{31}}\right)$$

$\log(x)$ is the natural logarithm

Result:

71.2893123...

71.2893123...

Series representations:

$$-\log\left(\frac{1.09508}{10^{31}}\right) = -2 i \pi \left\lfloor \frac{\arg(1.09508 \times 10^{-31} - x)}{2 \pi} \right\rfloor - \log(x) + \sum_{k=1}^{\infty} \frac{(-1)^k (1.09508 \times 10^{-31} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$-\log\left(\frac{1.09508}{10^{31}}\right) = -\left\lfloor \frac{\arg(1.09508 \times 10^{-31} - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - \log(z_0) - \left\lfloor \frac{\arg(1.09508 \times 10^{-31} - z_0)}{2 \pi} \right\rfloor \log(z_0) + \sum_{k=1}^{\infty} \frac{(-1)^k (1.09508 \times 10^{-31} - z_0)^k z_0^{-k}}{k}$$

$$-\log\left(\frac{1.09508}{10^{31}}\right) = -2 i \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{1.09508 \times 10^{-31}}{z_0}\right) + \arg(z_0)}{2 \pi} \right\rfloor - \log(z_0) + \sum_{k=1}^{\infty} \frac{(-1)^k (1.09508 \times 10^{-31} - z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representation:

$$-\log\left(\frac{1.09508}{10^{31}}\right) = -\int_1^{1.09508 \times 10^{-31}} \frac{1}{t} \, dt$$

And:

(((((colog(1.095078 * 10^-31))))))^1/9

Input interpretation:

$$\sqrt[9]{-\log\left(\frac{1.095078}{10^{31}}\right)}$$

log(x) is the natural logarithm

Result:

1.606540221...

1.60654... result very near to value of the electric charge of positron

25(((((colog(1.095078 * 10^-31))))))

Input interpretation:

$$25\left(-\log\left(\frac{1.095078}{10^{31}}\right)\right)$$

log(x) is the natural logarithm

Result:

1782.23281...

1782.23281.... result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino (**1760 ± 15 MeV- 1785.16 GeV**).

Series representations:

$$25(-1)\log\left(\frac{1.09508}{10^{31}}\right) = -50\, i\, \pi \left\lfloor \frac{\arg(1.09508\times 10^{-31} - x)}{2\pi} \right\rfloor - 25\log(x) + 25\sum_{k=1}^{\infty} \frac{(-1)^k (1.09508\times 10^{-31} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$25(-1)\log\left(\frac{1.09508}{10^{31}}\right) = -25\left\lfloor \frac{\arg(1.09508\times 10^{-31} - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) - 25\log(z_0) - 25\left\lfloor \frac{\arg(1.09508\times 10^{-31} - z_0)}{2\pi} \right\rfloor \log(z_0) + 25\sum_{k=1}^{\infty} \frac{(-1)^k (1.09508\times 10^{-31} - z_0)^k z_0^{-k}}{k}$$

$$25(-1)\log\left(\frac{1.09508}{10^{31}}\right) = -50\, i\, \pi \left\lfloor -\frac{-\pi + \arg\left(\frac{1.09508\times10^{-31}}{z_0}\right) + \arg(z_0)}{2\pi} \right\rfloor - 25\log(z_0) + 25\sum_{k=1}^{\infty} \frac{(-1)^k \left(1.09508\times10^{-31} - z_0\right)^k z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

More information »

- **Integral representation:**

$$25(-1)\log\left(\frac{1.09508}{10^{31}}\right) = -25\int_1^{1.09508\times10^{-31}} \frac{1}{t}\,dt$$

More information »

(((((((25(((((colog(1.095078 * 10^-31))))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{25\left(-\log\left(\frac{1.095078}{10^{31}}\right)\right)}$$

log(x) is the natural logarithm

Result:

1.647141700...

1.6471417…≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

Now, we have that:

From:

Progress in Dark Matter Research Editor J. Blain; NovaScience Publishers, Inc. N.Y., (2005), pp. 1 - 66.

Little Black Holes as Dark Matter Candidates With Feasible Cosmic and Terrestrial Interactions

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3.5 GTR radiating primordial little black holes: 10^{-7} kg ≤ M_{LBH} ≤ 10^{19} kg

Starting in 1998, this author proposed that black holes radiate by gravitational tunneling radiation (GTR) resulting in a most compelling case for primordial LBH as the main constituent of dark matter of the universe (Rabinowitz, 1998 a,b, 1999, 2001a,b, 2003). These were the smallest masses (10^{-7} kg to 10^{19} kg) considered until 2002. Since GTR is greatly attenuated compared with Hawking radiation, cf. Section 6.4, this has strong implications down to the smallest masses of LBH, whether the LBH are free or are gravitationally bound atoms. For Hawking (1974, 1975), the smallest LBH that can survive to the present is $M \sim 10^{12}$ kg .

We have, for 10^{12} Kg:

(10^12) kg = GeV

Result:

5.61×10^{38} GeV/c^2

$5.61 * 10^{38}$

We have that:

10/(21*2) * 1/sqrt(0.0864055) * (5.61×10^38)^1/2 gigaelectronvolts per speed of light squared

Where 0.0864055 is a Ramanujan mock theta function

Input interpretation:

$$\frac{10}{21 \times 2} \times \frac{1}{\sqrt{0.0864055}} \sqrt{5.61 \times 10^{38}\ \text{GeV}/c^2}$$

Result:

1.918×10^{19} GeV/c^2

$1.918 * 10^{19}$ GeV

Or:

ln (4/Pi) * (1/0.0864055)^1/2 * (5.61×10^38)^1/2

Input interpretation:

$$\log\left(\frac{4}{\pi}\right)\sqrt{\frac{1}{0.0864055}}\sqrt{5.61\times 10^{38}}$$

log(x) is the natural logarithm

Result:

$1.94645\ldots \times 10^{19}$

$1.94645 * 10^{19}$

1.08094974 (5.61)^1/4 10^38 gigaelectronvolts per speed of light squared

Where 1.08094974 is a Ramanujan mock theta function

Input interpretation:

$1.08094974\sqrt[4]{5.61}\times 10^{38}\ \text{GeV}/c^2$

Result:

$1.664\times 10^{38}\ \text{GeV}/c^2$

$1.664 * 10^{38}$

We have that:

(10^12) kg = GeV

$5.61\times 10^{38}\ \text{GeV}/c^2$

$5.61 * 10^{38}\ \text{GeV}/c^2$

From this results, we obtain:

Quantity	Value	Units	Expression
Mass	1.000000e+12	kilograms	M
Radius	1.484852e-15	meters	$R = M \cdot \frac{2G}{c^2}$
Surface area	2.770613e-29	square meters	$A = M^2 \cdot \frac{16\pi G^2}{c^4}$
Surface gravity	3.026414e+31	meters/second²	$\kappa = \frac{1}{M} \cdot \frac{c^4}{4G}$
Surface tides	4.076386e+46	meters/second² / meter	$d\kappa_R = \frac{1}{M^2} \cdot \frac{c^6}{4G^2}$
Entropy	1.151841e+40	*(dimensionless)*	$S = M^2 \cdot \frac{4\pi G}{\hbar c \ln 10}$
Temperature	1.227203e+11	Kelvin	$T = \frac{1}{M} \cdot \frac{\hbar c^3}{8k\pi G}$

From the temperature and radius, we obtain the charge of BH (see Hawking Radiation Calculator):

-(((((1.227203*10^11 * (4*Pi*1.484852*10^-15)^3-(1.484852*10^-15)^2))))) / ((6.67*10^-11))

Input interpretation:

$$-\frac{1.227203\times 10^{11}\,(4\pi\times 1.484852\times 10^{-15})^3-(1.484852\times 10^{-15})^2}{6.67\times 10^{-11}}$$

Result:

$2.11025... \times 10^{-20}$

2.11025... * 10^{-20}

sqrt((((((-(((((1.227203*10^11 * (4*Pi*1.484852*10^-15)^3-(1.484852*10^-15)^2))))) / ((6.67*10^-11))))))))

Input interpretation:

$$\sqrt{-\frac{1.227203\times 10^{11}\,(4\pi\times 1.484852\times 10^{-15})^3-(1.484852\times 10^{-15})^2}{6.67\times 10^{-11}}}$$

Result:

$1.45267... \times 10^{-10}$

$1.45267... * 10^{-10}$

colog sqrt((((((-(((((1.227203*10^11 * (4*Pi*1.484852*10^-15)^3-(1.484852*10^-15)^2))))) / ((6.67*10^-11))))))))

Input interpretation:

$$-\log\left(\sqrt{-\frac{1.227203\times10^{11}\,(4\,\pi\times1.484852\times10^{-15})^3-(1.484852\times10^{-15})^2}{6.67\times10^{-11}}}\right)$$

log(x) is the natural logarithm

Result:

22.65245...

22.65245...

26*3*colog sqrt((((((-(((((1.227203*10^11 * (4*Pi*1.484852*10^-15)^3-(1.484852*10^-15)^2))))) / ((6.67*10^-11))))))))

Input interpretation:

$$26\times3\left(-\log\left(\sqrt{-\frac{1.227203\times10^{11}\,(4\,\pi\times1.484852\times10^{-15})^3-(1.484852\times10^{-15})^2}{6.67\times10^{-11}}}\right)\right)$$

log(x) is the natural logarithm

Result:

1766.891...

1766.891... result in the range of the mass of candidate "glueball" $f_0(1710)$ and the hypothetical mass of Gluino (**1760 ± 15 MeV- 1785.16 GeV**).

((((26*3*cologsqrt((((((-(((((1.227203*10^11 * (4*Pi*1.484852*10^-15)^3-(1.484852*10^-15)^2))))) / ((6.67*10^-11)))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{26\times 3\left(-\log\left(\sqrt{-\frac{1.227203\times 10^{11}\,(4\pi\times 1.484852\times 10^{-15})^3-(1.484852\times 10^{-15})^2}{6.67\times 10^{-11}}}\right)\right)}$$

log(x) is the natural logarithm

Result:

1.64619262...

1.64619262... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

Or:

Input interpretation:

$$\sqrt[15]{26\times 3\left(-\log\left(\sqrt{-\frac{1.227203\times 10^{11}\times 4\pi\,(1.484852\times 10^{-15})^3-(1.484852\times 10^{-15})^2}{6.67\times 10^{-11}}}\right)\right)}$$

log(x) is the natural logarithm

Result:

1.64510602...

And form the Entropy 1.151841 * 10^{40}, we obtain:

34+5+8*ln(1.151841*10^40)

Input interpretation:

$34+5+8\log(1.151841\times 10^{40})$

log(x) is the natural logarithm

Result:

776.95812...

776.95812... result very near to the rest mass of Charged rho meson 775.4

And:

10^3-3^2+8*ln(1.151841*10^40)

Input interpretation:

$10^3-3^2+8\log(1.151841\times 10^{40})$

log(x) is the natural logarithm

Result:

1728.9581...

1728.9581... ≈ 1729

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

Pi^3 * ln(1.151841*10^40)

Input interpretation:

$\pi^3 \log(1.151841 \times 10^{40})$

log(x) is the natural logarithm

Result:

2860.1667...

2860.1667...

With regard the mass M = 10^{12} kg, we have also that:

From:
Progress in Dark Matter Research Editor J. Blain; NovaScience Publishers, Inc. N.Y., (2005), pp. 1 - 66.
Little Black Holes as Dark Matter Candidates with Feasible Cosmic and Terrestrial Interactions
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The tunneling probability $e^{-2\Delta\gamma}$ is usually << 1 and depends on parameters such as the width of the barrier, M, and the mass of the second body (Rabinowitz,1999 a,b) are free or are gravitationally bound atoms. For Hawking (1974, 1975), the smallest LBH that can survive to the present is $M \sim 10^{12}$ kg .

The GTR model is only briefly covered in this review section, since its implications are further examined elsewhere in this Chapter. Let us look here at one of the predictions of GTR. The evaporation rate for a black hole of mass M is $d\left(Mc^2\right)/dt = -P_R$, which gives the lifetime

$$t = \frac{16\pi G^2}{3\hbar c^4 \left\langle e^{-2\Delta\gamma} \right\rangle}\left[M^3\right]. \tag{3.1}$$

This implies that the smallest mass that can survive up to a time t is

$$M_{small} = \left(\frac{3\hbar c^4 \left\langle e^{-2\Delta\gamma} \right\rangle}{16\pi G^2} \right)^{1/3} \left[t^{1/3}\right]. \tag{3.2}$$

Primordial black holes with $M >> M_{small}$ have not lost an appreciable fraction of their mass up to the present. Those with $M << M_{small}$ would have evaporated away long ago.

Thus the smallest mass that can survive within $\sim 10^{17}$ sec (13.7×10^9 year = age of our universe) is

$$M_{small} \geq 10^{12} \left\langle e^{-2\Delta\gamma} \right\rangle^{1/3} \text{ kg} . \tag{3.3}$$

Hawking's result (1974, 1975) of 10^{12} kg is obtained by setting $e^{-2\Delta\gamma} = 1$ in eq. (3.3). Since $0 \leq e^{-2\Delta\gamma} \leq 1$, an entire range of black hole masses much smaller than 10^{12} kg may have survived from the beginning of the universe to the present than permitted by Hawking's theory.

We have that:

(((((((3*(1.054571726 * 10^-34) J s * (3*10^8)^4)))) / ((((16*Pi* (6.67 * 10^-11)^2 N m^2 / kg^2))))))^1/3 * (10^17)^1/3 s

Input interpretation:

$$\sqrt[3]{\frac{3 \times \frac{1.054571726}{10^{34}} \text{ J s (joule seconds)} (3 \times 10^8)^4}{16\,\pi \left(\frac{6.67}{10^{11}}\right)^2 \text{ N m}^2/\text{kg}^2 \text{ (newton square meters per kilogram squared)}}} \times \sqrt[3]{10^{17}} \text{ seconds}$$

Result:

1.046×10^{12} $kg^{2/3} s^{4/3}/\sqrt[3]{m}$ (kilogram to the two thirds seconds to the 4/3 per cube root meter)

1.046×10^12 kilogram to the two thirds seconds to the 4/3 per cube root meter

Input interpretation:

1.046×10^{12} kg (kilograms)

$1.046 * 10^{12}$ Kg

Input interpretation:

convert 1.046×10^{12} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

5.868×10^{38} GeV/c^2

$5.869 * 10^{38}$ GeV/c^2

We have that:

Pi * [1.6557845 (((5.868×10^38 * (9*10^16)))]^1/3

where 1.6557845... is the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$

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

Input interpretation:

$\pi\left(1.6557845\sqrt[3]{5.868 \times 10^{38} \times 9 \times 10^{16}}\right)$

Result:

$1.9516318\ldots \times 10^{19}$

$1.9516318 * 10^{19}$ GeV

Indeed:

((((((Pi * [1.6557845 (((5.868×10^38 * (9*10^16)))]^1/3)))))) (GeV/c^2) c^2

Input interpretation:

$\pi\left(1.6557845\sqrt[3]{5.868 \times 10^{38} \times 9 \times 10^{16}}\ \text{GeV}/c^2\ (c^2\ \text{(speed of light squared)})\right)$

Result:

1.952×10^{19} GeV (gigaelectronvolts)

$1.952 * 10^{19}$ GeV

This is the area of a circle! The radius is:

((((((1.6557845 (((5.868×10^38 * (9*10^16)))^1/3)))))^1/2

Input interpretation:

$$\sqrt{1.6557845 \sqrt[3]{5.868 \times 10^{38} \times 9 \times 10^{16}}}$$

Result:

$2.4924360... \times 10^9$

2.4924360... * 10^9

The area, for the formula $A = \pi r^2$, is:

Pi (((((((((1.6557845 (((5.868×10^38 * (9*10^16)))^1/3)))))^1/2)))))^2

Input interpretation:

$$\pi \sqrt{1.6557845 \sqrt[3]{5.868 \times 10^{38} \times 9 \times 10^{16}}}^{\,2}$$

Result:

$1.9516318... \times 10^{19}$

1.9516318… * 10^{19} practically the above result!

We have also:
5.869 * 10^{38} GeV/c^2

1/2 * Pi^2/6 * (5.868×10^38)^1/2

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

Input interpretation:

$$\frac{1}{2} \times \frac{\pi^2}{6} \sqrt{5.868 \times 10^{38}}$$

Result:

$1.99234044772363122281713668648642075196... \times 10^{19}$

$1.99234044... * 10^{19}$ GeV (Mass)

From the mass in Kg: $1.046 * 10^{12}$ Kg, we can to obtain the entropy, that is:

$1.260248 * 10^{40}$

From which:

-8+Pi/2 ln(1.260248 * 10^40)

Input interpretation:

$$-8 + \frac{\pi}{2} \log(1.260248 \times 10^{40})$$

log(x) is the natural logarithm

Result:

137.039027...

137.039027...

result that is practically equal to the value of the reciprocal of the fine-structure constant $\alpha^{-1} = 137.035999174(35)$. We note that some properties of subatomic particles exhibit a relation with α. A model for the observed relationship yields an approximation for α given by the two gamma functions$\Gamma(1/3)\ |\Gamma(-1/3)| \approx \alpha^{-1}/4\pi$.

We can to obtain, also the charge:

((((((1.173234*10^11 * ((4Pi*(1.553155*10^-15)^3)))-(1.553155*10^-15)^2)))) / ((6.67*10^-11))

Input interpretation:

$$\frac{1.173234 \times 10^{11} \left(4 \pi \left(1.553155 \times 10^{-15}\right)^3\right) - \left(1.553155 \times 10^{-15}\right)^2}{6.67 \times 10^{-11}}$$

Result:

$-3.60835... \times 10^{-20}$

$Q^2 = 3.60835 * 10^{-20}$

((((((((((((((1.173234*10^11 * ((4Pi*(1.553155*10^-15)^3)))-(1.553155*10^-15)^2)))) / -((6.67*10^-11))))))))))^1/2

Input interpretation:

$$\sqrt{-\frac{1.173234\times 10^{11}\,(4\pi\,(1.553155\times 10^{-15})^3) - (1.553155\times 10^{-15})^2}{6.67\times 10^{-11}}}$$

Result:

$1.89956... \times 10^{-10}$

Q = 1.89956 * 10^{-10}

Or:

Input interpretation:

$$1.1180931^2 \sqrt{-\frac{1.173234\times 10^{11}\,(4\pi\times 1.553155\times 10^{-15})^3 - (1.553155\times 10^{-15})^2}{6.67\times 10^{-11}}}$$

Result:

$1.89956... \times 10^{-10}$

From the initial formula

(((((((3*(1.054571726 * 10^-34) J s * (3*10^8)^4)))) / ((((16*Pi* (6.67 * 10^-11)^2 N m^2 / kg^2))))))^1/3 * (10^17)^1/3 s

if:

Since $0 < e^{2\Delta\gamma} < 1$, an entire range of black hole masses much smaller than 10^{12} kg may have survived from the beginning of the universe to the present than permitted by Hawking's theory.

