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# Beyond Planck: Constants For Quantum Gravity And Cosmological Structure

Adel Mathlouthi
*Independent Researcher, Tunisia.*

***Abstract***
*This paper introduces eight novel physical constants that define the dimensional boundaries of quantum black holes, Planck-scale phenomena, and the observable universe. These constants are derived from existing fundamental quantities but incorporate correction factors that reflect quantum vacuum fluctuations, horizon thermodynamics, and entropy bounds. We propose that these constants offer a unified dimensional framework across quantum, Planckian, and cosmological regimes, potentially resolving inconsistencies between general relativity and quantum mechanics*

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## I. Introduction

Modern physics rests on a foundation of universal constants—Planck's constant, the speed of light, the gravitational constant—that have guided our understanding of everything from quantum mechanics to cosmology. Yet as we probe deeper into the extremes of nature—quantum black holes, Planck-scale phenomena, and the vast dimensions of the universe—these constants begin to show their limitations.

Theoretical inconsistencies arise when bridging quantum mechanics and general relativity. Singularities defy dimensional analysis. The Planck scale, while elegant, lacks the granularity to describe emergent phenomena in quantum gravity. In addition, cosmological models often rely on parameters that are empirically tuned rather than derived from first principles.

This manuscript proposes a new set of physical constants—dimension-defining quantities that serve as scaffolding for the geometry and behavior of reality at its most fundamental levels. These constants are not meant to replace existing ones, but to complement and extend them, offering a unified dimensional framework across three regimes:

- Quantum black holes (sub-Planckian gravitational entities)
- Planck dimensions (the smallest meaningful units of space and time)
- Cosmological dimensions (the large-scale structure and expansion of the universe)

This manuscript proposes new physical constants to describe the dimensions of quantum black holes, refined Planck units, and the universe, using the end of the Triassic period and the beginning of the Jurassic period (~199 million years ago) as a reference for cosmological measurements. These constants address unresolved issues in quantum gravity and cosmology, offering a framework to unify scales from the quantum to the cosmic. The introduction justifies the need for these constants and the choice of the Triassic-Jurassic boundary as a reference, followed by detailed derivations and implications for each constant.

## II. Physical Constants

A-Quantum constants:

$$\varepsilon_\beta = \frac{e^2 \times (2\pi) \times \varepsilon_0'}{\alpha \times c^4} \times \sqrt{\frac{G}{\hbar \times c}} = 1{,}1089079 \times 10^{-72} Kg^{-1} m^{-3} s^4 A^2$$

$$G_\beta = \left(\frac{e^2 \times (2\pi)}{\alpha \times c^4} \times \sqrt{\frac{G^3}{\hbar \times c}}\right) = 8,3644755 \times 10^{-72}\, J.s$$

$$\hbar_\beta = \left(\frac{e^2 \times (2\pi)}{\alpha \times c^4} \times \sqrt{\frac{\hbar \times G}{c}}\right) = 1,3216713 \times 10^{-95}\, J.s$$

B-Cosmic constants:

$$\varepsilon_\alpha = \frac{\alpha \times c^4 \times \varepsilon_0'}{e^2 \times (2\pi)} \times \sqrt{\frac{\hbar \times c}{G}} = 7{,}0599378 \times 10^{49} Kg^{-1}m^{-3}s^4A^2$$

$$\mathrm{G}_\alpha = \left(\frac{\alpha \times c^4}{e^2 \times (2\pi)} \times \sqrt{G \times \hbar \times c}\right) = 5{,}\ 3253003 \times\ 10^{50}\ m^3Kg^{-1}S^{-2}$$

$$\hbar_\alpha = \left(\frac{\alpha \times c^4}{e^2 \times (2\pi)} \times \sqrt{\frac{\hbar^3 \times c}{G}}\right) = 8{,}\ 4145105 \times\ 10^{26}\ J.s$$

C-Physical constants

Vacuum permittivity : $\varepsilon_0' = \sqrt{\varepsilon_\alpha \times \varepsilon_\beta} = 8{,}\ 8480624 \times 10^{-12} Kg^{-1}m^{-3}s^4A^2$ [1]

gravitational constant: $\mathrm{G} = \sqrt{\mathrm{G}_\alpha \times \mathrm{G}_\beta} = 6{,}67408\ \times\ 10^{-11}\ m^3Kg^{-1}S^{-2}$

Dirac's constant: $\hbar = \sqrt{\hbar_\alpha \times \hbar_\beta} = 1{,}054571818\ \times\ 10^{-34}\ J.s$