We obtain, for 0.5:

(((((((3*(1.054571726 * 10^-34) J s * (3*10^8)^4) * 0.5))) / ((((16*Pi* (6.67 * 10^-11)^2 N m^2 / kg^2))))))^1/3 * (10^17)^1/3 s

Input interpretation:

$$\sqrt[3]{\frac{\left(3\times\frac{1.054571726}{10^{34}}\text{ J s (joule seconds)}\,(3\times 10^8)^4\right)\times 0.5}{16\pi\left(\frac{6.67}{10^{11}}\right)^2\text{ N m}^2/\text{kg}^2\text{ (newton square meters per kilogram squared)}}}\times \sqrt[3]{10^{17}}\text{ seconds}$$

Result:

$8.306\times 10^{11}\text{ kg}^{2/3}\text{s}^{4/3}/\sqrt[3]{\text{m}}$ (kilogram to the two thirds seconds to the 4/3 per cube root meter)

Input interpretation:

8.306×10^{11} kg (kilograms)

$8.306 * 10^{11}$ kg

Temperature = $1.477490 * 10^{11}$K; Entropy = $7.946509 * 10^{39}$;

Radius = $1.233318 * 10^{-15}$ m

The charge is:

((((((((((((((1.477490*10^11 * ((4Pi*(1.233318*10^-15)^3)))-(1.233318*10^-15)^2)))) / -((6.67*10^-11))))))))))^1/2

Input interpretation:

$$\sqrt{-\frac{1.477490 \times 10^{11} \left(4\pi\left(1.233318 \times 10^{-15}\right)^3\right) - \left(1.233318 \times 10^{-15}\right)^2}{6.67 \times 10^{-11}}}$$

Result:

$1.50839... \times 10^{-10}$

Q = $1.50839... * 10^{-10}$

Or:

Input interpretation:

$$1.1180931^2 \sqrt{-\frac{1.477490 \times 10^{11} \left(4\pi \times 1.233318 \times 10^{-15}\right)^3 - \left(1.233318 \times 10^{-15}\right)^2}{6.67 \times 10^{-11}}}$$

Result:

$1.50839... \times 10^{-10}$

Input interpretation:

convert 8.306×10^{11} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

4.659×10^{38} GeV/c^2

$4.659 * 10^{38}$ GeV

We have that:

(0.8232 * 4.659×10^38)^1/2

Where 0.8232 is a partial Ramanujan mock theta function

Input interpretation:

$$\sqrt{0.8232 \times 4.659 \times 10^{38}}$$

$1.95839... \times 10^{19}$

$1.95839... * 10^{19}$ GeV

We obtain, for 0.0864055 that is a Ramanujan mock theta function:

(((((((3*(1.054571726 * 10^-34) J s * (3*10^8)^4) * 0.0864055))) / ((((16*Pi* (6.67 * 10^-11)^2 N m^2 / kg^2))))))^1/3 * (10^17)^1/3 s

Input interpretation:

$$\sqrt[3]{\frac{\left(3 \times \frac{1.054571726}{10^{34}} \text{ J s (joule seconds)} \left(3 \times 10^8\right)^4\right) \times 0.0864055}{16\,\pi \left(\frac{6.67}{10^{11}}\right)^2 \text{ N m}^2/\text{kg}^2 \text{ (newton square meters per kilogram squared)}}} \times \sqrt[3]{10^{17}} \text{ seconds}$$

Result:

$4.626 \times 10^{11}\ \text{kg}^{2/3}\text{s}^{4/3}/\sqrt[3]{\text{m}}$ (kilogram to the two thirds seconds to the 4/3 per cube root meter)

Input interpretation:

4.626×10^{11} kg (kilograms)

$4.626 * 10^{11}$ kg

Temperature = $2.652839 * 10^{11}$K; Entropy = $2.464925 * 10^{39}$;

Radius = $6.868923 * 10^{-16}$ m

The charge is:

((((((((((((((2.652839*10^11 * ((4Pi*(6.868923*10^-16)^3)))-(6.868923*10^-16)^2)))) / -((6.67*10^-11)))))))))))^1/2

Input interpretation:

$$\sqrt{-\frac{2.652839\times 10^{11}\left(4\pi\left(6.868923\times 10^{-16}\right)^{3}\right)-\left(6.868923\times 10^{-16}\right)^{2}}{6.67\times 10^{-11}}}$$

Result:

$8.40094\ldots \times 10^{-11}$

$Q = 8.40094\ldots * 10^{-11}$

Input interpretation:

convert 4.626×10^{11} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

2.595×10^{38} GeV/c^2

$2.595 * 10^{38}$ GeV

We have that:

1.0061571663^5 * 1.0864055^2 * (2.595 * 10^38)^1/2

Where 1.0061571663 and 1.0864055 are two Ramanujan mock theta functions

Input interpretation:

$1.0061571663^5\times 1.0864055^2\sqrt{2.595\times 10^{38}}$

$1.96057\ldots \times 10^{19}$

$1.96057\ldots * 10^{19}$ GeV

Now, we have, for 10^{-7} Kg:

1/(10^7) kg = GeV

Result:

5.61×10^{19} GeV/c^2

$5.61 * 10^{19}$

1.0864055*Pi/34 * 1/sqrt(0.0864055) * (5.61×10^19) gigaelectronvolts per speed of light squared

Where 1.0864055 and 0.0864055 are the values of a Ramanujan mock theta function

Input interpretation:

$$1.0864055 \times \frac{\pi}{34} \times \frac{1}{\sqrt{0.0864055}} \times \frac{5.61 \times 10^{19}\ \text{GeV (gigaelectronvolts)}}{c^2\ \text{(speed of light squared)}}$$

Result:

$1.916 \times 10^{19}\ \text{GeV}/c^2$

1.916 * 10^{19} GeV

With regard the charge, from the temperature and the radius, we obtain (see Hawking Radiation Calculator):

sqrt[[-(((((1.227203*10^30 * (4*Pi*1.484852*10^-34)^3-(1.484852*10^-34)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\sqrt{-\frac{1.227203 \times 10^{30}\,(4\,\pi \times 1.484852 \times 10^{-34})^3 - (1.484852 \times 10^{-34})^2}{6.67 \times 10^{-11}}}$$

Result:

$1.45267... \times 10^{-29}$

colog sqrt[[-(((((1.227203*10^30 * (4*Pi*1.484852*10^-34)^3-(1.484852*10^-34)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$-\log\left(\sqrt{-\frac{1.227203 \times 10^{30}\,(4\,\pi \times 1.484852 \times 10^{-34})^3 - (1.484852 \times 10^{-34})^2}{6.67 \times 10^{-11}}}\right)$$

log(x) is the natural logarithm

Result:

66.401566...

66.401566...

26 colog sqrt[[-(((((1.227203*10^30 * (4*Pi*1.484852*10^-34)^3-(1.484852*10^-34)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$26\left(-\log\left(\sqrt{-\frac{1.227203\times 10^{30}\,(4\,\pi\times 1.484852\times 10^{-34})^3-(1.484852\times 10^{-34})^2}{6.67\times 10^{-11}}}\right)\right)$$

log(x) is the natural logarithm

Result:

1726.4407...

1726.4407... result very near to the mass of candidate glueball $f_0(1710)$ meson.

((((((((26 cologsqrt[[-(((((1.227203*10^30 * (4*Pi*1.484852*10^-34)^3-(1.484852*10^-34)^2))))) / ((6.67*10^-11))]]))))))))^1/15

Input interpretation:

$$\sqrt[15]{26\left(-\log\left(\sqrt{-\frac{1.227203\times 10^{30}\,(4\,\pi\times 1.484852\times 10^{-34})^3-(1.484852\times 10^{-34})^2}{6.67\times 10^{-11}}}\right)\right)}$$

log(x) is the natural logarithm

Result:

1.64365290...

1.64365290... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Or:

Input interpretation:

$$\sqrt[15]{26\left(-\log\left(\sqrt{-\frac{1.227203\times 10^{30}\times 4\,\pi\,(1.484852\times 10^{-34})^3-(1.484852\times 10^{-34})^2}{6.67\times 10^{-11}}}\right)\right)}$$

log(x) is the natural logarithm

Result:

1.64328391...

From the Entropy 115.1841, we obtain:

1.0061571663^9/3 (((ln(115.1841))))

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1.0061571663^9}{3} \log(115.1841)$$

$\log(x)$ is the natural logarithm

Result:

1.6720434...

1.6720434... result that is very near to the proton mass

Series representations:

$$\frac{1}{3} \log(115.184)\, 1.00615716630000^9 = 0.35226635716098 \log(114.184) - 0.35226635716098 \sum_{k=1}^{\infty} \frac{(-1)^k e^{-4.73781 k}}{k}$$

$$\frac{1}{3} \log(115.184)\, 1.00615716630000^9 = 0.70453271432196\, i \pi \left\lfloor \frac{\arg(115.184 - x)}{2 \pi} \right\rfloor + 0.35226635716098 \log(x) - 0.35226635716098 \sum_{k=1}^{\infty} \frac{(-1)^k (115.184 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

- $$\frac{1}{3} \log(115.184)\, 1.00615716630000^9 = 0.35226635716098 \left\lfloor \frac{\arg(115.184 - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + 0.35226635716098 \log(z_0) + 0.35226635716098 \left\lfloor \frac{\arg(115.184 - z_0)}{2 \pi} \right\rfloor \log(z_0) - 0.35226635716098 \sum_{k=1}^{\infty} \frac{(-1)^k (115.184 - z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

- **Integral representations:**

$$\frac{1}{3}\log(115.184)\,1.00615716630000^9 = 0.35226635716098\int_1^{115.184}\frac{1}{t}\,dt$$

- $$\frac{1}{3}\log(115.184)\,1.00615716630000^9 = \frac{0.17613317858049}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-4.73781\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

More information »

Now, we have that:

The discussion below adopts cosmology with $(h, \Omega_{\rm tot}, \Omega_{\rm CDM}, \Omega_{\rm bar}, \sigma_8) = (0.7, 1, 0.23, 0.05, 0.9)$.

$$n_{\rm PBH} = \frac{1}{M_{\rm PBH}}\Omega_{\rm CDM}\frac{3H_0^2}{8\pi G} \simeq 10^9\left(\frac{M_{\rm PBH}}{30M_\odot}\right)^{-1}\left(\frac{\Omega_{\rm CDM}h^2}{0.1}\right){\rm Mpc}^{-3} \quad (2)$$

$$P_{\rm PBH}(z) = \frac{9}{4}(1+z_{\rm eq})^2 n_{\rm PBH}^{-1}[g(z)]^{-2} \simeq 2\times10^{-2}\left(\frac{M_{\rm PBH}}{30M_\odot}\right)\left(\frac{\Omega_{\rm CDM}h^2}{0.13}\right)\left(\frac{1}{g^2(z)}\right){\rm Mpc}^3 \quad (3)$$

even by $z \sim 20$ in halos with H_2 cooling. Even in halos with $T_{\rm vir} > 10^4$K, the required f_* remains at a modest few percent level at $z \simeq 12-15$ for $M_{\rm PBH} = 30M_\odot$. If the bulk of the CIB comes from BH accretion, the values of the required f_* drop by over an order of magnitude. Thus to account for the observed near-IR CIB fluctuation signal with high-z emissions, very few baryons would need to be converted into luminous sources inside first collapsed halos at $z > 10-15$ if the DM is made of PBHs such as discovered by LIGO.

1 pc = $3{,}08567758130573\times10^{16}$ m; 1 Mpc = $3{,}08567758130573 * 10^{22}$ m

The values considered for M_{PBH} are 29 * 10^{30} solar masses; 36 * 10^{30} solar masses; 30 * 10^{30} solar masses and the average 32.5 * 10^{30} solar masses;

From (2), we obtain:

10^9 (((36*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3

Input interpretation:

$$\frac{10^9 \times \frac{0.23\times0.7^2}{0.1}}{\frac{(36\times1.9891\times10^{30})(3.08567758130573\times10^{22})^3}{30\times1.9891\times10^{30}}}$$

Result:

$3.196620162454515635219504900837470359432150329301217 0... \times 10^{-59}$

$3.196620162... * 10^{-59}$

And the reciprocal:

1/ ((((((((10^9 (((36*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3))))))))

Input interpretation:

$$\frac{1}{\frac{10^9 \times \frac{0.23\times0.7^2}{0.1}}{\frac{(36\times1.9891\times10^{30})(3.08567758130573\times10^{22})^3}{30\times1.9891\times10^{30}}}}$$

Result:

$3.128304112403998804907402389920100991919345199645075 4... \times 10^{58}$

$3.1283041124...* 10^{58}$

10^9 (((29*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3

Input interpretation:

$$\frac{10^9 \times \frac{0.23\times0.7^2}{0.1}}{\frac{(29\times1.9891\times10^{30})(3.08567758130573\times10^{22})^3}{30\times1.9891\times10^{30}}}$$

Result:

$$3.968218132702157340272488842418928722053703857063579 7\ldots \times 10^{-59}$$

$3.9682181327\ldots * 10^{-59}$

And the reciprocal:

1/ ((((((((10^9 (((29*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3))))))))

Input interpretation:

$$\frac{1}{\frac{10^9 \times \frac{0.23 \times 0.7^2}{0.1}}{\frac{(29 \times 1.9891 \times 10^{30})(3.08567758130573 \times 10^{22})^3}{30 \times 1.9891 \times 10^{30}}}}$$

Result:

$$2.5200227572143323706198519252134146879350280774918663\ldots \times 10^{58}$$

$2.520022757\ldots * 10^{58}$

With regard the average, we obtain:

10^9 (((32.5*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3

Input interpretation:

$$\frac{10^9 \times \frac{0.23 \times 0.7^2}{0.1}}{\frac{(32.5 \times 1.9891 \times 10^{30})(3.08567758130573 \times 10^{22})^3}{30 \times 1.9891 \times 10^{30}}}$$

Result:

$$3.5408715645650019343969900440045825519863819032259634\ldots \times 10^{-59}$$

$3.540871564\ldots * 10^{-59}$

And the reciprocal:

1/ ((((((((10^9 (((32.5*1.9891*10^30) / (30*1.9891*10^30)))^-1 * (0.23 * 0.7^2)/0.1 * (3.08567758130573 * 10^22)^-3))))))))

Input interpretation:

$$\frac{1}{\frac{10^9 \times \frac{0.23\times 0.7^2}{0.1}}{\frac{(32.5\times 1.9891\times 10^{30})(3.08567758130573\times 10^{22})^3}{30\times 1.9891\times 10^{30}}}}$$

Result:

$2.824163434809165587763627157566757839927186638568470 8... \times 10^{58}$

2.8241634348…* 10^{58}

From (3)

$$P_{\rm PBH}(z) = \frac{9}{4}(1+z_{\rm eq})^2 n_{\rm PBH}^{-1}[g(z)]^{-2} \simeq 2\times 10^{-2}\left(\frac{M_{\rm PBH}}{30M_\odot}\right)\left(\frac{\Omega_{\rm CDM}h^2}{0.13}\right)\left(\frac{1}{g^2(z)}\right)\ {\rm Mpc}^3$$

we obtain:

((((((2*10^-2 (((32.5*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758130573 * 10^22)^3))))))))

Input interpretation:

$$2\times 10^{-2}\times\frac{32.5\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times\frac{0.23\times 0.7^2}{0.13}\,(3.08567758130573\times 10^{22})^3$$

Result:

$5.518541352754970275108658458481705489952119443166666... \times 10^{65}$

5.51854135275…* 10^{65}

((((((2*10^-2 (((36*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758130573 * 10^22)^3))))))))

Input interpretation:

$$2\times 10^{-2}\times\frac{36\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times\frac{0.23\times 0.7^2}{0.13}\,(3.08567758130573\times 10^{22})^3$$

Result:

$6.112845806128582458581898600164350696562347690892307 6... \times 10^{65}$

6.112845806…* 10^{65}

((((((2*10^-2 (((29*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758130573 * 10^22)^3))))))))

Input interpretation:

$$2\times 10^{-2}\times \frac{29\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times \frac{0.23\times 0.7^2}{0.13}\,(3.08567758130573\times 10^{22})^3$$

Result:

$4.9242368993813580916354183167990602833418911954410256... \times 10^{65}$

$4.924236899...* 10^{65}$

Now, we have also:

((Pi)))/(36+1/5)^2 * ((((((2*10^-2 (((32.5*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758130573 * 10^22)^3))))))))^1/3

Input interpretation:

$$\frac{\pi}{\left(36+\frac{1}{5}\right)^2}\sqrt[3]{2\times 10^{-2}\times \frac{32.5\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times \frac{0.23\times 0.7^2}{0.13}\,(3.08567758130573\times 10^{22})^3}$$

Result:

$1.96641... \times 10^{19}$

$1.96641 * 10^{19}$

((Pi)))/(36+5/6)^2 * ((((((2*10^-2 (((36*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758130573 * 10^22)^3))))))))^1/3

Input interpretation:

$$\frac{\pi}{\left(36+\frac{5}{6}\right)^2}\sqrt[3]{2\times 10^{-2}\times \frac{36\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times \frac{0.23\times 0.7^2}{0.13}\,(3.08567758130573\times 10^{22})^3}$$

Result:

$1.96524... \times 10^{19}$

$1.96425...* 10^{19}$

(1.0661571663)/(3*144) * ((((((2*10^-2 (((29*1.9891*10^30) / (30*1.9891*10^30))) * (0.23 * 0.7^2)/0.13 * (3.08567758 * 10^22)^3))))))))^1/3

Where 1.0661571663 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1.0661571663}{3\times 144}\sqrt[3]{2\times 10^{-2}\times \frac{29\times 1.9891\times 10^{30}}{30\times 1.9891\times 10^{30}}\times \frac{0.23\times 0.7^2}{0.13}\left(3.08567758\times 10^{22}\right)^3}$$

Result:

$1.94887... \times 10^{19}$

$1.94887...* 10^{19}$

From the previous values, we have also:

(32.5*1.9891*10^30)^1/11

Input interpretation:

$$\sqrt[11]{32.5\times 1.9891\times 10^{30}}$$

Result:

779.592...

779.592…

(30*1.9891*10^30)^1/11

Input interpretation:

$$\sqrt[11]{30\times 1.9891\times 10^{30}}$$

Result:

773.940...

773.940...

(36*1.9891*10^30)^1/11

Input interpretation:

$\sqrt[11]{36 \times 1.9891 \times 10^{30}}$

Result:

786.874...

786.874...

(29*1.9891*10^30)^1/11

Input interpretation:

$\sqrt[11]{29 \times 1.9891 \times 10^{30}}$

Result:

771.558...

771.558...

Where 779.592, 773.940, 786.874 and 771.558 are results very near to the rest masses of Charged rho meson, Neutral rho meson and Omega meson 775.4 775.49 782.65

Now, from the various masses, that we calculate in GeV, we obtain:

(32.5*1.9891*10^30) Kg = GeV

Result:

3.626×10^{58} GeV/c^2

$3.626 * 10^{58}$

Additional conversions:

6.465×10^{34} grams

6.465×10^{31} kg (kilograms)

(36*1.9891*10^30) Kg = GeV

Result:

4.017×10^{58} GeV/c^2

$4.017 * 10^{58}$

Additional conversions:

7.161×10^{34} grams

7.161×10^{31} kg (kilograms)

(29*1.9891*10^30) Kg = GeV

Result:

3.236×10^{58} GeV/c^2

$3.236 * 10^{58}$

Additional conversions:

5.768×10^{34} grams

5.768×10^{31} kg (kilograms)

(30*1.9891*10^30) Kg = GeV

Result:

3.347×10^{58} GeV/c^2

$3.347 * 10^{58}$

Additional conversions:

5.967×10^{34} grams

5.967×10^{31} kg (kilograms)

We have that:

((1.0061571663^5 * 0.5772156649)) * (3.626×10^58)^1/3   gigaelectronvolts per speed of light squared

Where 1.0061571663 is a Ramanujan mock theta function and 0.5772156649 is the Euler-Mascheroni constant

Input interpretation:

$(1.0061571663^5 \times 0.5772156649) \sqrt[3]{3.626 \times 10^{58}}$ GeV/c^2

Result:

1.97×10^{19} GeV/c^2

$1.97 * 10^{19}$ GeV

0.5772156649 * (4.017×10^58)^1/3 gigaelectronvolts per speed of light squared

Input interpretation:

$0.5772156649 \sqrt[3]{4.017 \times 10^{58}}$ GeV/c^2

Result:

1.977×10^{19} GeV/c^2

$1.977 * 10^{19}$ GeV

1.0061571663^10 * 0.5772156649 * (3.236×10^58)^1/3 gigaelectronvolts per speed of light squared

Input interpretation:

$1.0061571663^{10} \times 0.5772156649 \sqrt[3]{3.236 \times 10^{58}}$ GeV/c^2

Result:

1.956×10^{19} GeV/c^2

$1.956 * 10^{19}$ GeV

1.0061571663^8 * 0.5772156649 * (3.347×10^58)^1/3 gigaelectronvolts per speed of light squared

Input interpretation:

$1.0061571663^{8} \times 0.5772156649 \sqrt[3]{3.347 \times 10^{58}}$ GeV/c^2

Result:

1.954×10^{19} GeV/c^2

$1.954 * 10^{19}$ GeV

We note that, from the two results $3.1283041124 * 10^{58}$ and $2.520022757 * 10^{58}$, we obtain:

ln (((((((3.1283041124 * 10^58) + (2.520022757 * 10^58)))) / 2))))

Input interpretation:

$\log\left(\frac{1}{2}\left(3.1283041124 \times 10^{58} + 2.520022757 \times 10^{58}\right)\right)$

log(x) is the natural logarithm

Result:

134.588147585...

134.588147585... result that is very near to the rest mass of Pion meson 134.976

Series representations:

$$\log\left(\frac{1}{2}\left(3.12830411240000\times 10^{58}+2.52002\times 10^{58}\right)\right)=\log\left(2.82416\times 10^{58}\right)-\sum_{k=1}^{\infty}\frac{(-1)^k e^{-134.588 k}}{k}$$

$$\log\left(\frac{1}{2}\left(3.12830411240000\times 10^{58}+2.52002\times 10^{58}\right)\right)=2 i \pi \left\lfloor\frac{\arg\left(2.82416\times 10^{58}-x\right)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k \left(2.82416\times 10^{58}-x\right)^k x^{-k}}{k} \quad \text{for } x<0$$

$$\log\left(\frac{1}{2}\left(3.12830411240000\times 10^{58}+2.52002\times 10^{58}\right)\right)=\left\lfloor\frac{\arg\left(2.82416\times 10^{58}-z_0\right)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg\left(2.82416\times 10^{58}-z_0\right)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k \left(2.82416\times 10^{58}-z_0\right)^k z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$\log\left(\frac{1}{2}\left(3.12830411240000\times 10^{58}+2.52002\times 10^{58}\right)\right)=\int_1^{2.82416\times 10^{58}}\frac{1}{t}\,dt$$

$$\log\left(\frac{1}{2}(3.12830411240000\times 10^{58}+2.52002\times 10^{58})\right)=\frac{1}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{-134.588\,s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,d\,s\quad\text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

More information »

And:

((((((ln (((((((3.1283041124 * 10^58) + (2.520022757 * 10^58)))) / 2))))))))))^1/10

Input interpretation:

$$\sqrt[10]{\log\left(\frac{1}{2}(3.1283041124\times 10^{58}+2.520022757\times 10^{58})\right)}$$

$\log(x)$ is the natural logarithm

Result:

1.632678529362...

$1.632678... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934...$

Furthermore, from the following results: 1.96641, 1.96425, 1.94887, 1.97, 1.977, 1.956, 1.954 (* 10^{19}) we obtain:

The following average: 1.962361428571... * 10^{19} GeV practically the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV

The total mean is: 1,965053256 * 10^{19} GeV

0.898893179095 (1.96641+1.96425+1.94887+1.97+1.977+1.956+1.954)/7 * 10^19

Where $\boldsymbol{\psi(q)}$ **= 0.898893179095….** is a Ramanujan mock theta function

Input interpretation:

$$0.898893179095\times\left(\frac{1}{7}(1.96641+1.96425+1.94887+1.97+1.977+1.956+1.954)\right)\times 10^{19}\ \text{GeV}$$

(gigaelectronvolts)

Result:

1.764×10^{19} GeV (gigaelectronvolts)

$1.764 * 10^{19}$ GeV

Unit conversions:

1.764×10^{28} eV (electronvolts)

Input interpretation:

1764×10^{16} GeV (gigaelectronvolts)

$1764 * 10^{16}$ GeV

Unit conversions:

1.764×10^{28} eV (electronvolts)

And:

0.898893179095 (1.965053256) * 10^19 GeV

Input interpretation:

$0.898893179095 \times 1.965053256 \times 10^{19}$ GeV (gigaelectronvolts)

Result:

$1.76637297 \times 10^{19}$ GeV (gigaelectronvolts)

Unit conversions:

$1.76637297 \times 10^{28}$ eV (electronvolts)

$1.76637297 * 10^{19}$ GeV

$1766.37297 * 10^{16}$ GeV

And from:

(1764)^1/15 ×10^16 gigaelectronvolts

We obtain:

Input interpretation:

$\sqrt[15]{1764} \times 10^{16}$ GeV (gigaelectronvolts)

Result:

1.646×10^{16} GeV (gigaelectronvolts)

$1.646 * 10^{16}$

Or, equivalently:

(((((10^3 * 0.898893179095
(1.96641+1.96425+1.94887+1.97+1.977+1.956+1.954)/7)))))^1/15

Input interpretation:

$$\left(10^3 \times 0.898893179095 \left(\frac{1}{7} (1.96641 + 1.96425 + 1.94887 + 1.97 + 1.977 + 1.956 + 1.954)\right)\right)^{\wedge} (1/15)$$

Result:

1.646010...

$1.646010... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

And:

(1766.37297)^1/15 *10^16 gigaelectronvolts

Input interpretation:

$\sqrt[15]{1766.37297} \times 10^{16}$ GeV (gigaelectronvolts)

Result:

$1.64616044 \times 10^{16}$ GeV (gigaelectronvolts)

$1.64616044 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Note that the results of the two division: $3.1283041124… * 10^{58}$ / $2.520022757… * 10^{58}$ and $6.112845806… * 10^{65}$ / $4.924236899… * 10^{65}$ are very near!

(3.1283041124 * 10^58) / (2.520022757 * 10^58)

Input interpretation:

$$\frac{3.1283041124 \times 10^{58}}{2.520022757 \times 10^{58}}$$

Result:

1.241379310448822268314142847242549722736491938751170571274...

1.2413793104488…

(6.112845806 * 10^65) / (4.924236899 * 10^65)

Input interpretation:

$$\frac{6.112845806 \times 10^{65}}{4.924236899 \times 10^{65}}$$

Result:

1.241379310414854189979132439785570113368341420244899553927...

1.2413793104148541189…..

We have that:

1/2 * (6.112845806 * 10^65) / (4.924236899 * 10^65)

Input interpretation:

$$\frac{1}{2} \times \frac{6.112845806 \times 10^{65}}{4.924236899 \times 10^{65}}$$

Result:

0.620689655207427094989566219892785056684170710122449776963...

0.6206896552…

1/2 * (3.1283041124 * 10^58) / (2.520022757 * 10^58)

Input interpretation:

$$\frac{1}{2} \times \frac{3.1283041124 \times 10^{58}}{2.520022757 \times 10^{58}}$$

Result:

0.620689655224411134157071423621274861368245969375585285637...

0.6206896552…

And, we obtain the following interesting expression:

(1.08094974)^1/18 * 1/ 0.6206896552

Where 1.08094974 is a Ramanujan mock theta function

Input interpretation:

$$\sqrt[18]{1.08094974} \times \frac{1}{0.6206896552}$$

Result:

1.618093361739439993763399696640363128161467533733714053753...

Or:

(1.08094974)^1/18 * 2/ (((((((1/2 * (6.112845806 * 10^65) / (4.924236899 * 10^65))))))) + ((((((((1/2 * (3.1283041124 * 10^58) / (2.520022757 * 10^58))))))))

Input interpretation:

$$\sqrt[18]{1.08094974} \times \frac{2}{\frac{1}{2} \times \frac{6.112845806 \times 10^{65}}{4.924236899 \times 10^{65}} + \frac{1}{2} \times \frac{3.1283041124 \times 10^{58}}{2.520022757 \times 10^{58}}}$$

Result:

1.618093361697940005162983724814956105184840856166145935508...

1.6180933617394... a very good approximation to the golden ratio

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

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

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

Input interpretation:

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

Result:

1.618033988749894848204586834365638117720309179805762862135...

The result, thence, is:

1.618033988749894848204586834365638117720309179805762862135.....

We obtain the following new interesting mathematical result and connection:

$$\sqrt[18]{1.08094974}\times\frac{2}{\frac{1}{2}\times\frac{6.112845806\times10^{65}}{4.924236899\times10^{65}}+\frac{1}{2}\times\frac{3.1283041124\times10^{58}}{2.520022757\times10^{58}}}$$

$= 1.618093361697940005162983724814956105184840856166145935508... \Rightarrow$

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

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

$= 1.618033988749894848204586834365638117720309179805762862135...$

1.61809336169... ≈ 1.61803398874...

We have also:

1.0061571663 + 1/ ((((((((6.112845806 * 10^65) / (4.924236899 * 10^65)))) ((((3.1283041124 * 10^58) / (2.520022757 * 10^58))))))))

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$1.0061571663 + \frac{1}{\frac{6.112845806\times10^{65}}{4.924236899\times10^{65}} \times \frac{3.1283041124\times10^{58}}{2.520022757\times10^{58}}}$$

Result:

1.6550769192954517073717678950097868021250304248014804264 75...

1.65507… result very near to the 14^{th} root of a Ramanujan class invariant

We note, indeed, that the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164{,}2696$

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

thence, we obtain the following mathematical connection:

$$1.0061571663 + \frac{1}{\frac{6.112845806\times10^{65}}{4.924236899\times10^{65}} \times \frac{3.1283041124\times10^{58}}{2.520022757\times10^{58}}} = 1.6550769\ldots \Rightarrow$$

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

Now we analyze the value for DM equal to 10^{-9}, 10^{-11} and 10^{-16} solar masses

From:

Microlensing constraints on primordial black holes with the Subaru/HSC Andromeda observation

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Primordial black holes (PBHs) have long been suggested as a viable candidate for the elusive dark matter (DM). The abundance of such PBHs has been constrained using a number of astrophysical observations, except for a hitherto unexplored mass window of $M_{\rm PBH} = [10^{-14}, 10^{-9}]M_\odot$. Here we carry out a dense-cadence (2 min sampling rate), 7 hour-long observation of the Andromeda galaxy (M31) with the Subaru Hyper Suprime-Cam to search for microlensing of stars in M31 by PBHs lying in the halo regions of the Milky Way (MW) and M31. Given our simultaneous monitoring of more than tens of millions of stars in M31, if such light PBHs make up a significant fraction of DM, we expect to find many microlensing events for the PBH DM scenario. However, we identify only a single candidate event, which translates into the most stringent upper bounds on the abundance of PBHs in the mass range $M_{\rm PBH} \simeq [10^{-11}, 10^{-6}]M_\odot$.

data. Our results constrain PBHs in an open window of PBH masses, $M_{\rm PBHs} \simeq [10^{-11}, 10^{-9}]M_\odot$, as well as give tighter constraints than those reported by previous work in the range of $M_{\rm PBH} \simeq [10^{-9}, 10^{-6}]M_\odot$. In particular, our constraint is tighter than the constraint from the 2-year Kepler data that had monitored an open cluster containing 10^5 stars, with about 15 or 30 min cadence over 2 years [18].

If a star in M31[2] and a foreground PBH are almost perfectly aligned along the line-of-sight to an observer, the star is multiply imaged due to strong gravitational lensing. In case these multiple images are unresolved, the flux from the star appears magnified. When the source star and the lensing PBH are separated by an angle β on the sky, the total lensing magnification, i.e. the sum of the magnification of the two images, is

$$A = A_1 + A_2 = \frac{u^2+2}{u\sqrt{u^2+4}}, \tag{2}$$

where $u = (d \times \beta)/R_E$, and d is the distance to a lensing PBH. The Einstein radius R_E is defined as

$$R_E^2 = \frac{4GM_{\rm PBH}D}{c^2}, \tag{3}$$

where $M_{\rm PBH}$ is the PBH mass. D is the lensing weighted distance, $D \equiv d(1-d/d_s)$, where d_s is the distance to a source star in M31, and d is the distance to the PBH. By plugging typical values of the parameters, we can find the typical Einstein radius:

$$\theta_E \equiv \frac{R_E}{d} \simeq 3 \times 10^{-8}\ \text{arcsec} \left(\frac{M_{\rm PBH}}{10^{-8}M_\odot}\right)^{1/2}\left(\frac{d}{100\ \text{kpc}}\right)^{-1/2} \tag{4}$$

where we assumed $d_s = 770$ kpc for distance to a star in M31 and we assumed $D \sim d$ for simplicity, and employed $M_{\rm PBH} = 10^{-8}M_\odot$ as a working example for the sake of comparison with Ref. [18]. In the following analysis we will consider a wide range of PBH mass scales. The PBH lensing phenomena we search for are in the microlensing regime; we cannot resolve two lensed images with angular resolution of an optical telescope, and we can measure only the total magnification. A size of a star in M31 is viewed as

$$\theta_s \simeq \frac{R_s}{d_s} \simeq 5.8 \times 10^{-9}\ \text{arcsec}, \tag{5}$$

if the source star has a similar size to the solar radius ($R_\odot \simeq 6.96 \times 10^{10}$ cm). Comparing with Eq. (4) we find that the Einstein radius becomes smaller than the source size if PBH mass $M_{\rm PBH} \lesssim 10^{-10}M_\odot$ corresponding to $M_{\rm PBH} \lesssim 10^{23}$ g. We will later discuss such lighter PBHs, where we will take into account the effect of finite source size on the microlensing [18, 37, 51].

We have that, for $M_{\rm PBH} = 10^{-11}$:

(1.9891*10^30*10^-11)

Input interpretation:

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

Result:

19 891 000 000 000 000 000

19891000000000000000 kg = GeV

convert 19891000000000000000 kg (kilograms)
to gigaelectronvolts per speed of light squared

Result:

1.116×10^{46} GeV/c^2

$1.116 * 10^{46}$ GeV

Additional conversions:

- Show exact values

1.989×10^{22} grams

$1.9891 * 10^{19}$ Kg

(1.0061571663^10/4 * 33021.1005)* (1.116×10^46)^1/3 gigaelectronvolts per speed of light squared

Where 1.0061571663 and 33021.1005 are two Ramanujan mock theta functions

Input interpretation:

$$\left(\frac{1.0061571663^{10}}{4} \times 33021.1005\right) \sqrt[3]{1.116 \times 10^{46}} \text{ GeV}/c^2$$

Result:

1.962×10^{19} GeV/c^2

$1.962 * 10^{19}$ GeV practically equal to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

We have that, for $M_{PBH} = 10^{-9}$:

(1.9891*10^30*10^-9)

Input interpretation:

$$\frac{1.9891 \times 10^{30}}{10^{9}}$$

Result:

1 989 100 000 000 000 000 000

Scientific notation:

1.9891×10^{21}

$1.9891 * 10^{21}$ Kg

Input interpretation:

convert 1989100000000000000000 kg (kilograms)
to gigaelectronvolts per speed of light squared

Result:

1.116×10^{48} GeV/c^2

$1.116 * 10^{48}$ GeV

(1.0061571663^5/18 * 33021.1005)* (1.116×10^48)^1/3 gigaelectronvolts per speed of light squared

Input interpretation:

$$\left(\frac{1.0061571663^5}{18}\times 33021.1005\right)\sqrt[3]{1.116\times10^{48}\ \text{GeV}/c^2}$$

Result:

1.962×10^{19} GeV/c^2

$1.962 * 10^{19}$ GeV practically equal to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

We have that, for $M_{PBH} = 10^{-6}$:

Input interpretation:

$$\frac{1.9891\times10^{30}}{10^6}$$

Result:

1989100000000000000000000

Scientific notation:

1.9891×10^{24}

$1.9891 * 10^{24}$ Kg

For a mass of 1.989 * 10^24 Kg and a corresponding entropy of 4.556822 * 10^64, we have that:

1/1.61803398 Pi/355 (4.556822*10^64)^1/3

Input interpretation:

$$\frac{1}{1.61803398}\times\frac{\pi}{355}\sqrt[3]{4.556822\times10^{64}}$$

Result:

$1.953535...\times10^{19}$

$1.953535... * 10^{19}$ very near to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

Now, we have for 10^{-11} :

27*3 + 16 ln (1.116×10^46)

Input interpretation:

$27\times3+16\log(1.116\times10^{46})$

$\log(x)$ is the natural logarithm

Result:

1777.458642266963530565244025483702762923892549214...

1777.45864226... result 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**).

(((((27*3 + 16 ln (1.116×10^46)))))^1/15

Input interpretation:

$\sqrt[15]{27\times3+16\log(1.116\times10^{46})}$

$\log(x)$ is the natural logarithm

Result:

1.6468471793376411533569705066294243543735575858182...

$1.646847... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Or:

((((ln^2(1.116×10^46))))))^1/19

Input interpretation:

$\sqrt[19]{\log^2(1.116\times10^{46})}$

log(x) is the natural logarithm

Result:

1.633813393624844719137721645769664052394644373679 1...

1.63381339... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Now, we have, for 10^{-9}:

16 * ln (1.116×10^48)

Input interpretation:

$16 \log(1.116 \times 10^{48})$

log(x) is the natural logarithm

Result:

1770.141365242772992453819752033602417567127796850 26...

1770.141365... result 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)**.

(((((16 * ln (1.116×10^48)))))^1/15

Input interpretation:

$\sqrt[15]{16 \log(1.116 \times 10^{48})}$

log(x) is the natural logarithm

Result:

1.646394336205253734546223353964989482679203514661195...

1.6463943.... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Or:

((((ln^2(1.116×10^48))))))^1/19

Input interpretation:

$$\sqrt[19]{\log^2(1.116\times 10^{48})}$$

log(x) is the natural logarithm

Result:

1.641141780316375228395532506192914285015296751830569...

$1.641141780\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

From the mass $1.9891 * 10^{19}$ Kg ($1.116 * 10^{46}$ GeV) , we obtain temperature and radius, thence the charge Q. The inverse is:

1 / sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{1}{\sqrt{-\frac{6169.641\,(4\,\pi\times 2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}$$

Result:

346.080...

1/Q = 346.080

And:

5 * 1/ sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$5\times\frac{1}{\sqrt{-\frac{6169.641\,(4\,\pi\times 2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}$$

Result:

1730.40...

1730.40... result in the range of the mass of candidate “glueball” $f_0(1710)$

2/5 * 1/ sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{2}{5} \times \frac{1}{\sqrt{-\frac{6169.641\left(4\pi \times 2.953518 \times 10^{-8}\right)^3 - \left(2.953518 \times 10^{-8}\right)^2}{6.67 \times 10^{-11}}}}$$

Result:

138.432...

138.432... result very near to the rest mass of Pion 139.57

Or:

1.1180931^2* 2/5 * 1/ sqrt[[-((((((6169.641 * 4*Pi*(2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.1180931^2 \times \frac{2}{5} \times \frac{1}{\sqrt{-\frac{6169.641 \times 4\pi \left(2.953518 \times 10^{-8}\right)^3 - \left(2.953518 \times 10^{-8}\right)^2}{6.67 \times 10^{-11}}}}$$

Result:

138.432...

For 1.9891 * 10^{21} Kg, (1.116 * 10^{48} GeV) we obtain the inverse of charge Q:

1/ sqrt[[-((((((61.69641 * (4*Pi*0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{1}{\sqrt{-\frac{61.69641\left(4\pi \times 2.953518 \times 10^{-6}\right)^3 - 2.953518 \times 10^{-6\,2}}{6.67 \times 10^{-11}}}}$$

Result:

3.46080...

1/Q = 3.46080...

13 * 3 / sqrt[[-((((((61.69641 * (4*Pi*0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$13\times\frac{3}{\sqrt{-\frac{61.69641\left(4\pi\times2.953518\times10^{-6}\right)^3-2.953518\times10^{-6\,2}}{6.67\times10^{-11}}}}$$

Result:

134.971...

134.971.... result practically equal to the rest mass of Pion meson 134.976

From M * 1/Q, i.e the ratio between mass and charge, we obtain:

1.116 * 10^48 * 1 / sqrt[[-(((((61.69641 * (4*Pi*0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.116\times10^{48}\times\frac{1}{\sqrt{-\frac{61.69641\left(4\pi\times2.953518\times10^{-6}\right)^3-2.953518\times10^{-6\,2}}{6.67\times10^{-11}}}}$$

Result:

$3.86226...\times10^{48}$

$3.86226 * 10^{48}$

And:

1.116 * 10^46 * 1/ sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.116\times10^{46}\times\frac{1}{\sqrt{-\frac{6169.641\left(4\pi\times2.953518\times10^{-8}\right)^3-\left(2.953518\times10^{-8}\right)^2}{6.67\times10^{-11}}}}$$

Result:

$3.86226...\times10^{48}$

$3.86226 * 10^{48}$

Practically the two results are identical.