The fine structure constant $\alpha\ = 7{,}2973525888\ \times\ 10^{-3}$ [2]

## III. A Quantum Black Hole Unit System:

Quantum Black Holes: I describe these as "sub-Planckian gravitational entities" where "mass, time, and information converge in paradoxical intimacy." This is intriguing, as sub-Planckian scales (< $10^{-35}$ m, < $10^{-43}$ s) are typically considered inaccessible to current physics due to the breakdown of classical and quantum descriptions. The phrase "paradoxical intimacy" suggests a regime where quantum gravity effects dominate, possibly resolving singularities or information paradoxes (e.g., the black hole information paradox). These constants might define the scale at which quantum black holes transition from classical to quantum behavior or encode information-theoretic properties.

Time= $\sqrt{\frac{\hbar_\beta \times G_\beta}{c^5}} = \frac{e^2 \times G \times (2\pi)}{\alpha \times c^7} = 6{,}75673 \times 10^{-105}\ Seconds$

Ray= $\sqrt{\frac{\hbar_\beta \times G_\beta}{c^3}} = \frac{e^2 \times G \times (2\pi)}{\alpha \times c^6} = 2{,}0256163 \times 10^{-96} meters$

Energy= $\sqrt{\frac{\hbar_\beta \times c^5}{G_\alpha}} = \frac{e^2 \times (2\pi)}{\alpha \times c^2} = 2{,}4515365 \times 10^{-52}\ Jouls$

Mass= $\sqrt{\frac{\hbar_\beta \times c}{G_\alpha}} = \frac{e^2 \times (2\pi)}{\alpha \times c^4} = 2{,}\ 7276761 \times\ 10^{-69}\ Kg$ .

Force= $\frac{c^4}{G_\alpha} = \frac{e^2 \times (2\pi)}{\alpha \times \sqrt{G \times \hbar \times c}} = 1{,}516842 \times 10^{-17}\ N.$

Density= $\frac{c^5}{\hbar_\alpha \times G_\alpha \times G} = \frac{4 \times \pi^2 \times e^4}{\alpha^2 \times c^4 \times \hbar^2 \times G} = 8{,}1253467 \times 10^{-26}\ Kg\ m^{-3}$

Density= $\frac{c^5}{\hbar_\alpha \times G_\alpha \times G_\beta} = \frac{e^2 \times (2\pi)}{\alpha \times \hbar \times G} \times \sqrt{\frac{c}{G \times \hbar}} = 6.4394599 \times 10^{36}\ Kg\ m^{-3}$

Pressure= $\frac{c^7}{\hbar_\alpha \times G_\alpha \times G} = \frac{4 \times \pi^2 \times e^4}{\alpha^2 \times c^2 \times \hbar^2 \times G} = 7{,}31281207 \times 10^{-9}\ Pa$

Pressure= $\frac{c^7}{\hbar_\alpha \times G_\alpha \times G_\beta} = \frac{e^2 \times (2\pi)}{\alpha \times \sqrt{\frac{G^3 \hbar^3}{c^5}}} = 5{,}74 \times\ 10^{52} Pa$ .

Current= $\sqrt{\frac{c^6 \times 4 \times \pi \times \varepsilon_\alpha}{G_\alpha}} = \frac{2 \times \pi \times e^2}{\alpha} \times \sqrt{\frac{4 \times \pi \times \varepsilon_0{}'}{c^3 \times \hbar}}$

$= 4{,}\ 3676134 \times 10^{-36}\mathrm{A}$

Tension= $\sqrt{\frac{c^4}{G_\alpha \times 4 \times \pi \times \varepsilon_\alpha}} = \frac{2 \times \pi \times e^2}{\alpha} \times \sqrt{\frac{1}{4 \times \pi \times \varepsilon_0{}' \times c^5 \times \hbar}}$

$= 1{,}\ 3093781 \times 10^{-34}\mathrm{V}$

## IV. The Planck Dimensions

Time= $\sqrt{\frac{\hbar_\alpha \times G_\beta}{c^5}} = \sqrt{\frac{\hbar_\beta \times G_\alpha}{c^5}} = \sqrt{\frac{\hbar \times G}{c^5}} = \mathbf{5{,}3899187 \times 10^{-44}\ s}\ \boldsymbol{Second}\mathrm{s}$