We have that:

1/2 * 2498.279529 * ((((((1.116 * 10^46 * 1/ sqrt[[-((((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]])))))^1/3

Where 2498.279529 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{2}\times 2498.279529\sqrt[3]{1.116\times 10^{46}\times \frac{1}{\sqrt{-\frac{6169.641\left(4\pi\times 2.953518\times 10^{-8}\right)^3-\left(2.953518\times 10^{-8}\right)^2}{6.67\times 10^{-11}}}}}$$

Result:

$1.95986... \times 10^{19}$

$1.95986...* 10^{19}$ practically equal to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV

For a mass of 10^{-10} solar masses, we obtain:

Input interpretation:

convert 1.9891×10^{20} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

1.116×10^{47} GeV/c^2

$1.116 * 10^{47}$ GeV

And:

1.116 * 10^47 * 1 / sqrt[[-((((((616.9641 * (4*Pi*2.953518*10^-7)^3-(2.953518*10^-7)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.116\times 10^{47}\times \frac{1}{\sqrt{-\frac{616.9641\left(4\pi\times 2.953518\times 10^{-7}\right)^3-\left(2.953518\times 10^{-7}\right)^2}{6.67\times 10^{-11}}}}$$

Result:

$3.86226... \times 10^{48}$

$3.86226...* 10^{48}$ that is the same previous result.

From the equation (3), we obtain:

$$R_E^2 = \frac{4GM_{\text{PBH}}D}{c^2},$$

For G = 6.67 * 10^{-11}, M_{PBH} = 10^{-10} solar masses, c = 3 * 10^8 and D = 100 kpc = 100 * 3.0857 * 10^{21} , we obtain:

(((4(6.67*10^-11)*(10^-10)*(1.9891*10^30)*(100 * 3.0857 * 10^21)))) / (9*10^16)

Input interpretation:

$$\frac{\frac{4\times 6.67\times 10^{-11}\times 1.9891\times 10^{30}\,(100\times 3.0857\times 10^{21})}{10^{10}}}{9\times 10^{16}}$$

Result:

$1.81950659346222222222222222222222222222222222222222... \times 10^{17}$

$1.819506593462…* 10^{17}$

Repeating decimal:

$0.181950659346\overline{2}\times 10^{18}$ (period 1)

Thence:

(((((((4(6.67*10^-11)*(10^-10)*(1.9891*10^30)*(100 * 3.0857 * 10^21)))) / (9*10^16)))))^1/2

Input interpretation:

$$\sqrt{\frac{\frac{4\times 6.67\times 10^{-11}\times 1.9891\times 10^{30}\,(100\times 3.0857\times 10^{21})}{10^{10}}}{9\times 10^{16}}}$$

Result:

$4.26557... \times 10^{8}$

$4.26557...* 10^{8}$

For D = 770 Kpc, we obtain:

(((((((4(6.67*10^-11)*(10^-10)*(1.9891*10^30)*(770*3.0857*10^21)))) / (9*10^16)))))^1/2

Input interpretation:

$$\sqrt{\frac{\frac{4\times 6.67\times 10^{-11}\times 1.9891\times 10^{30}\,(770\times 3.0857\times 10^{21})}{10^{10}}}{9\times 10^{16}}}$$

Result:

$1.18365... \times 10^9$

$1.18365...* 10^9$

We obtain, from the square root of the ratio of the two results:

sqrt(((1.18365 * 10^9) / (4.26557 * 10^8))))

Input interpretation:

$$\sqrt{\frac{1.18365\times 10^9}{4.26557\times 10^8}}$$

Result:

1.665800985020803662180348497134535102531079993583084866574...

1.66580... result near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

And:

sqrt(((1.18365 * 10^9) / (4.26557 * 10^8)))) - (((1/24*1.1424432422)))

where 1.1424432422 is a Ramanujan mock theta function

Input interpretation:

$$\sqrt{\frac{1.18365\times 10^9}{4.26557\times 10^8}} - \frac{1}{24}\times 1.1424432422$$

Result:

1.618199183262470328847015163801201769197746660249751533240...

1.61819918326... a result very near to the value of golden ratio

Thence, we obtain the following new interesting mathematical result and connection:

$$\sqrt{\frac{1.18365 \times 10^9}{4.26557 \times 10^8}}$$

$= 1.665800985020803662180348497134535102531079993583084866574...$

1.66580… result very near to the 14th root of a Ramanujan class invariant

We note, indeed, that the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164{,}2696$

is:

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

thence, we obtain the following mathematical connection:

$$\sqrt{\frac{1.18365 \times 10^9}{4.26557 \times 10^8}}$$

$= 1.665800985020803662180348497134535102531079993583084866574... \Rightarrow$

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

And:

$$\sqrt{\frac{1.18365\times 10^9}{4.26557\times 10^8}} - \frac{1}{24}\times 1.1424432422$$

$= 1.6181991832624703288470151638012017691977466602497515332 40\ldots \Rightarrow$

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

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

$= 1.6180339887498948482045868343656381177203091798057628621 35\ldots$

Practically result very near to the golden ratio.

From the two entropies: $4.557280 * 10^{58}$ and $4.557280 * 10^{54}$,we have that:

ln(4.557280 * 10^58)

Input interpretation:

$\log(4.557280\times 10^{58})$

$\log(x)$ is the natural logarithm

Result:

135.066661...

135.0666... result very near to the rest mass of Pion meson 134.976

Series representations:

$$\log(4.55728\times 10^{58}) = \log(4.55728\times 10^{58}) - \sum_{k=1}^{\infty}\frac{(-1)^k e^{-135.067k}}{k}$$

$$\log(4.55728\times 10^{58}) = 2 i \pi \left\lfloor \frac{\arg(4.55728\times 10^{58} - x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728\times 10^{58} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(4.55728\times 10^{58}) = \left\lfloor \frac{\arg(4.55728\times 10^{58} - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(4.55728\times 10^{58} - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728\times 10^{58} - z_0)^k z_0^{-k}}{k}$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$\log(4.55728\times 10^{58}) = \int_1^{4.55728\times 10^{58}} \frac{1}{t}\, dt$$

$$\log(4.55728\times 10^{58}) = \frac{1}{2 i \pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-135.067 s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

More information »

ln(4.557280 * 10^54)

Input interpretation:

$\log(4.557280\times 10^{54})$

log(x) is the natural logarithm

Result:

125.856321...

125.856321… result very near to the Higgs boson mass 125.18

Series representations:

$$\log(4.55728\times 10^{54}) = \log(4.55728\times 10^{54}) - \sum_{k=1}^{\infty} \frac{(-1)^k e^{-125.856k}}{k}$$

$$\log(4.55728\times 10^{54}) = 2 i \pi \left\lfloor \frac{\arg(4.55728\times 10^{54} - x)}{2\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728\times 10^{54} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(4.55728\times 10^{54}) = \left\lfloor \frac{\arg(4.55728\times 10^{54} - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(4.55728\times 10^{54} - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728\times 10^{54} - z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$\log(4.55728\times 10^{54}) = \int_1^{4.55728\times 10^{54}} \frac{1}{t}\, dt$$

$$\log(4.55728\times 10^{54}) = \frac{1}{2 i \pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-125.856 s}\, \Gamma(-s)^2\, \Gamma(1+s)}{\Gamma(1-s)}\, ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

More information »

And:

(34)/(20Pi)* (4.557280 * 10^58)^1/3

Input interpretation:

$$\frac{34}{20\pi}\sqrt[3]{4.557280\times10^{58}}$$

Result:

$1.932862... \times 10^{19}$

$1.932862...* 10^{19}$ practically near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV

Series representations:

$$\frac{\sqrt[3]{4.55728\times10^{58}}\ 34}{20\pi}=\frac{1.51807\times10^{19}}{\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{\sqrt[3]{4.55728\times10^{58}}\ 34}{20\pi}=\frac{3.03613\times10^{19}}{-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\frac{\sqrt[3]{4.55728\times10^{58}}\ 34}{20\pi}=\frac{6.07227\times10^{19}}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

More information »

Integral representations:

$$\frac{\sqrt[3]{4.55728\times10^{58}}\ 34}{20\pi}=\frac{3.03613\times10^{19}}{\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{\sqrt[3]{4.55728\times 10^{58}}\ 34}{20\pi}=\frac{1.51807\times 10^{19}}{\int_0^1\sqrt{1-t^2}\,dt}$$

$$\frac{\sqrt[3]{4.55728\times 10^{58}}\ 34}{20\pi}=\frac{3.03613\times 10^{19}}{\int_0^\infty \frac{\sin(t)}{t}\,dt}$$

More information »

((e ln(4) Pi))*(4.557280 * 10^54)^1/3

Input interpretation:

$(e\log(4)\pi)\sqrt[3]{4.557280\times 10^{54}}$

log(x) is the natural logarithm

Result:

$1.962765...\times 10^{19}$

$1.962765...*10^{19}$ practically near to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia)

Series representations:

$$\sqrt[3]{4.55728\times 10^{54}}\ e(\log(4)\pi)=1.65794\times 10^{18}\,e\,\pi\log(3)-1.65794\times 10^{18}\,e\,\pi\sum_{k=1}^{\infty}\frac{\left(-\frac{1}{3}\right)^k}{k}$$

$$\sqrt[3]{4.55728\times 10^{54}}\ e(\log(4)\pi)=3.31588\times 10^{18}\,e\,i\,\pi^2\left\lfloor\frac{\arg(4-x)}{2\pi}\right\rfloor+1.65794\times 10^{18}\,e\,\pi\log(x)-1.65794\times 10^{18}\,e\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k(4-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$\sqrt[3]{4.55728\times 10^{54}}\ e(\log(4)\pi)=3.31588\times 10^{18}\,e\,i\,\pi^2\left\lfloor-\frac{-\pi+\arg\left(\frac{4}{z_0}\right)+\arg(z_0)}{2\pi}\right\rfloor+1.65794\times 10^{18}\,e\,\pi\log(z_0)-1.65794\times 10^{18}\,e\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k(4-z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$\sqrt[3]{4.55728 \times 10^{54}}\ e\,(\log(4)\,\pi) = 1.65794\times10^{18}\ e\,\pi \int_1^4 \frac{1}{t}\,dt$$

$$\sqrt[3]{4.55728 \times 10^{54}}\ e\,(\log(4)\,\pi) = \frac{8.2897\times10^{17}\ e}{i} \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{3^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds$$

for $-1 < \gamma < 0$

$\Gamma(x)$ is the gamma function

More information »

14 ln(4.557280 * 10^54)

Input interpretation:

$14 \log(4.557280 \times 10^{54})$

$\log(x)$ is the natural logarithm

Result:

1761.98849…

1761.98849… result in the range of the mass of candidate "glueball" $f_0(1710)$ **("glueball" =1760 ± 15 MeV)**

Series representations:

$$14 \log(4.55728 \times 10^{54}) = 14 \log(4.55728\times10^{54}) - 14 \sum_{k=1}^{\infty} \frac{(-1)^k\, e^{-125.856\,k}}{k}$$

$$14 \log(4.55728 \times 10^{54}) = 28\, i\, \pi \left\lfloor \frac{\arg(4.55728\times10^{54} - x)}{2\,\pi} \right\rfloor + 14 \log(x) - 14 \sum_{k=1}^{\infty} \frac{(-1)^k\,(4.55728\times10^{54} - x)^k\, x^{-k}}{k} \quad \text{for } x < 0$$

$$14 \log(4.55728 \times 10^{54}) = 14 \left\lfloor \frac{\arg(4.55728 \times 10^{54} - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + 14 \log(z_0) + 14 \left\lfloor \frac{\arg(4.55728 \times 10^{54} - z_0)}{2\pi} \right\rfloor \log(z_0) - 14 \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728 \times 10^{54} - z_0)^k z_0^{-k}}{k}$$

arg(z) is the complex argument

⌊x⌋ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$14 \log(4.55728 \times 10^{54}) = 14 \int_1^{4.55728\times10^{54}} \frac{1}{t} \, dt$$

$$14 \log(4.55728 \times 10^{54}) = \frac{7}{i\pi} \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-125.856 s} \, \Gamma(-s)^2 \, \Gamma(1+s)}{\Gamma(1-s)} \, ds \quad \text{for } -1 < \gamma < 0$$

Γ(x) is the gamma function

More information »

(((14 ln(4.557280 * 10^54))))^1/15

Input interpretation:

$$\sqrt[15]{14 \log(4.557280 \times 10^{54})}$$

log(x) is the natural logarithm

Result:

1.645887718...

1.645887…≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

13 ln(4.557280 * 10^58)

Input interpretation:

$13 \log(4.557280 \times 10^{58})$

$\log(x)$ is the natural logarithm

Result:

1755.86660...

1755.866…

result in the range of the mass of candidate "glueball" $f_0(1710)$ **("glueball" =1760 ± 15 MeV)**

Series representations:

$$13 \log(4.55728 \times 10^{58}) = 13 \log(4.55728 \times 10^{58}) - 13 \sum_{k=1}^{\infty} \frac{(-1)^k e^{-135.067 k}}{k}$$

$$13 \log(4.55728 \times 10^{58}) = 26 i \pi \left\lfloor \frac{\arg(4.55728 \times 10^{58} - x)}{2 \pi} \right\rfloor + 13 \log(x) - 13 \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728 \times 10^{58} - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$13 \log(4.55728 \times 10^{58}) = 13 \left\lfloor \frac{\arg(4.55728 \times 10^{58} - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + 13 \log(z_0) + 13 \left\lfloor \frac{\arg(4.55728 \times 10^{58} - z_0)}{2 \pi} \right\rfloor \log(z_0) - 13 \sum_{k=1}^{\infty} \frac{(-1)^k (4.55728 \times 10^{58} - z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$13 \log(4.55728 \times 10^{58}) = 13 \int_1^{4.55728\times10^{58}} \frac{1}{t} \, dt$$

$$13 \log(4.55728 \times 10^{58}) = \frac{13}{2 i \pi} \int_{-i \infty+\gamma}^{i \infty+\gamma} \frac{e^{-135.067 s} \Gamma(-s)^2 \Gamma(1+s)}{\Gamma(1-s)} ds \quad \text{for } -1 < \gamma < 0$$

$\Gamma(x)$ is the gamma function

More information »

(((13 ln(4.557280 * 10^58))))^1/15

Input interpretation:

$$\sqrt[15]{13 \log(4.557280 \times 10^{58})}$$

$\log(x)$ is the natural logarithm

Result:

1.645505865...

1.645505... ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

1/(Pi^2) * ((((((ln(4.557280 * 10^58))) * ((ln(4.557280 * 10^54))))))

Input interpretation:

$$\frac{1}{\pi^2} (\log(4.557280 \times 10^{58}) \log(4.557280 \times 10^{54}))$$

$\log(x)$ is the natural logarithm

Result:

1722.35810...

1722.35810... This result is very near to the mass of candidate glueball $f_0(1710)$ meson that is about 1723

Series representations:

$$\frac{\log(4.55728\times 10^{58})\log(4.55728\times 10^{54})}{\pi^2} = \frac{1}{\pi^2}\left(\log(4.55728\times 10^{58}) - \sum_{k=1}^{\infty}\frac{(-1)^k e^{-135.067k}}{k}\right)\left(\log(4.55728\times 10^{54}) - \sum_{k=1}^{\infty}\frac{(-1)^k e^{-125.856k}}{k}\right)$$

$$\frac{\log(4.55728\times 10^{58})\log(4.55728\times 10^{54})}{\pi^2} = \frac{1}{\pi^2}\left(2 i \pi \left\lfloor\frac{\arg(4.55728\times 10^{54} - x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (4.55728\times 10^{54} - x)^k x^{-k}}{k}\right)\left(2 i \pi \left\lfloor\frac{\arg(4.55728\times 10^{58} - x)}{2\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k (4.55728\times 10^{58} - x)^k x^{-k}}{k}\right) \text{ for } x < 0$$

$$\frac{\log(4.55728\times 10^{58})\log(4.55728\times 10^{54})}{\pi^2} = \frac{1}{\pi^2}\left(\left\lfloor\frac{\arg(4.55728\times 10^{54} - z_0)}{2\pi}\right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor\frac{\arg(4.55728\times 10^{54} - z_0)}{2\pi}\right\rfloor \log(z_0) - \sum_{k=1}^{\infty}\frac{(-1)^k (4.55728\times 10^{54} - z_0)^k z_0^{-k}}{k}\right)\left(\left\lfloor\frac{\arg(4.55728\times 10^{58} - z_0)}{2\pi}\right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor\frac{\arg(4.55728\times 10^{58} - z_0)}{2\pi}\right\rfloor \log(z_0) - \sum_{k=1}^{\infty}\frac{(-1)^k (4.55728\times 10^{58} - z_0)^k z_0^{-k}}{k}\right)$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

More information »

Integral representations:

$$\frac{\log(4.55728\times 10^{58})\log(4.55728\times 10^{54})}{\pi^2} = \int_0^1\int_0^1 \frac{1}{(1 + 4.55728\times 10^{54}\, t_1)(1 + 4.55728\times 10^{58}\, t_2)}\, dt_2\, dt_1$$

- $$\frac{\log(4.55728\times 10^{58})\log(4.55728\times 10^{54})}{\pi^2} = \frac{\left(\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-135.067 s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{e^{-125.856 s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}{4\,i^2\,\pi^4} \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

More information »

((((((1/(Pi^2) * ((((((ln(4.557280 * 10^58))) * ((ln(4.557280 * 10^54))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{\frac{1}{\pi^2}\left(\log(4.557280\times 10^{58})\log(4.557280\times 10^{54})\right)}$$

$\log(x)$ is the natural logarithm

Result:

1.643393495...

$1.643393495\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

We note that:

(1.643393495 * 1.22734321771259) - 0.0864055

Where f(q) = 1.22734321771259... and 0.0864055 are two Ramanujan mock theta functions

Input interpretation:

$1.643393495\times 1.22734321771259 - 0.0864055$

Result:

1.93060236012123918560205

1.9306… a result that is a very near sub-multiple of $1.962 * 10^{19}$ GeV

For the value of ζ(2), we have:

1,6449 × 1,3334259 = 2,19335226291; 2,19335226291- 0,22734321 = 1,966009...

Where 1.22734321 – 1 = 0.22734321

With regard the dark matter mass value of 19 GeV for the DM, we make the following observations.

From:

Dark Matter Bound States from Three-Body Recombination - Eric Braaten, Daekyoung Kang, and Ranjan Laha - arXiv:1905.04558v1 [hep-ph] 11 May 2019

In Ref. [3], we showed that the results in Fig. 1 can be fit equally well by a simpler self-interacting dark matter model with 2 parameters. The model has resonant short-range interactions with an S-wave resonance close to the scattering threshold [4]. The parameters are the dark matter mass m_χ and the scattering length a. This model has been applied previously to the direct detection of dark matter [5,6]. The self-interaction reaction rate as a function of the velocity v is

$$v\,\sigma_{\text{elastic}}(v) - \frac{8\pi a^2 v}{1+(am_\chi/2)^2 v^2}. \qquad (1)$$

The best fit to the results in Fig. 1 is $m_\chi = 19$ GeV and $a = \pm 17$ fm [3].

In summary, the small-scale structure problems of the universe can be solved by a self-interacting dark matter model with resonant S-wave interactions, with

parameters $m_\chi \approx 19$ GeV and $a \approx \pm 17$ fm. Dark nuclei d_N must be produced by rearrangement reactions, such as 3-body recombination: $d + d + d_{N-1} \to d_N + d$ The most favorable case for producing dark nuclei larger than the dark deuteron is for the dark matter particles to be identical bosons. We found that a significant fraction of dark deuterons cannot be formed in the early universe by 3-body recombination. Since the formation of the dark deuteron d_2 is a bottleneck for the formation of larger dark nuclei d_N, they cannot be formed either.

We have that:

3.387*10^-26 Kg = GeV

Result:

19 GeV/c^2

19 GeV/c^2

convert 19 GeV/c^2 to megaelectronvolts per speed of light squared

Result:

19 000 MeV/c^2

19000 MeV/c^2

Note that:

$\frac{19000}{3}$ (irreducible)

6333.33333333333333333333333333333333333333333333333333...

6333.33... MeV/c^2

We note that 6333.3 is a result very near to the value of Charmed B meson 6276. Indeed, we have:

(19000/3) – 55

Input:

$\frac{19000}{3} - 55$

Exact result:

$\frac{18835}{3}$

Decimal approximation:

6278.33333333333333333333333333333333333333333333333333...

6278.33 result very near to the rest mass of Charmed B meson 6276

We remember that: "....The mean of the values in blue is 1.96286 * 10^{19} GeV = 1962.860 * 10^{19} MeV......1962.860 is very near to the rest mass of the strange D meson 1968.49 . **Furthermore, 1.96286095714 is very nearly to the result of the following Ramanujan mock theta function: χ(q) = 1.962364415...**

If we take the sub-multiple of 1.962860 * 10^{19} GeV, i.e. 19.62860 GeV, we obtain:

convert 19.62860 GeV/c^2 to kilograms

- Open code

Result:

3.49912×10^{-26} kg (kilograms)

Now, from the Hawking Radiation black hole Calculator, inserting this mass, we obtain:

Entropy = 1.410296 * 10^{-35}

Temperature = 3.507177 * 10^{48} K

Radius = 5.195674 * 10^{-53} m

We have the following charge Q:

sqrt(((((-(((((3.507177*10^48 * (4*Pi*5.195674*10^-53)^3-(5.195674*10^-53)^2))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\sqrt{-\frac{3.507177 \times 10^{48} \left(4\pi \times 5.195674 \times 10^{-53}\right)^3 - \left(5.195674 \times 10^{-53}\right)^2}{6.67 \times 10^{-11}}}$$

Result:

$5.08306... \times 10^{-48}$

5.08306…*10^{-48} very near to the previous result obtained with 19.64283 GeV (with the following alternative mean 1.964283 * 10^19) = 5.08674...* 10^{-48}

Indeed:

sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\sqrt{-\frac{3.504641 \times 10^{48} \left(4\pi \times 5.199433 \times 10^{-53}\right)^3 - \left(5.199433 \times 10^{-53}\right)^2}{6.67 \times 10^{-11}}}$$

Result:

- More digits

$5.08674... \times 10^{-48}$

And the reciprocal:

1 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\frac{1}{\sqrt{-\frac{3.504641\times 10^{48}\,(4\,\pi\times 5.199433\times 10^{-53})^3-(5.199433\times 10^{-53})^2}{6.67\times 10^{-11}}}}$$

Result:

$1.96590... \times 10^{47}$

$1.96590...* 10^{47}$

From M * 1/Q, i.e the ratio between mass and charge, we obtain:

19 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))

Input interpretation:

$$\frac{19}{\sqrt{-\frac{3.504641\times 10^{48}\,(4\,\pi\times 5.199433\times 10^{-53})^3-(5.199433\times 10^{-53})^2}{6.67\times 10^{-11}}}}$$

Result:

$3.73520... \times 10^{48}$

$3.73520... * 10^{48}$ result very nearly to the previous $3.86226...* 10^{48}$

From this result, we have:

1/2 * 2498.2795 * ((((((((((((19 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))))))))))))^1/3

Where 2498.2795 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{2} \times 2498.2795 \sqrt[3]{\frac{19}{\sqrt{-\frac{3.504641 \times 10^{48} (4\pi \times 5.199433 \times 10^{-53})^3 - (5.199433 \times 10^{-53})^2}{6.67 \times 10^{-11}}}}}$$

Result:

$1.938128... \times 10^{19}$

$1.938128... * 10^{19}$ result practically near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia)

and in Planck units, where instead of G, we have inserted 1.9 × 10^{-35} s^{-2} that is the value of Cosmological Constant in Planck units:

((((((((6.417937 * 10^-19) / sqrt(((((-(((((3.504641 *10^48 * (4*Pi*1.283506*10^-18)^3-(1.283506*10^-18)^2))))) / ((1.9*10^-35)))))))))

Input interpretation:

$$\frac{\frac{6.417937}{10^{19}}}{\sqrt{-\frac{3.504641 \times 10^{48} (4\pi \times 1.283506 \times 10^{-18})^3 - (1.283506 \times 10^{-18})^2}{1.9 \times 10^{-35}}}}$$

Result:

$-2.30695... \times 10^{-35}\, i$

Polar coordinates:

$r = 2.30695 \times 10^{-35}$ (radius), $\theta = -90°$ (angle)

2.30695 * 10^{-35} Kg

And the inverse:

1/ ((((((((6.417937 * 10^-19) / sqrt(((((-(((((3.504641 *10^48 * (4*Pi*1.283506*10^-18)^3-(1.283506*10^-18)^2))))) / ((1.9*10^-35)))))))))

Input interpretation:

$$\frac{1}{\frac{\frac{6.417937}{10^{19}}}{\sqrt{-\frac{3.504641 \times 10^{48} (4\pi \times 1.283506 \times 10^{-18})^3 - (1.283506 \times 10^{-18})^2}{1.9 \times 10^{-35}}}}}$$

Result:

$4.33472... \times 10^{34}\, i$

Polar coordinates:

$r = 4.33472 \times 10^{34}$ (radius), $\theta = 90°$ (angle)

$4.33472 * 10^{34}$ Kg

We highlight that the Planck mass is expressed in Kg: $m_P = 2.176435(24)\times10^{-8}$ kg

Input interpretation:

convert 4.33472×10^{34} kg (kilograms) to gigaelectronvolts per speed of light squared

Result:

2.4316×10^{61} GeV/c^2

0.08185/1.22734321771259 * (2.4316×10^61)^1/3

Where 0.08185 and **f(q) = 1.22734321771259...** are two Ramanujan mock theta functions

Input interpretation:

$$\frac{0.08185}{1.22734321771259} \sqrt[3]{2.4316 \times 10^{61}} \text{ GeV}/c^2$$

Result:

1.932×10^{19} GeV/c^2

$1.932 * 10^{19}$ GeV

From the ratio mass/charge, we obtain also:

((((((((19 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11))))))))))))))^1/15

Input interpretation:

$$\sqrt[15]{\frac{19}{\sqrt{-\frac{3.504641 \times 10^{48} (4\pi \times 5.199433 \times 10^{-53})^3 - (5.199433 \times 10^{-53})^2}{6.67 \times 10^{-11}}}}}$$

Result:

1730.431...

1730.431...

Or:

Input interpretation:

$$\sqrt[15]{\frac{19}{\sqrt{-\frac{3.504641\times 10^{48}\times 4\,\pi\,(5.199433\times 10^{-53})^3-(5.199433\times 10^{-53})^2}{6.67\times 10^{-11}}}}}$$

Result:

1704.867...

1704.867...

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

And:

((((((((19 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))))))))))^1/225

Input interpretation:

$$\sqrt[225]{\frac{19}{\sqrt{-\frac{3.504641\times 10^{48}\,(4\,\pi\times 5.199433\times 10^{-53})^3-(5.199433\times 10^{-53})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6439059...

1.6439059... $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

-0.02578+((((((((19 / sqrt(((((-(((((3.504641*10^48 * (4*Pi*5.199433*10^-53)^3-(5.199433*10^-53)^2))))) / ((6.67*10^-11)))))))))))))))^1/225

Where 2578 is a rest mass of charmed Xi prime baryon

convert 10×2578 MeV/c^2 to teraelectronvolts per speed of light squared 0.02578 TeV/c^2

Input interpretation:

$$-0.02578+\sqrt[225]{\frac{19}{\sqrt{-\frac{3.504641\times 10^{48}\,(4\,\pi\times 5.199433\times 10^{-53})^3-(5.199433\times 10^{-53})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.618125893348794970930769885068000801535399808349681732997...

1.618125893348... result very near to the value of golden ratio. Indeed:

Thence, we obtain the following interesting mathematical connection:

$$-0.02578 + \sqrt[225]{\frac{19}{\sqrt{-\frac{3.504641 \times 10^{48} (4\pi \times 5.199433 \times 10^{-53})^3 - (5.199433 \times 10^{-53})^2}{6.67 \times 10^{-11}}}}}$$

$= 1.618125893348794970930769885068000801535399808349681732997... \Rightarrow$

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

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

$= 1.618033988749894848204586834365638117720309179805762862135...$

$1.6181258933... \approx 1.6180339887...$

From the entropy = $1.412337 * 10^{-35}$ (Temperature $3.504641 * 10^{48}$)

1/3 ln^2(1.412337*10^-35) – 34

Input interpretation:

$$\frac{1}{3}\log^2(1.412337 \times 10^{-35}) - 34$$

log(x) is the natural logarithm

Result:

2112.43245...

2112.43245... result very near to the rest mass of strange D meson 2112.3

((((1/3 ln^2(1.412337*10^-35) - 34)))^1/15

Input interpretation:

$$\sqrt[15]{\frac{1}{3}\log^2(1.412337 \times 10^{-35}) - 34}$$

log(x) is the natural logarithm

Result:

1.665912507...

1.665912... is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164,2696 i.e. 1,65578...

(2.103786766-0.9243408) ((((1/3 ln^2(1.412337*10^-35) - 34)))^1/15

Where 2.103786766 and 0.9243408 are two Ramanujan mock theta functions

Input interpretation:

$$(2.103786766 - 0.9243408) \sqrt[15]{\frac{1}{3} \log^2(1.412337 \times 10^{-35}) - 34}$$

log(x) is the natural logarithm

Result:

1.964854...

1.964854... result that is a sub-multiple of 1.963 $*10^{19}$ GeV, practically near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 μg Wikipedia)

From the mass of 19 GeV, we obtain the following new interesting mathematical solution:

Input interpretation:

convert 19 GeV/c^2 to kilograms

Result:

3.387×10^{-26} kg (kilograms)

3.387000e-26

Radius = 5.029192e-53

Temperature = 3.623275e+48

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(3.387*10^-26)* sqrt[[-(((((3.623275*10^48 * (4*Pi*5.029192*10^-53)^3-(5.029192*10^-53)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{3.387\times10^{-26}}\sqrt{-\frac{3.623275\times10^{48}\,(4\,\pi\times5.029192\times10^{-53})^3-(5.029192\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334839554061952119589006670475883024016962084510231860...

1.6183348...

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(3.387*10^-26)* sqrt[[-(((((3.623275*10^48 * 4*Pi*(5.029192*10^-53)^3-(5.029192*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1 \Big/ \left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{3.387\times10^{-26}}\sqrt{-\frac{3.623275\times10^{48}\times4\,\pi\,(5.029192\times10^{-53})^3-(5.029192\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.61833...

1.61833...

Thence:

$$\sqrt{\left(1 \Big/ \left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{3.387\times10^{-26}}\sqrt{-\frac{3.623275\times10^{48}\,(4\,\pi\times5.029192\times10^{-53})^3-(5.029192\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)} \Rightarrow$$

1.618334839554061952119589006670475883024016962084510231860... ⇒

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

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

$$= 1.6180339887498948482045868343656381177203091798057628621\ldots$$

A beautiful mathematical connection with the golden ratio value!

From:

Baryonic Dark Matter
Michael Duerr and Pavel Fileviez Perez - arXiv:1309.3970v1 [hep-ph] 16 Sep 2013

Let us discuss the possible correlation between possible discoveries at the Large Hadron Collider and in dark matter experiments. At the Large Hadron Collider we could discover the new neutral gauge boson associated to the breaking of the local baryon number, the gauge boson Z_B. Therefore, one could know about the mass M_{Z_B} and the gauge coupling g_B. Assuming that our dark matter candidate describes all the relic density in the Universe and for a given value of the spin-independent cross section one can solve for the dark matter mass M_χ and the baryon number B. Then, we could predict the values for the production cross section of a dark matter pair and a energetic jet, relevant for the monojet searches at the Large Hadron Collider. A possible benchmark scenario is when $g_B = 0.2$, $M_{Z_B} = 2$ TeV, $M_\chi = 955$ GeV, and $\sigma^{SI}_{\chi N} \approx 3.1 \times 10^{-45}$ cm^2. In summary, one could say that this theory provides a scenario for dark matter which could be fully tested in the future combining dark matter and collider experiments.

1.0061571663^8 (955)^1/11 GeV

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$1.0061571663^8 \sqrt[11]{955}$

Result:

1.959909399...

1.9599…GeV

Input interpretation:

convert 955 GeV/c^2 to kilograms

Result:

1.702×10^{-24} kg (kilograms)

From 955 GeV, we obtain a temperature of 7.210360e+46 and a radius of 2.527217e-51. The charge is:

sqrt[[-(((((7.210360*10^46 * (4*Pi*2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\sqrt{-\frac{7.210360 \times 10^{46} (4 \pi \times 2.527217 \times 10^{-51})^3 - (2.527217 \times 10^{-51})^2}{6.67 \times 10^{-11}}}$$

Result:

$2.47244... \times 10^{-46}$

$2.47244… * 10^{-46}$

From the ratio mass/charge, we obtain:

(1.702*10^-24) * 1/ sqrt[[-(((((7.210360*10^46 * (4*Pi*2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.702 \times 10^{-24} \times \frac{1}{\sqrt{-\frac{7.210360 \times 10^{46} (4 \pi \times 2.527217 \times 10^{-51})^3 - (2.527217 \times 10^{-51})^2}{6.67 \times 10^{-11}}}}$$

Result:

$6.88389... \times 10^{21}$

$6.88389... * 10^{21}$

(((0.0864055/((((sqrt(5)+1))/2)))^2))) * (1.702*10^-24) * 1/ sqrt[[-(((((7.210360*10^46 * (4*Pi*2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]

Where 0.0864055 is a Ramanujan mock theta function

Input interpretation:

$$\left(\frac{0.0864055}{\frac{1}{2}(\sqrt{5}+1)}\right)^2 \times 1.702 \times 10^{-24} \times \frac{1}{\sqrt{-\frac{7.210360 \times 10^{46}(4\pi \times 2.527217 \times 10^{-51})^3 - (2.527217 \times 10^{-51})^2}{6.67 \times 10^{-11}}}}$$

Result:

$1.96309... \times 10^{19}$

$1.96309... * 10^{19}$ very near to the value of DM particle that has a Planck scale mass: $m \approx 10^{19}$ GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia)

We note that:

1/(1.96309 × 10^19)^2 Kg = GeV

Input interpretation:

convert $\frac{1}{(1.96309 \times 10^{19})^2}$ kg (kilograms)

to gigaelectronvolts per speed of light squared

Result:

1.4556×10^{-12} GeV/c^2

(((((1/(((1/(1.96309 × 10^19)^2))))))^1/2 GeV

Input interpretation:

$$\sqrt{\frac{1}{\frac{1}{(1.96309 \times 10^{19})^2}}} \text{ GeV (gigaelectronvolts)}$$

Result:

1.9631×10^{19} GeV (gigaelectronvolts)

$1.9631 * 10^{19}$ GeV

We have also:

(((((((1/ sqrt[[-(((((7.210360*10^46 * (4*Pi*2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]))))))))^1/(13^2+7^2)

Input interpretation:

$$\sqrt[13^2+7^2]{\frac{1}{\sqrt{-\frac{7.210360\times 10^{46}\,(4\,\pi\times 2.527217\times 10^{-51})^3-(2.527217\times 10^{-51})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6188471...

1.6188471...

Or:

-(3/10^2)+1.0061571663^8(((((((1/ sqrt[[-(((((7.210360*10^46 * (4*Pi*2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]))))))))^1/233

Input interpretation:

$$-\frac{3}{10^2}+1.0061571663^8\sqrt[233]{\frac{1}{\sqrt{-\frac{7.210360\times 10^{46}\,(4\,\pi\times 2.527217\times 10^{-51})^3-(2.527217\times 10^{-51})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.6184063...

1.6184063...

Or:

-(3/10^2)+1.0061571663^8(((((((1/ sqrt[[-(((((7.210360*10^46 * 4*Pi*(2.527217*10^-51)^3-(2.527217*10^-51)^2))))) / ((6.67*10^-11))]]))))))))^1/233

Input interpretation:

$$-\frac{3}{10^2}+1.0061571663^8\sqrt[233]{\frac{1}{\sqrt{-\frac{7.210360\times 10^{46}\times 4\,\pi\,(2.527217\times 10^{-51})^3-(2.527217\times 10^{-51})^2}{6.67\times 10^{-11}}}}}$$

Result:

1.61682759...

1.61682759... result very near to the value of Planck lenght

Now, we have that:

In Fig. 1 we show the allowed region where the DM relic density is $0.10 < \Omega_\chi h^2 < 0.12$ in the plane spanned by the DM mass M_χ and the gauge coupling g_B. For a range of $0.1 < g_B < 0.5$, the DM mass in the range 750 GeV $< M_\chi <$ 990 GeV allows for a DM relic density around the current value. Notice that a gauge coupling g_B in the interval [0.1, 0.5] and $M_{Z_B} = 2$ TeV is consistent with recent collider studies [8]. One could use

DM mass range 750 < M_X < 990 GeV

From a DM mass of 750 GeV, we obtain:

Input interpretation:

convert 750 GeV/c^2 to kilograms

Result:

1.337×10^{-24} kg (kilograms)

$1.337 * 10^{-24}$ Kg

We have: Temperature = 9.178782e+46: Radius = 1.985246e-51; thence the charge is:

sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\sqrt{-\frac{9.178782\times10^{46}\,(4\,\pi\times1.985246\times10^{-51})^3-(1.985246\times10^{-51})^2}{6.67\times10^{-11}}}$$

Result:

$1.94222...\times10^{-46}$

From the ratio mass/charge, we obtain:

(1.337*10^-24) / sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{1.337\times10^{-24}}{\sqrt{-\frac{9.178782\times10^{46}\,(4\,\pi\times1.985246\times10^{-51})^3-(1.985246\times10^{-51})^2}{6.67\times10^{-11}}}}$$

Result:

$6.88389...\times10^{21}$

6.88389...*10^{21}

And:

(((0.0864055/((((sqrt(5)+1))/2)))^2))) (1.337*10^-24) / sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\left(\frac{0.0864055}{\frac{1}{2}\left(\sqrt{5}+1\right)}\right)^2\times\frac{1.337\times10^{-24}}{\sqrt{-\frac{9.178782\times10^{46}\,(4\,\pi\times1.985246\times10^{-51})^3-(1.985246\times10^{-51})^2}{6.67\times10^{-11}}}}$$

Result:

$1.96309...\times10^{19}$

1.96309...*10^{19} GeV practically near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia)

From the result of ratio mass/charge and 0.0864055 that is a Ramanujan mock theta function,

(((0.0864055/((((sqrt(5)+1))/2)))^2))) (1.337*10^-24) / sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]

we obtain from the following formula the golden ratio:

sqrt(((((((1/ ((((((((1.9630945052676525822 *10^19)/(0.0864055^2))) * 1/(1.337*10^-24)* sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.9630945052676525822\times10^{19}}{0.0864055^2}\times\frac{1}{1.337\times10^{-24}}\sqrt{-\frac{9.178782\times10^{46}\,(4\pi\times1.985246\times10^{-51})^3-(1.985246\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.6180339887498948482426264726183230177811548424834207905 52...

1.61803398... = the value of golden ratio!

Or:

1.1180931*sqrt(((((((1/ ((((((((1.9630945052 *10^19)/(0.0864055^2))) * 1/(1.337*10^-24)* sqrt[[-(((((9.178782*10^46 * 4*Pi*(1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1/\left(\frac{1.9630945052\times10^{19}}{0.0864055^2}\times\frac{1}{1.337\times10^{-24}}\sqrt{-\frac{9.178782\times10^{46}\times4\pi\,(1.985246\times10^{-51})^3-(1.985246\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618034033406518880650468120614589196235836915991833592193...

If we take the value of the **Ramanujan mock theta function: $\chi(q)$ = 1.962364415...**, we obtain:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.337*10^-24)* sqrt[[-(((((9.178782*10^46 * (4*Pi*1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{1.337\times 10^{-24}}\sqrt{-\frac{9.178782\times 10^{46}\,(4\,\pi\times 1.985246\times 10^{-51})^3-(1.985246\times 10^{-51})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618334952476041131836861209263473454725132339669316608739...

1.618334952476.... result very near to the value of the golden ratio.

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.337*10^-24)* sqrt[[-(((((9.178782*10^46 * 4*Pi*(1.985246*10^-51)^3-(1.985246*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{1.337\times 10^{-24}}\sqrt{-\frac{9.178782\times 10^{46}\times 4\,\pi\,(1.985246\times 10^{-51})^3-(1.985246\times 10^{-51})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618334997113085852673582849059481520262492268716384583145...

Now, we take the following previous formula:

1/2 * 2498.279529 * ((((((1.116 * 10^46 * 1/ sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]))))))^1/3

where 2498.279529 is a Ramanujan mock theta function

Input interpretation:

$$\frac{1}{2}\times 2498.279529\sqrt[3]{1.116\times 10^{46}\times\frac{1}{\sqrt{-\frac{6169.641\,(4\,\pi\times 2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}}$$

Result:

$1.95986...\times 10^{19}$

1.95986...* 10^{19} practically near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia)

From the following mock:

f(q) = 1.1424432422... **$\chi(q)$ = 2.6709253774829…** **F(q) = 1.897512108...**

$\phi(q)$ = 0.50970737445... **$\psi(q)$ = 1.8236681145196...**

We have that:
sqr(2,670925)+1,823668 +1,8975121+0,509707 = 11,364727455625

thence:

11.3647274*sqrt((((((1/ (((((((1.95986*10^19) / (1/2 * 2498.279529) * 1/((((((1.116 * 10^46 * sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]))))))^1/3))))))

Input interpretation:

$$11.3647274\sqrt{\frac{1}{\frac{1.95986\times 10^{19}}{\frac{1}{2}\times 2498.279529}\times\frac{1}{\sqrt[3]{1.116\times 10^{46}\sqrt{-\frac{6169.641\left(4\pi\times 2.953518\times 10^{-8}\right)^3-\left(2.953518\times 10^{-8}\right)^2}{6.67\times 10^{-11}}}}}}}$$

Result:

1.618700643243536104321400887275112652685710464506607276740...

1.61870064... result very near to the value of golden ratio.

Or:

0.96347*11.3647*sqrt((((((1/ (((((((1.95986*10^19) / (1/2 * 2498.28) * 1/((((((1.116 * 10^46 * sqrt[[-(((((6169.64 * 4*Pi*(2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]))))))^1/3))))))

Input interpretation:

$$0.96347 \times 11.3647 \sqrt{\frac{1}{\frac{1.95986\times 10^{19}}{\frac{1}{2}\times 2498.28} \times \frac{1}{\sqrt[3]{1.116\times 10^{46} \sqrt{-\frac{6169.64\times 4\pi(2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}}}}$$

Result:

1.61869...

1.61869...

$0.96347 \approx -1 + \frac{5\pi}{8}$

Indeed:

Input interpretation:

$$\left(-1+\frac{5\pi}{8}\right) \times 11.3647 \sqrt{\frac{1}{\frac{1.95986\times 10^{19}}{\frac{1}{2}\times 2498.28} \times \frac{1}{\sqrt[3]{1.116\times 10^{46} \sqrt{-\frac{6169.64\times 4\pi(2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}}}}$$

Result:

1.61873...

1.61873...

With the value of Ramanujan mock theta function 1.962364, we obtain:

11.36472*sqrt(((((((1/ (((((((1.962364 *10^19) / (1/2 * 2498.279529) * 1/((((((1.116 * 10^46 * sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]))))))^1/3))))))

Input interpretation:

$$11.36472 \sqrt{\frac{1}{\frac{1.962364\times 10^{19}}{\frac{1}{2}\times 2498.279529} \times \frac{1}{\sqrt[3]{1.116\times 10^{46} \sqrt{-\frac{6169.641\,(4\pi\times 2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}}}}$$

Result:

1.617666519544308670747928033415256530508614065305332136987...

1.617666...

Or:

0.96347*11.3647*sqrt(((((((1/ ((((((1.962364*10^19) / (1/2 * 2498.28) * 1/((((((1.116 * 10^46 * sqrt[[-(((((6169.64 * 4*Pi*(2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]))))))^1/3))))))

Input interpretation:

$$0.96347\times 11.3647\sqrt{\frac{1}{\frac{1.962364\times 10^{19}}{\frac{1}{2}\times 2498.28}\times\frac{1}{\sqrt[3]{1.116\times 10^{46}\sqrt{-\frac{6169.64\times 4\pi\left(2.953518\times 10^{-8}\right)^3-\left(2.953518\times 10^{-8}\right)^2}{6.67\times 10^{-11}}}}}}}$$

Result:

1.61765...

1.61765...

From the previous formula:

From M * 1/Q, i.e the ratio between mass and charge, we obtain:

1.116 * 10^48 * 1 / sqrt[[-(((((61.69641 * (4*Pi*0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$1.116\times 10^{48}\times\frac{1}{\sqrt{-\frac{61.69641\left(4\pi\times 2.953518\times 10^{-6}\right)^3-2.953518\times {10^{-6}}^2}{6.67\times 10^{-11}}}}$$

Result:

$3.86226...\times 10^{48}$

$3.86226 * 10^{48}$

We obtain:

1.0061571663^(5/21)*((((1.116 * 10^48 * 1 / sqrt[[-(((((61.69641 * (4*Pi*0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]])))))^1/233

Where 1.0061571663 is a Ramanujan mock theta function

Input interpretation:

$$1.0061571663^{5/21} \sqrt[233]{1.116\times 10^{48}\times \frac{1}{\sqrt{-\frac{61.69641\,(4\,\pi\times 2.953518\times 10^{-6})^3-2.953518\times 10^{-6\,2}}{6.67\times 10^{-11}}}}}$$

Result:

1.618683485302598968686072459372996850791787394411006833147...

1.6186834... result very near to the value of golden ratio

Or:

1.0061571663^(5/21)*((((1.116 * 10^48 * 1 / sqrt[[-(((((61.69641 * 4*Pi*(0.000002953518)^3-(0.000002953518)^2))))) / ((6.67*10^-11))]])))))^1/233

Input interpretation:

$$1.0061571663^{5/21} \sqrt[233]{1.116\times 10^{48}\times \frac{1}{\sqrt{-\frac{61.69641\times 4\,\pi\times 2.953518\times 10^{-6\,3}-2.953518\times 10^{-6\,2}}{6.67\times 10^{-11}}}}}$$

Result:

1.6171333...

1.6171333…

From this other formula:

From the mass 1.9891 * 10^{19} Kg (see 1.116 * 10^{46} GeV) , we obtain temperature and radius, thence the charge Q. The inverse is:

1 / sqrt[[-(((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{1}{\sqrt{-\frac{6169.641\,(4\,\pi\times 2.953518\times 10^{-8})^3-(2.953518\times 10^{-8})^2}{6.67\times 10^{-11}}}}$$

Result:

346.080...

1/Q = 346.080

We obtain:

1.0061571663^(5/21)*(((((((1.116 * 10^46* 1 / sqrt[[-((((((6169.641 * (4*Pi*2.953518*10^-8)^3-(2.953518*10^-8)^2))))) / ((6.67*10^-11))]])))))^1/233

Input interpretation:

$$1.0061571663^{5/21} \sqrt[233]{1.116\times10^{46}\times\frac{1}{\sqrt{-\frac{6169.641(4\pi\times2.953518\times10^{-8})^3-(2.953518\times10^{-8})^2}{6.67\times10^{-11}}}}}$$

Result:

1.6186834853025989686860724593729968507917873944110068331 47...

1.6186834853.... result very near to the value of golden ratio and identical to the previous

We now take the value 783 GeV

Input:

$9^3 - 1^3 + 55 = 728 + 55 = 783$

Result:

True

783 GeV = Kg

Input interpretation:

convert 783 GeV/c^2 to kilograms

Result:

1.396×10^{-24} kg (kilograms)

For the previous formula, considering T = 8.790854e+46 and R = 2.072853e-51, from the ratio mass/charge, we obtain:

(1.396*10^-24) / sqrt[[-((((((8.790854*10^46 * (4*Pi*2.072853*10^-51)^3-(2.072853*10^-51)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$\frac{1.396\times 10^{-24}}{\sqrt{-\frac{8.790854\times 10^{46}\,(4\,\pi\times 2.072853\times 10^{-51})^3-(2.072853\times 10^{-51})^2}{6.67\times 10^{-11}}}}$$

Result:

$6.88388...\times 10^{21}$

We obtain, from the following inverse formula, considering 1.962364415 * 10^19 as the solution of it:

sqrt(((((((1/ ((((((((**1.962364415** *10^19)/(0.0864055^2))) * 1/(1.396*10^-24)* sqrt[[-(((((8.790854*10^46 * (4*Pi*2.072853*10^-51)^3-(2.072853*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{1.396\times 10^{-24}}\sqrt{-\frac{8.790854\times 10^{46}\,(4\,\pi\times 2.072853\times 10^{-51})^3-(2.072853\times 10^{-51})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618334745914495247114126861947411846127722988257285618515...

1.6183347459... result very near to the value of golden ratio

Or:

1.1180931*sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.396*10^-24)* sqrt[[-(((((8.790854*10^46 * 4*Pi*(2.072853*10^-51)^3-(2.072853*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1\Big/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.396\times10^{-24}}\sqrt{-\frac{8.790854\times10^{46}\times4\pi(2.072853\times10^{-51})^3-(2.072853\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.61833...

Now:

From:

Mass and Life Time of Heavy Dark Matter Decaying into IceCube PeV Neutrinos

Madhurima Pandeya, Debasish Majumdara, Astroparticle Physics and Cosmology Division, Saha Institute of Nuclear Physics, HBNI 1/AF Bidhannagar, Kolkata 700064, India Ashadul Halderb 3, Shibaji Banerjeeb 4 Department of Physics, St. Xavier's College, 30, Mother Teresa Sarani, Kolkata - 700016, India

https://arxiv.org/abs/1905.08662v1

Considering that the ultrahigh energy (UHE) upgoing muon neutrino events around the PeV energy region observed by the IceCube are due to the decay of super heavy dark matter to neutrinos, we constrain the mass of the decaying dark matter and its decay lifetime using the IceCube analysis of these neutrinos in the PeV region. The theoretical fluxes are computed by adpoting the procedure given in the reference [1, 2], where the DGLAP numerical evolutions of QCD cascades as well as electroweak corrections are included for evolving the decay process of the super heavy dark matter. Our results indicate that to explain the IceCube events around PeV region the decaying dark matter mass m_χ would be $\sim 5\times10^7$ GeV with the decay lifetime $\tau\sim 7\times10^{28}$ sec.

5*10^7 GeV = Kg

Input interpretation:

convert 5×10^7 GeV/c^2 to kilograms

Result:

8.913×10^{-20} kg (kilograms)

Mass = 8.913000e-20

Radius = 1.323448e-46

Temperature = 1.376869e+42

From the ratio between mass/charge, we obtain

(((((8.913000*10^-20 * 1 / sqrt[[-(((((1.376869*10^42 * (4*Pi*1.323448*10^-46)^3-(1.323448*10^-46)^2))))) / ((6.67*10^-11))]]

Input interpretation:

$$8.913000\times10^{-20}\times\frac{1}{\sqrt{-\frac{1.376869\times10^{42}\,(4\,\pi\times1.323448\times10^{-46})^3-(1.323448\times10^{-46})^2}{6.67\times10^{-11}}}}$$

Result:

$6.88389... \times 10^{21}$

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.913*10^-20)* sqrt[[-(((((1.376869*10^42 * (4*Pi*1.323448*10^-46)^3-(1.323448*10^-46)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\middle/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.913\times10^{-20}}\sqrt{-\frac{1.376869\times10^{42}\,(4\,\pi\times1.323448\times10^{-46})^3-(1.323448\times10^{-46})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334916397245799091094641352877021854238750865036075418...

1.618334916397... practically a result identical to the previous result and very near to the value of golden ratio.

Or:

1.1180931* sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.913*10^-20)* sqrt[[-(((((1.376869*10^42 * 4*Pi*(1.323448*10^-46)^3-(1.323448*10^-46)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931 \sqrt{\left(1 \middle/ \left(\frac{1.962364415\times 10^{19}}{0.0864055^2} \times \frac{1}{8.913\times 10^{-20}} \sqrt{-\frac{1.376869\times 10^{42}\times 4\pi(1.323448\times 10^{-46})^3 - (1.323448\times 10^{-46})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.61833...

1.61833...

1.1180931 ≈ √5 / 2

Indeed:

Input interpretation:

$$\frac{\sqrt{5}}{2} \sqrt{\left(1 \middle/ \left(\frac{1.962364415\times 10^{19}}{0.0864055^2} \times \frac{1}{8.913\times 10^{-20}} \sqrt{-\frac{1.376869\times 10^{42}\times 4\pi(1.323448\times 10^{-46})^3 - (1.323448\times 10^{-46})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.61825...

1.61825...

Now, we have:

From:

http://www.physics.ntua.gr/corfu2009/Talks/pokorski@fuw_edu_pl_01.ppt

REHEATING TEMPERATURE IN GAUGE MEDIATION MODELS AND COMPRESSED
PARTICLE SPECTRUM

Olechowski, SP, Turzynski, Wells

ABOUT RECONCILING SUPERSYMMETRIC DARK MATTER WITH THE THERMAL HISTORY OF THE UNIVERSE)

STABLE GRAVITINO AS DARK MATTER AND MAXIMAL REHEATING TEMPERATURE (for stau/sneutrino NLSP)

GRAVITINO MASS AROUND 1-10 GeV

5 GeV = Kg

Input interpretation:

convert 5 GeV/c² to kilograms

Result:

8.913×10^{-27} kg (kilograms)

8.913000e-27

Temperature = 1.376869e+49; Radius = 1.323448e-53

For the above formula, we obtain:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.913*10^-27)* sqrt[[-(((((1.376869*10^49 * (4*Pi*1.323448*10^-53)^3-(1.323448*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.913\times10^{-27}}\sqrt{-\frac{1.376869\times10^{49}\,(4\,\pi\times1.323448\times10^{-53})^3-(1.323448\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334916397245799091094641352877021854238750865036075418...

1.618334916...

Or:

Input interpretation:

$$1.1180931\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.913\times10^{-27}}\sqrt{-\frac{1.376869\times10^{49}\times4\,\pi\,(1.323448\times10^{-53})^3-(1.323448\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

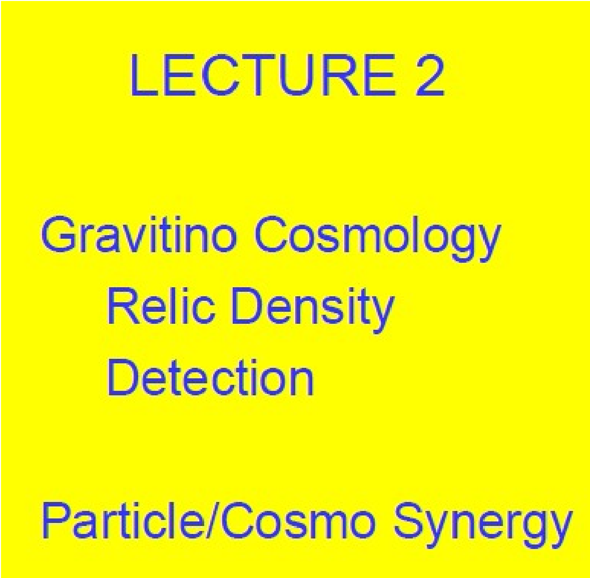
Result:

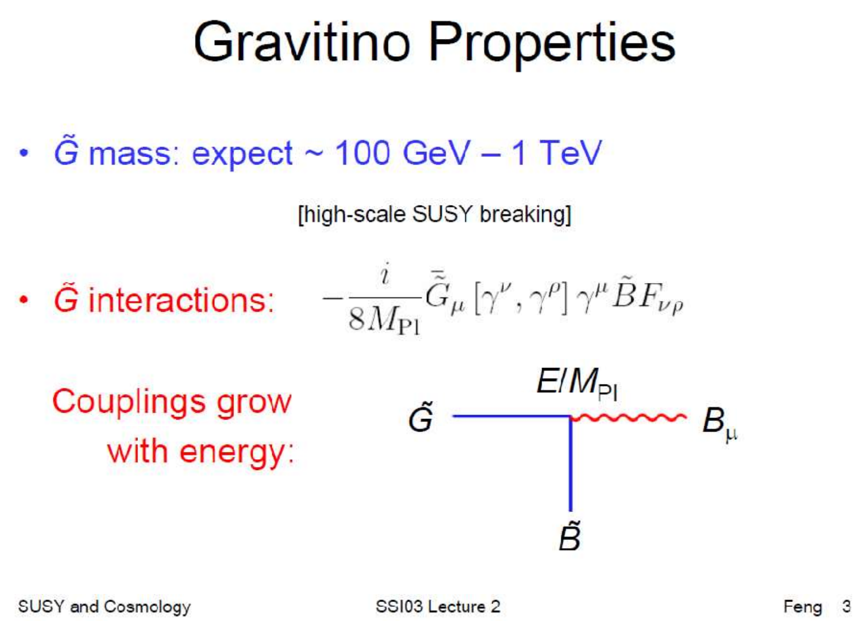
1.61833...

1.61833…

From:

https://www.slac.stanford.edu/econf/C0307282/lec_notes/feng/feng2.pdf





For 377 GeV = kg, where 377 is in the range and is a Fibonacci's number

Input interpretation:

convert 377 GeV/c^2 to kilograms

Result:

6.721×10^{-25} kg (kilograms)

Radius = 9.979687e-52

Temperature = 1.825924e+47

For the above formula, we obtain:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.721*10^-25)* sqrt[[-(((((1.825924*10^47 * (4*Pi*9.979687*10^-52)^3-(9.979687*10^-52)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1\left/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{6.721\times 10^{-25}}\sqrt{-\frac{1.825924\times 10^{47}\,(4\,\pi\times 9.979687\times 10^{-52})^3-(9.979687\times 10^{-52})^2}{6.67\times 10^{-11}}}\right)\right.\right)}$$

Result:

1.618334883949452366144420872424743478574231269605882602682...

1.61833488...

From: https://xenqabbalah.fandom.com/wiki/E8_lie_group

There is a unique complex Lie algebra of type E8, corresponding to a complex group of complex dimension 248. The complex Lie group E_8 of complex dimension 248 can be considered as a simple real Lie group of real dimension 496. This is simply connected, has maximal compact subgroup the compact form (see below) of E_8, and has an outer automorphism group of order 2 generated by complex conjugation.

For 496 GeV we obtain:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.842*10^-25)* sqrt[[-(((((1.387925*10^47 * (4*Pi*1.312906*10^-51)^3-(1.312906*10^-51)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1\left/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{8.842\times 10^{-25}}\sqrt{-\frac{1.387925\times 10^{47}\,(4\,\pi\times 1.312906\times 10^{-51})^3-(1.312906\times 10^{-51})^2}{6.67\times 10^{-11}}}\right)\right.\right)}$$

Result:

1.618334709806929520154574661182262249605179646637855893533...

1.618334709...

From:

Cosmological Constraint on the Light Gravitino Mass from CMB Lensing and Cosmic Shear
Ken Osato, Toyokazu Sekiguchi, Masato Shirasaki, Ayuki Kamada, and Naoki Yoshidaa;

arXiv:1601.07386v2 [astro-ph.CO] 19 May 2016

We have used two cosmological observations: the CMB lensing power spectrum from Planck, and the two-point correlation function of cosmic shear from the CFHTLenS. The combination enables us to measure the amplitude of the matter power spectrum at a broad range of scales, which is essential to probe the light gravitino mass. Combining the two data with primary CMB power spectra and galaxy clustering, we have obtained a stringent upper bound on the light gravitino mass $m_{3/2} < 4.7$ eV (95% C.L.). Our constraint is considerably tighter than the previous constraint from Ly-α forest [6].

Now, we take:

4.58732381157 eV = g

Input interpretation:
convert 4.58732381157 eV/c^2 to grams

Result:
$8.1776459805 \times 10^{-33}$ grams

Additional conversion:
$8.1776459805 \times 10^{-36}$ kg (kilograms)

Mass = 8.177646e-36

Temperature = 1.500680e+58

Radius = 1.214259e-62

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.177646*10^-36)* sqrt[[-(((((1.500680*10^58 * (4*Pi*1.214259*10^-62)^3-(1.214259*10^-62)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.177646\times10^{-36}}\sqrt{-\frac{1.500680\times10^{58}\left(4\pi\times1.214259\times10^{-62}\right)^3-\left(1.214259\times10^{-62}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334783640665040725863768439076613343928803385853181640...

1.61833478…

From:

26. Dark Matter

Revised September 2017 by M. Drees (Bonn University) and G. Gerbier (Queen's University, Canada).

Table 26.1: Summary of performances of the best direct detection experiments, for spin independent and spin dependent couplings. For the "low mass" section, in most cases, there is no minimum in the exclusion curve and a best "typical" WIMP mass cross section point has been chosen.

	Target	Fiducial Mass [kg]	Cross section [pb]	WIMP mass [GeV]	Ref.
Spin independent high mass (>10 GeV)					
Xenon1t	Xe	1042	7.7×10^{-11}	35	[49]
PANDAX II	Xe	364	8.6×10^{-11}	40	[53]
LUX	Xe	118	1.1×10^{-10}	50	[50]
SuperCDMS	Ge	12	1.0×10^{-8}	46	[57]
DEAP	Ar	2000	1.2×10^{-8}	100	[55]
Spin independent low mass (<10 GeV)					
LUX	Xe	118	2×10^{-9}	10	[50]
Xenon1t	Xe	1042	2×10^{-9}	10	[49]
PANDAX II	Xe	364	2×10^{-9}	10	[53]
PICO60	C_3F_8 - F	46	2×10^{-7}	10	[67]
SuperCDMS	Ge HV	0.6	3×10^{-5}	3	[58]
CRESST	$CaWO_4$ - O	0.25	1×10^{-2}	1	[63]
NEWS-G	Ne	0.3	6×10^{-2}	1	[66]
Spin dependent p					
PICO60	C_3F_8 - F	54	3.4×10^{-5}	30	[67]
Spin dependent n					
LUX	Xe	118	1.6×10^{-5}	35	[51]

35 GeV (from WIMP mass)

convert 35 GeV/c^2 to kilograms

Result:

6.239×10^{-26} kg (kilograms)

Mass = 6.239e-26

Temperature = 1.966987e+48

Radius = 9.263989e-53

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * (4*Pi*9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{6.239\times 10^{-26}}\sqrt{-\frac{1.966987\times 10^{48}\,(4\,\pi\times 9.263989\times 10^{-53})^3-(9.263989\times 10^{-53})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618334795330145367074400704476840037090146200762483666013...

1.6183347953...

And for this other Ramanujan mock theta function: **1.897512108**, we obtain:

sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * (4*Pi*9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.897512108\times 10^{19}}{0.0864055^2}\times\frac{1}{6.239\times 10^{-26}}\sqrt{-\frac{1.966987\times 10^{48}\,(4\,\pi\times 9.263989\times 10^{-53})^3-(9.263989\times 10^{-53})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.645757806885211498847249136347373995730567094544126058366...

1.6457578.....

For 46 GeV

convert 46 GeV/c^2 to kilograms

Result:

8.2×10^{-26} kg (kilograms)

Mass = 8.2e-26

Temperature = 1.496589e+48

Radius = 1.217578e-52

sqrt((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * (4*Pi*1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\frac{1}{\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.2\times10^{-26}}\sqrt{-\frac{1.496589\times10^{48}\left(4\pi\times1.217578\times10^{-52}\right)^3-\left(1.217578\times10^{-52}\right)^2}{6.67\times10^{-11}}}}}$$

Result:

1.618334896580888381739963009851067915643877314020282562828...

1.6183348965...

And with the mock theta function **1.897512108**, we obtain:

sqrt((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * (4*Pi*1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\frac{1}{\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{8.2\times10^{-26}}\sqrt{-\frac{1.496589\times10^{48}\left(4\pi\times1.217578\times10^{-52}\right)^3-\left(1.217578\times10^{-52}\right)^2}{6.67\times10^{-11}}}}}$$

Result:

1.645757909851668903181958970448177035083015596693641054492...

1.6457579... ≈ ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ...

From:

Dark Matter Candidates from Particle Physics and Methods of Detection
Jonathan L. Feng
Department of Physics and Astronomy, University of California, Irvine, CA 92697, USA - arXiv:1003.0904v2 [astro-ph.CO] 9 Apr 2010

Finally, note that m_{h0} is only one of two dimensionful parameters in the SM: there is also the term $\bar{\Lambda}^4$, which contributes to dark energy or the cosmological constant. Equation (3) implies that the total energy density in dark energy is $\Lambda \simeq (2.76\ \text{meV})^4$. If the natural value of $\bar{\Lambda}$ is M_{Pl}^4, it must cancel other contributions to 1 part in 10^{122}, a fine-tuning that dwarfs even the gauge hierarchy problem. This is the *cosmological constant problem*. Although one might hope for a unified solution to the cosmological constant and dark matter problems, at present there is little indication that they are related, and we will assume they are decoupled in this review.

For $\Lambda \approx (2.76\ \text{meV})^4$

Mass = 1.034e-37

Temperature = 1.186850e+60

Radius = 1.535336e-64

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * (4*Pi*1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}\,(4\pi\times1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334942453801838862847710693996459243059029065439265599...

1.618334942…

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * 4*Pi*(1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1\Bigg/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}\times4\pi(1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.61834...

1.61834...

And with the mock theta function **1.897512108**, we obtain:

sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * (4*Pi*1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1\Bigg/\left(\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}(4\pi\times1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.645757956501908188946252200275715374699052348882326433433...

$1.6457579... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934$ ...

Now, we take the upper bound of gravitino mass 1 TeV:

1 TeV = Kg

convert 1 TeV/c^2 to kilograms

- Open code

Result:

1.783×10^{-24} kg (kilograms)

Mass = 1.783e-24

Temperature = 6.882800e+46

Radius = 2.647490e-51

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * (4*Pi*2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.783\times10^{-24}}\sqrt{-\frac{6.882800\times10^{46}\,(4\,\pi\times2.647490\times10^{-51})^3-(2.647490\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334884752517596313628172861612404908617514672589422310...

1.61833488….

We have the following beautiful mathematical connection, applicable to all other formulas whose result is very close to the golden ratio:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.783\times10^{-24}}\sqrt{-\frac{6.882800\times10^{46}\,(4\,\pi\times2.647490\times10^{-51})^3-(2.647490\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)}=$$

$$= 1.618334884752517596313628172861612404908617514672589422310\ldots \Rightarrow$$

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

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

$$= 1.6180339887498948482045868343656381177203091798057628621354\ldots$$

= 1.61803398...

Or:

1.1180931*sqrt((((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * 4*Pi*(2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$1.1180931 \sqrt{\left(1 \Big/ \left(\frac{1.962364415 \times 10^{19}}{0.0864055^2} \times \frac{1}{1.783 \times 10^{-24}} \sqrt{-\frac{6.882800 \times 10^{46} \times 4 \pi (2.647490 \times 10^{-51})^3 - (2.647490 \times 10^{-51})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.61833...

1.61833...

And with the mock theta function **1.897512108**, we obtain:

sqrt((((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * (4*Pi*2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1 \Big/ \left(\frac{1.897512108 \times 10^{19}}{0.0864055^2} \times \frac{1}{1.783 \times 10^{-24}} \sqrt{-\frac{6.882800 \times 10^{46} (4 \pi \times 2.647490 \times 10^{-51})^3 - (2.647490 \times 10^{-51})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.645757897822863974176464029532373716700753101087949279752...

$1.6457578... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

Note that:

(1.61833)* 1.369955709 – (0.50970737445/2) = 1.96218673532097 ≈ 1.962186

This result is near to the value of DM particle that has a Planck scale mass: m ≈ 10^{19} GeV (Planck mass = 1,2209 × 10^{19} GeV/c^2 = 21,76 µg Wikipedia). Furthermore, 1.96286095714 is very nearly to the result of the following Ramanujan mock theta function: χ(q) = 1.962364415...

From this result, we can to obtain also:

27 + 10^3 * sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * (4*Pi*2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$27+10^3\sqrt{\left(1\Big/\left(\frac{1.897512108\times 10^{19}}{0.0864055^2}\times\frac{1}{1.783\times 10^{-24}}\sqrt{-\frac{6.882800\times 10^{46}\left(4\pi\times 2.647490\times 10^{-51}\right)^3-\left(2.647490\times 10^{-51}\right)^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1672.76...

1672.76... result practically equal to the rest mass of Omega baryon 1672.45

From the value 1.61833488... , from the following expressions, we can to obtain also:

exp^5(1.6183348847525175963)-144-21-5

Input interpretation:

$\exp^5(1.6183348847525175963)-144-21-5$

Result:

3097.153592342004422...

3097.15359... result very near to the rest mass of J/Psi meson 3096.916

e*exp^4 (1.6183348847525175963)

Input interpretation:

$e\exp^4(1.6183348847525175963)$

Result:

1760.476058093343051...

1760.476058... result in the range of the mass of candidate “glueball” $f_0(1710)$ (“glueball” =1760 ± 15 MeV)

From the previous Table:

Table 26.1: Summary of performances of the best direct detection experiments, for spin independent and spin dependent couplings. For the "low mass" section, in most cases, there is no minimum in the exclusion curve and a best "typical" WIMP mass cross section point has been chosen.

	Target	Fiducial Mass [kg]	Cross section [pb]	WIMP mass [GeV]	Ref.
Spin independent high mass (>10 GeV)					
Xenon1t	Xe	1042	7.7×10^{-11}	35	[49]
PANDAX II	Xe	364	8.6×10^{-11}	40	[53]
LUX	Xe	118	1.1×10^{-10}	50	[50]
SuperCDMS	Ge	12	1.0×10^{-8}	46	[57]
DEAP	Ar	2000	1.2×10^{-8}	100	[55]
Spin independent low mass (<10 GeV)					
LUX	Xe	118	2×10^{-9}	10	[50]
Xenon1t	Xe	1042	2×10^{-9}	10	[49]
PANDAX II	Xe	364	2×10^{-9}	10	[53]
PICO60	C_3F_8 - F	46	2×10^{-7}	10	[67]
SuperCDMS	Ge HV	0.6	3×10^{-5}	3	[58]
CRESST	$CaWO_4$ - O	0.25	1×10^{-2}	1	[63]
NEWS-G	Ne	0.3	6×10^{-2}	1	[66]
Spin dependent p					
PICO60	C_3F_8 - F	54	3.4×10^{-5}	30	[67]
Spin dependent n					
LUX	Xe	118	1.6×10^{-5}	35	[51]

For 35 GeV (WIMP mass)

convert 35 GeV/c^2 to kilograms

Result:

6.239×10^{-26} kg (kilograms)

Mass = 6.239e-26

Temperature = 1.966987e+48

Radius = 9.263989e-53

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * (4*Pi*9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{6.239\times10^{-26}}\sqrt{-\frac{1.966987\times10^{48}\left(4\pi\times9.263989\times10^{-53}\right)^3-\left(9.263989\times10^{-53}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.6183347953301453670744007044768400370901462007624836660013...

1.6183347953...

Or:

1.1180931 sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * 4*Pi*(9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{6.239\times10^{-26}}\sqrt{-\frac{1.966987\times10^{48}\times4\pi\left(9.263989\times10^{-53}\right)^3-\left(9.263989\times10^{-53}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.6183347688148109011040876962089292697409565435357930988811...

1.618334768....

And for this other Ramanujan mock theta function: **1.897512108**, we obtain:

sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * (4*Pi*9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{6.239\times10^{-26}}\sqrt{-\frac{1.966987\times10^{48}\,(4\,\pi\times9.263989\times10^{-53})^3-(9.263989\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.645757806885211498847249136347373995730567094544126058366...

1.6457578..... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934\ldots$

Or:

1.1180931*sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * 4*Pi*(9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1\Big/\left(\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{6.239\times10^{-26}}\sqrt{-\frac{1.966987\times10^{48}\times4\,\pi\,(9.263989\times10^{-53})^3-(9.263989\times10^{-53})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.64576...

1.64576...

For 46 GeV, we obtain:

convert 46 GeV/c^2 to kilograms

Result:

8.2×10^{-26} kg (kilograms)

Mass = 8.2e-26

Temperature = 1.496589e+48

Radius = 1.217578e-52

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * (4*Pi*1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\frac{1}{\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.2\times10^{-26}}\sqrt{-\frac{1.496589\times10^{48}\left(4\pi\times1.217578\times10^{-52}\right)^3-\left(1.217578\times10^{-52}\right)^2}{6.67\times10^{-11}}}}}$$

Result:

1.618334896580888381739963009851067915643877314020282562828...

1.6183348965...

Or:

1.1180931 sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * 4*Pi*(1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1\bigg/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{8.2\times10^{-26}}\sqrt{-\frac{1.496589\times10^{48}\times4\pi\left(1.217578\times10^{-52}\right)^3-\left(1.217578\times10^{-52}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334964213461844499764846499887659522595617439644153651...

1.61833496....

And with the mock theta function **1.897512108**, we obtain:

sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * (4*Pi*1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\frac{1}{\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{8.2\times10^{-26}}\sqrt{-\frac{1.496589\times10^{48}\left(4\pi\times1.217578\times10^{-52}\right)^3-\left(1.217578\times10^{-52}\right)^2}{6.67\times10^{-11}}}}}$$

Result:

1.645757909851668903181958970448177035083015596693641054492...

$1.6457579... \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934...$

From:

Dark Matter Candidates from Particle Physics and Methods of Detection

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Finally, note that m_{h0} is only one of two dimensionful parameters in the SM: there is also the term $\bar{\Lambda}^4$, which contributes to dark energy or the cosmological constant. Equation (3) implies that the total energy density in dark energy is $\Lambda \simeq (2.76 \text{ meV})^4$. If the natural value of $\bar{\Lambda}$ is M_{Pl}^4, it must cancel other contributions to 1 part in 10^{122}, a fine-tuning that dwarfs even the gauge hierarchy problem. This is the *cosmological constant problem*. Although one might hope for a unified solution to the cosmological constant and dark matter problems, at present there is little indication that they are related, and we will assume they are decoupled in this review.

For $\Lambda \approx (2.76 \text{ meV})^4$

Mass = 1.034e-37

Temperature = 1.186850e+60

Radius = 1.535336e-64

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * (4*Pi*1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\Big/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}\,(4\pi\times1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334942453801838862847710693996459243059029065439265599...

1.618334942…

Or:

1.1180931 sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * 4*Pi*(1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931 \sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}\times4\pi(1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618335048894477231811797426650562682632016383892188795531...

1.61833504....

And with the mock theta function **1.897512108**, we obtain:

sqrt(((((((1/ ((((((((1.897512108 *10^19)/(0.0864055^2))) * 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * (4*Pi*1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.897512108\times10^{19}}{0.0864055^2}\times\frac{1}{1.034\times10^{-37}}\sqrt{-\frac{1.186850\times10^{60}(4\pi\times1.535336\times10^{-64})^3-(1.535336\times10^{-64})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.645757956501908188946252200275715374699052348882326433433...

1.6457579... ≈ ζ(2) = $\frac{\pi^2}{6} = 1.644934$ ...

It's very interesting to observe that also for the value of total energy density in dark energy, that is $\Lambda \approx (2.76 \text{ meV})^4$, we obtain solutions almost same to the values of golden ratio 1.61803398... and $\zeta(2) = 1.64493$

From the mass of SMBH87, we obtain the radius and the temperature.

Mass = 1.312806e+40

Radius = 1.949322e+13

Temperature = 9.347940e-18

Applying the modified inverse formula of the ratio mass/charge of a black hole, we obtain:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.312806*10^40)* sqrt[[-(((((9.347940*10^-18 * (4*Pi*1.949322*10^13)^3-(1.949322*10^13)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{1.312806\times10^{40}}\sqrt{-\frac{9.347940\times10^{-18}\left(4\pi\times1.949322\times10^{13}\right)^3-\left(1.949322\times10^{13}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334810460146755973570892432464983851493564780925293469...

1.6183348….

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.312806*10^40)* sqrt[[-(((((9.347940*10^-18 * 4*Pi*(1.949322*10^13)^3-(1.949322*10^13)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$1.1180931 \sqrt{\left(1 \Big/ \left(\frac{1.962364415 \times 10^{19}}{0.0864055^2} \times \frac{1}{1.312806 \times 10^{40}} \sqrt{-\frac{9.347940 \times 10^{-18} \times 4\pi (1.949322 \times 10^{13})^3 - (1.949322 \times 10^{13})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618334794396567289468197219223196546862502506658642037431...

1.61833479...

From:

THE NEUTRALINO MASS: CORRELATION WITH THE CHARGINOS

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arXiv:hep-ph/0601099v1 12 Jan 2006

In our analysis, we fix the heavy chargino mass as $M_{\chi_2^+} = 320$ GeV, and choose two different values for the light chargino mass ($M_{\chi_1^+}$), as $\tan\beta$ varies from 5 to 50.

A comparative analysis of Figure 7 and Figure 8 suggest that the mass of the heaviest neutralino remains around 325 GeV for the lighter chargino ($M_{\chi_1^+} =$ 105 GeV), and does not exceed 330 GeV, for the heavier chargino ($M_{\chi_1^+} = 160$ GeV).

We remember that (from Wikipedia):

In particle physics, the **chargino** is a hypothetical particle which refers to the mass eigenstates of a charged superpartner, i.e. any new electrically charged fermion (with spin 1/2) predicted by supersymmetry.[1] They are linear combinations of the charged wino and charged higgsinos. There are two charginos that are fermions and are electrically charged, which are typically labeled $C\tilde{\chi}_1^{\pm}$ (the lightest) and $C\tilde{\chi}_2^{\pm}$ (the heaviest) although sometimes $\tilde{\chi}_1^{\pm}$ and $\tilde{\chi}_2^{\pm}$ is also used to refer to charginos, when $\tilde{\chi}_i^0$ is used to refer to neutralinos. The heavier chargino can decay through the neutral Z boson to the lighter chargino. Both can decay through a charged W boson to a neutralino:

$$C\tilde{\chi}_2^{\pm} \to C\tilde{\chi}_1^{\pm} + Z^0$$
$$C\tilde{\chi}_2^{\pm} \to \tilde{N}_2^0 + W^{\pm}$$
$$C\tilde{\chi}_1^{\pm} \to \tilde{N}_1^0 + W^{\pm}$$

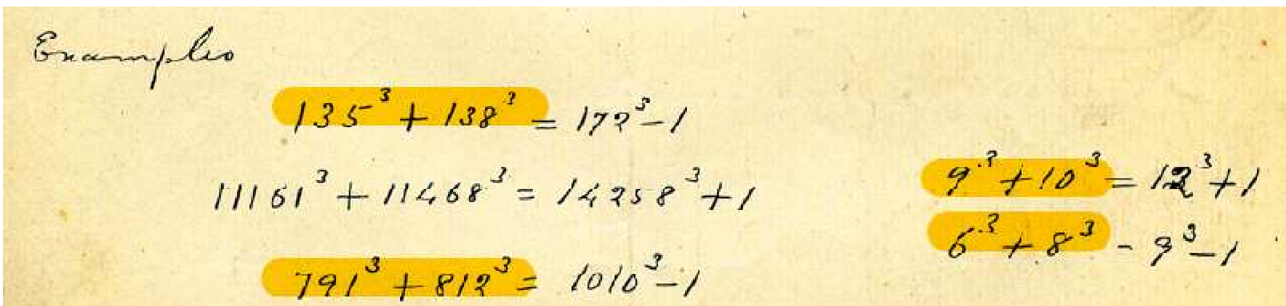
In supersymmetry, the **neutralino**[1] is a hypothetical particle. In the Minimal Supersymmetric Standard Model (MSSM), a popular model of realization of supersymmetry at a low energy, there are four neutralinos that are fermions and are electrically neutral, the lightest of which is stable in an R-parity conserved scenario of MSSM. They are typically labeled $\tilde{N}_1^0$ (the lightest), $\tilde{N}_2^0$, $\tilde{N}_3^0$ and $\tilde{N}_4^0$ (the heaviest) although sometimes $\tilde{\chi}_1^0, \ldots, \tilde{\chi}_4^0$ is also used when $\tilde{\chi}_i^{\pm}$ is used to refer to charginos. These four states are mixtures of the bino and the neutral wino (which are the neutral electroweak gauginos), and the neutral higgsinos. As the neutralinos are Majorana fermions, each of them is identical to its antiparticle. Because these particles only interact with the weak vector bosons, they are not directly produced at hadron colliders in copious numbers. They would primarily appear as particles in cascade decays of heavier particles (decays that happen in multiple steps) usually originating from colored supersymmetric particles such as squarks or gluinos.

We have:

Heavy chargino mass = 320 GeV

Heavy neutralino mass = 325-330 GeV

From the following Ramanujan's sums of two cubes:



We have that:

812 - 791 + 135 + 138 = 294; 294 + 10 + 9 + 6 + 8 = 327

Thence, for the heavy chargino mass = 320 GeV and heavy neutralino mass = 325-330 GeV, we take the value 327 GeV that does not exceed 330

Thence:

327 GeV = Kg

Input interpretation:

convert 327 GeV/c^2 to kilograms

Result:

5.829×10^{-25} kg (kilograms)

$5.829 * 10^{-25}$ Kg

Mass = 5.829000e-25

Radius = 8.655200e-52

Temperature = 2.105341e+47

From the modified inverse formula of the ratio charge/mass of a black hole, we obtain:

sqrt((((((1/ (((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(5.829000*10^-25)* sqrt[[-(((((2.105341*10^47 * (4*Pi*8.655200*10^-52)^3-(8.655200*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1\left/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\times\frac{1}{5.829000\times 10^{-25}}\sqrt{-\frac{2.105341\times 10^{47}\left(4\pi\times 8.655200\times 10^{-52}\right)^3-\left(8.655200\times 10^{-52}\right)^2}{6.67\times 10^{-11}}}\right)\right.\right)}$$

Result:

1.618334800323499092580379583211312332193763108481076768216...

1.6183348....

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(5.829000*10^-25)* sqrt[[-(((((2.105341*10^47 * 4*Pi*(8.655200*10^-52)^3-(8.655200*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931 \sqrt{\left(1 / \left(\frac{1.962364415 \times 10^{19}}{0.0864055^2} \times \frac{1}{5.829000 \times 10^{-25}} \sqrt{-\frac{2.105341 \times 10^{47} \times 4 \pi (8.655200 \times 10^{-52})^3 - (8.655200 \times 10^{-52})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618334755119960385716458725294361818867285073384006656795...

1.61833475...

Now, from:

Baryogenesis and Dark Matter from B Mesons

Gilly Elor, Miguel Escudero and Ann E. Nelson - arXiv:1810.00880v3 [hep-ph] 21 Feb 2019

4. B Meson Decay Operators

Here we categorize the lightest final states for all the quark combinations that allow for B mesons to decay into a visible baryon plus DM, and for Λ_b baryons decaying to mesons and DM. Note that the mass difference between final and initial states for the B-mesons will give an upper bound on the dark Dirac fermion ψ mass. In Table III we list the minimum hadronic mass states for each operator.

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

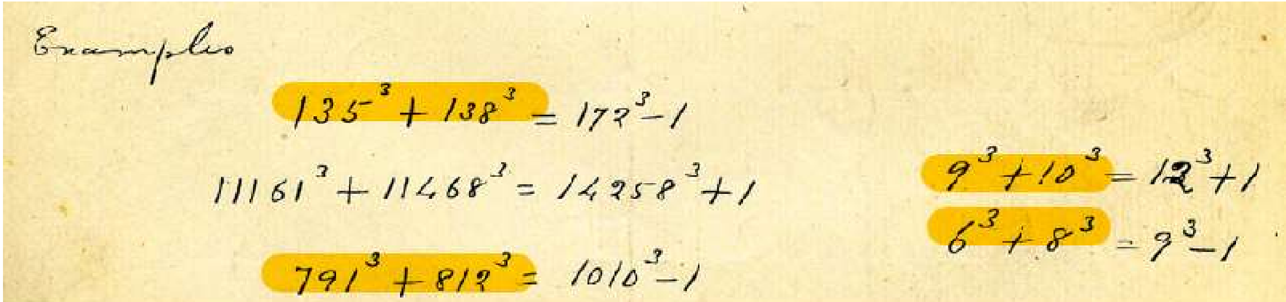
TABLE III. Here we itemize the lightest possible initial and final states for the B decay process to visible and dark sector states resulting from the four possible operators. The diagram in Figure 2 corresponds to the first line. The mass difference between initial and final visible sector states corresponds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

If we take $\Delta M = 3754.7$ MeV, where the initial state = Λ_b and the final state = $\bar{\psi} + \overline{D}^0$, we note that:

$\bar{D}^0$ **= 1864.84±0.17 MeV** and Λ_b = **Λ(1890) Mass** = **1850 to 1910 (≈ 1890)** = Value (**MeV**) Our Estimate (from: http://pdg.lbl.gov/2014/listings/rpp2014-list-lambda-1890.pdf)

And: 1864.84 + 1890 = **3754.84 MeV** ≅ ΔM = 3745.7 MeV

From the Ramanujan's sum of two cubes:



We have that:

(14258 – 11161) + (135 +138 +172) +(1010 – 812) + (6 + 8) = **3754**

Thence, we take as value 3754 MeV.

We have:

3754 MeV = Kg

Input interpretation:

convert 3754 MeV/c^2 to kilograms

Result:

6.692×10^{-27} kg (kilograms)

Mass = 6.692e-27

Radius = 9.936626e-54

Temperature = 1.833836e+49

From the following formula, we obtain:

1.1180931*sqrt(((((((1/ (((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.692*10^-27)* sqrt[[-(((((1.833836*10^49 * 4*Pi*(9.936626*10^-54)^3-(9.936626*10^-54)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{6.692\times10^{-27}}\sqrt{-\frac{1.833836\times10^{49}\times4\pi(9.936626\times10^{-54})^3-(9.936626\times10^{-54})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334830950116049589965309654098843783550056852839871088...

1.61833483...

Or, equivalently:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(6.692*10^-27)* sqrt[[-(((((1.833836*10^49 * (4*Pi*9.936626*10^-54)^3-(9.936626*10^-54)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{6.692\times10^{-27}}\sqrt{-\frac{1.833836\times10^{49}(4\pi\times9.936626\times10^{-54})^3-(9.936626\times10^{-54})^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618334814206079936531206122910767005053161241215436878215...

1.61833481...

Now, we take ΔM = 5121.9 MeV. We have that:

Λ(2020) MASS VALUE (MeV) ≈ 2020 OUR ESTIMATE

2043±22 ZHANG 13A DPWA Multichannel 2140 BACCARI 77 DPWA K− p → Λω 2117 DECLAIS 77 DPWA K N → K N 2100±30 LITCHFIELD 71 DPWA K− p → K N 2020±20 BARBARO-... 70 DPWA K− p → Σ π

K(3100) MASS VALUE (MeV) ≈ 3100 OUR ESTIMATE

3-BODY DECAYS VALUE (MeV) 3054±11 OUR AVERAGE 3060± 7±20 1 ALEEV 93 BIS2 K(3100) → Λp π+ 3056± 7±20 1 ALEEV 93 BIS2 K(3100) → Λp π− 3055± 8±20 1 ALEEV 93 BIS2 K(3100) → Λp π− 3045± 8±20 1 ALEEV 93 BIS2 K(3100) → Λp π+

The sum and the average of the two various values is: 5138 and the mean with 5120 is 5129.

With the Ramanujan's sum of two cubes, we have:

(14258 – 11468) + (1010 + 791 + 812) – (172 + 138) + (10 + 9) + (6 + 8) = 5126

Thence, we take as value 5126 MeV

5126 MeV = Kg

Input interpretation:

convert 5126 MeV/c^2 to kilograms

Result:

9.138×10^{-27} kg (kilograms)

Mass = 9.138e-27

Radius = 1.356857e-53

Temperature = 1.342967e+49

From the following formula, we obtain

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(9.138*10^-27)* sqrt[[-(((((1.342967*10^49 * 4*Pi*(1.356857*10^-53)^3-(1.356857*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$1.1180931 \sqrt{\left(1 \Bigg/ \left(\frac{1.962364415 \times 10^{19}}{0.0864055^2} \times \frac{1}{9.138 \times 10^{-27}} \sqrt{-\frac{1.342967 \times 10^{49} \times 4\pi (1.356857 \times 10^{-53})^3 - (1.356857 \times 10^{-53})^2}{6.67 \times 10^{-11}}}\right)\right)}$$

Result:

1.618334990855605556110961017957973428338717297952202771234...

1.6183349...

Or, equivalently:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(9.138*10^-27)* sqrt[[-(((((1.342967*10^49 * (4*Pi*1.356857*10^-53)^3-(1.356857*10^-53)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\times\frac{1}{9.138\times10^{-27}}\sqrt{-\frac{1.342967\times10^{49}\left(4\pi\times1.356857\times10^{-53}\right)^3-\left(1.356857\times10^{-53}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.6183349649663961905858585731236046289695041213631210770 87...

1.6183349...

Now, we have also the following value resulting from the Ramanujan's mock theta functions: **1,963264846419852467162**

We observe that:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * ((Pi/(2*1.9632648))*1/(9.138*10^-27))* sqrt[[-(((((1.342967*10^49 *4Pi(1.356857*10^-53)^3-(1.356857*10^-53)^2))))) / ((6.67*10^-11))]])))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{9.138\times10^{-27}}\right)\sqrt{-\frac{1.342967\times10^{49}\times4\pi\left(1.356857\times10^{-53}\right)^3-\left(1.356857\times10^{-53}\right)^2}{6.67\times10^{-11}}}\right)\right)}$$

Result:

1.618154400037431317249824947279108407640742582118803650325...

1.6181544....

If we take ΔM = 5484.5 MeV

We have bottom Lambda = 5619.4±0.6 and Pion π^0 = 134.9766±0.0006. We note that: 5619.4 – 134.9766 = 5.484,4234.

With the Ramanujan's sum of two cubes, we have:

-[(14258 - 11468 – 11161) + (1010 + 791 + 812) + (172 + 138) - (9 + 10 + 6 + 8)]

= 5481

Thence, we take as value 5481 MeV. We obtain:

Input interpretation:

convert 5481 MeV/c^2 to kilograms

Result:

9.771×10^{-27} kg (kilograms)

$9.771 * 10^{-27}$

Mass = 9.771000e-27

Radius = 1.450848e-53

Temperature = 1.255965e+49

From the new formula, we obtain:

sqrt((((((1/((((((((1.962364415 *10^19)/(0.0864055^2))) * ((Pi/(2*1.9632648))*1/(9.771*10^-27))* sqrt[[-(((((1.255965*10^49 *4Pi(1.450848*10^-53)^3-(1.450848*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{9.771\times10^{-27}}\right)\sqrt{-\frac{1.255965\times10^{49}\times4\pi(1.450848\times10^{-53})^3-(1.450848\times10^{-53})^2}{6.67\times10^{-11}}}\right)}$$

Result:

1.618154444227503832653999771713166483081017195612359909103...

1.6181544...

Or, with the previous formulas:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(6.692*10^-27)* sqrt[[-(((((1.833836*10^49 * 4*Pi*(9.936626*10^-54)^3-(9.936626*10^-54)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{6.692\times10^{-27}}\sqrt{-\frac{1.833836\times10^{49}\times4\pi(9.936626\times10^{-54})^3-(9.936626\times10^{-54})^2}{6.67\times10^{-11}}}\right)\right)\right)}$$

Result:

1.618154240149785744984534495671252662512066767442024121218...

1.61815424....

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(5.829000*10^-25)* sqrt[[-(((((2.105341*10^47 * 4*Pi*(8.655200*10^-52)^3-(8.655200*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{5.829\times10^{-25}}\sqrt{-\frac{2.105341\times10^{47}\times4\pi\,(8.6552\times10^{-52})^3-(8.6552\times10^{-52})^2}{6.67\times10^{-11}}}\right)\right)\right)}$$

Result:

1.618154164328092006442308513009685942282801113558379787715...

1.6181541...

sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(1.312806*10^40)* sqrt[[-(((((9.347940*10^-18 * 4*Pi*(1.949322*10^13)^3-(1.949322*10^13)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{1.312806\times10^{40}}\sqrt{-\frac{9.347940\times10^{-18}\times4\pi\,(1.949322\times10^{13})^3-(1.949322\times10^{13})^2}{6.67\times10^{-11}}}\right)\right)\right)}$$

Result:

1.618154203600316013812311817190402899870761840940404538908...

1.6181542...

sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * 4*Pi*(2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{\left(1/\left(\frac{1.962364415\times10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times1.9632648}\times\frac{1}{1.783\times10^{-24}}\sqrt{-\frac{6.882800\times10^{46}\times4\pi\,(2.647490\times10^{-51})^3-(2.647490\times10^{-51})^2}{6.67\times10^{-11}}}\right)\right)\right)}$$

Result:

1.618154289464838325664011386800503881221918227176205371759...

1.61815428...

sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(1.034*10^-37)* sqrt[[-(((((1.186850*10^60 * 4*Pi*(1.535336*10^-64)^3-(1.535336*10^-64)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{1\Big/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times 1.9632648}\times\frac{1}{1.034\times 10^{-37}}\sqrt{-\frac{1.186850\times 10^{60}\times 4\pi\,(1.535336\times 10^{-64})^3-(1.535336\times 10^{-64})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618154458069826405976364354661182680986207157545507477212...

1.618154458...

sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(8.2*10^-26)* sqrt[[-(((((1.496589*10^48 * 4*Pi*(1.217578*10^-52)^3-(1.217578*10^-52)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{1\Big/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times 1.9632648}\times\frac{1}{8.2\times 10^{-26}}\sqrt{-\frac{1.496589\times 10^{48}\times 4\pi\,(1.217578\times 10^{-52})^3-(1.217578\times 10^{-52})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618154373398260615897927312458895140724812110322501850490...

1.618154373...

sqrt(((((((1/((((((((1.962364415 *10^19)/(0.0864055^2)))*((Pi/(2*1.9632648))* 1/(6.239*10^-26)* sqrt[[-(((((1.966987*10^48 * 4*Pi*(9.263989*10^-53)^3-(9.263989*10^-53)^2))))) / ((6.67*10^-11))]]))))))

Input interpretation:

$$\sqrt{1\Big/\left(\frac{1.962364415\times 10^{19}}{0.0864055^2}\left(\frac{\pi}{2\times 1.9632648}\times\frac{1}{6.239\times 10^{-26}}\sqrt{-\frac{1.966987\times 10^{48}\times 4\pi\,(9.263989\times 10^{-53})^3-(9.263989\times 10^{-53})^2}{6.67\times 10^{-11}}}\right)\right)}$$

Result:

1.618154178021414306551072260119979666237354243446907568291...

1.618154178...

From:

sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-(((((6.882800*10^46 * (4*Pi*2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]]))))))

We obtain the GENERAL FORMULA, that is:

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

Result:

$$1.95053\times 10^{-11}\sqrt{\frac{M}{\sqrt{\frac{r^2-64\pi^3 r^3 T}{G}}}}$$

Or:

1.1180931*sqrt(((((((1/ ((((((((1.962364415 *10^19)/(0.0864055^2))) * 1/(1.783*10^-24)* sqrt[[-((((((6.882800*10^46 * 4*Pi*(2.647490*10^-51)^3-(2.647490*10^-51)^2))))) / ((6.67*10^-11))]]))))))

We obtain another GENERAL FORMULA

$$1.1180931 \sqrt{\frac{1}{\frac{1.962364415\times 10^{19}}{0.0864055^2} \times \frac{1}{M} \sqrt{-\frac{T\times 4\pi r^3 - r^2}{G}}}}$$

$$2.18087\times 10^{-11} \sqrt{\frac{M}{\sqrt{\frac{r^2-4\pi r^3 T}{G}}}}$$

Alternate forms assuming G, M, r, and T are positive:

$$\frac{2.18087\times 10^{-11} \sqrt[4]{G}\ \sqrt{M}}{\sqrt[4]{r^2 - 4\pi r^3 T}}$$

- $$\frac{2.18087\times 10^{-11} \sqrt{\frac{M}{r}}}{\sqrt[4]{\frac{1-4\pi r T}{G}}}$$

- **Real roots:**

$$G < 0, \quad M = 0, \quad r < 0, \quad T < \frac{0.0795775}{r}$$

- $$G < 0, \quad M = 0, \quad r > 0, \quad T > \frac{0.0795775}{r}$$

- $$G > 0, \quad M = 0, \quad r < 0, \quad T > \frac{0.0795775}{r}$$

- $G > 0, \quad M = 0, \quad r > 0, \quad T < \frac{0.0795775}{r}$

- **Series expansion at r = 0:**

$$2.18087\times10^{-11}\sqrt{\frac{M}{\sqrt{\frac{r^2}{G}}}} + 6.8514\times10^{-11}\, r\, T\sqrt{\frac{M}{\sqrt{\frac{r^2}{G}}}} + 5.38108\times10^{-10}\, r^2\, T^2\sqrt{\frac{M}{\sqrt{\frac{r^2}{G}}}} + 5.07155\times10^{-9}\, r^3\, T^3\sqrt{\frac{M}{\sqrt{\frac{r^2}{G}}}} + 5.17814\times10^{-8}\, r^4\, T^4\sqrt{\frac{M}{\sqrt{\frac{r^2}{G}}}} + O(r^5)$$

(generalized Puiseux series)

Big-O notation »

- **Series expansion at r = ∞:**

$$1.15832\times10^{-11}\sqrt{\frac{M}{\sqrt{-\frac{r^3\,T}{G}}}} + \frac{2.3044\times10^{-13}\sqrt{\frac{M}{\sqrt{-\frac{r^3\,T}{G}}}}}{r\,T} + \frac{1.14611\times10^{-14}\sqrt{\frac{M}{\sqrt{-\frac{r^3\,T}{G}}}}}{r^2\,T^2} + \frac{6.84036\times10^{-16}\sqrt{\frac{M}{\sqrt{-\frac{r^3\,T}{G}}}}}{r^3\,T^3} + O\left(\left(\frac{1}{r}\right)^4\right)$$

(generalized Puiseux series)

Big-O notation »

- **Derivative:**

$$\frac{\partial}{\partial r}\left(2.18087\times10^{-11}\sqrt{\frac{M}{\sqrt{\frac{r^2-4\pi\,r^3\,T}{G}}}}\right) = \frac{(1.09043\times10^{-11} - 2.05542\times10^{-10}\, r\, T)\sqrt{\frac{M}{\sqrt{\frac{r^2-4\pi\,r^3\,T}{G}}}}}{r\,(12.5664\, r\, T - 1)}$$

-

Indefinite integral:

$$\int 1.1180931 \sqrt{\frac{1}{\frac{(1.962364415 \times 10^{19}) \sqrt{-\frac{T\,4\,\pi\,r^3 - r^2}{G}}}{0.0864055^2\,M}}}\,dr =$$

$$4.36174 \times 10^{-11}\,r\,\sqrt[4]{1 - 12.5664\,r\,T}\;{}_2F_1(0.25,\,0.5;\,1.5;\,12.5664\,r\,T)\sqrt{\frac{M}{\sqrt{\frac{r^2 - 12.5664\,r^3\,T}{G}}}} + \text{constant}$$

${}_2F_1(a,\,b;\,c;\,x)$ is the hypergeometric function

- **Limit:**

$$\lim_{r \to \pm\infty} 2.18087 \times 10^{-11} \sqrt{\frac{M}{\sqrt{\frac{r^2 - 4\,\pi\,r^3\,T}{G}}}} = 0 \approx 0$$

Conclusion:

The most interesting result, which will have to be further explored, concerns the development of the formula concerning the ratio between charge and mass of a black hole, which provides the value of the golden ratio for any mass, temperature and radius. To keep in mind that for this mathematical application, we have equated the mass of the dark matter candidate particles, to that of small black holes, or quantum black holes. It is possible to hypothesize, given that the golden ratio is an irrational number that can be expressed through a continuous infinite fraction, the fractal nature of the particles, of the black holes and, probably, of the multiverse itself.

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