Ray= $\sqrt{\frac{\hbar_\alpha \times G_\beta}{c^3}} = \sqrt{\frac{\hbar_\beta \times G_\alpha}{c^3}} = \sqrt{\frac{\hbar \times G}{c^3}} = 1{,}\ 6169\mathbf{756 \times 10^{-35}}$ m

Energy= $\sqrt{\frac{\hbar_\beta \times c^5}{G_\beta}} = \sqrt{\frac{\hbar_\alpha \times c^5}{G_\alpha}} = \sqrt{\frac{\hbar \times c^5}{G}} = 1{,}\ 96244311268 \times \mathbf{10^9}$ J

Mass= $\sqrt{\frac{\hbar_\beta \times c}{G_\beta}} = \sqrt{\frac{\hbar_\alpha \times c}{G_\alpha}} = \sqrt{\frac{\hbar \times c}{G}} = \mathbf{2,18049235 \times 10^{-8}\ Kg}$ .

Force= $\frac{c^4}{G} = \mathbf{1.213650 \times 10^{44}}\ \boldsymbol{N}.$

Density= $\frac{c^5}{\hbar \times G_\alpha \times G_\beta} = \mathbf{5,1575586 \times 10^{96}}\boldsymbol{Kg.m^{-3}}$

Pressure= $\frac{c^7}{\hbar \times G_\alpha \times G_\beta} = \mathbf{4,6418 \times 10^{113}}\boldsymbol{Pa}$

Current= $\sqrt{\frac{c^6 \times 4 \times \pi \times \varepsilon_0{'}}{G}} = \sqrt{\frac{c^6 \times 4 \times \pi \times \varepsilon_\alpha}{G_\alpha}} = \sqrt{\frac{c^6 \times 4 \times \pi \times \varepsilon_\beta}{G_\beta}} = \mathbf{3,46798 \times 10^{25}}\ \boldsymbol{A}$

Tension= $\sqrt{\frac{c^4}{G \times 4 \times \pi \times \varepsilon_0{'}}} = \sqrt{\frac{c^4}{G_\alpha \times 4 \times \pi \times \varepsilon_\beta}} = \sqrt{\frac{c^4}{G_\beta \times 4 \times \pi \times \varepsilon_\alpha}} = \mathbf{1,049891 \times 10^{27}}\boldsymbol{V}$

## V. The Universe Dimensions (The Radiation Era)

(End of the Triassic era about 199 million years ago)

To measure the universe's dimensions, a reference point in cosmic history is essential to contextualize its expansion and structure. Here, we choose the end of the Triassic period and the beginning of the Jurassic period, approximately 199 million years ago (Ma), as a pivotal reference. This epoch, marked by the Triassic-Jurassic extinction event, represents a significant moment in Earth's history when biodiversity shifted dramatically, and dinosaurs began their dominance. Cosmologically, this time corresponds to a lookback time of ~199 million years, when the universe was

$\left(\frac{\alpha \times \hbar \times c^2}{2 \times \pi \times e^2}\right) = \mathbf{4.2942106 \times 10^{17}}\ \boldsymbol{seconds} = \mathbf{13607904963.1}\ \boldsymbol{years\ after\ big - bang}$ .

Using this reference anchors our measurements to a well-defined moment when the universe's expansion was slightly slower, and its observable diameter was marginally smaller, offering a unique perspective on its dimensional evolution.

Time= $\sqrt{\frac{\hbar_\alpha \times G_\alpha}{c^5}} = \frac{\alpha \times c^2 \times \hbar}{e^2\ \times (2\pi)} = \mathbf{4,2942106 \times 10^{17}}\ \boldsymbol{Second}$s

Ray= $\sqrt{\frac{\hbar_\alpha \times G_\alpha}{c^3}} = \frac{\alpha \times c^3 \times \hbar}{e^2\ \times (2\pi)} = \mathbf{1,2882206 \times 10^{26}}$ meters

Energy= $\sqrt{\frac{\hbar_\alpha \times c^5}{G_\beta}} = \frac{\alpha \times c^7 \times \hbar}{e^2\ \times (2\pi) \times G} = \mathbf{1,5788882 \times 10^{70}}\ \boldsymbol{Jouls}$

Mass= $\sqrt{\frac{\hbar_\alpha \times c}{G_\beta}} = \frac{\alpha \times c^5 \times \hbar}{e^2\ \times (2\pi) \times G} = \mathbf{1,7367754 \times 10^{53}}\boldsymbol{Kg} = (\boldsymbol{Planck\ tension})^2 / \boldsymbol{2\pi}$

Force= $\frac{c^4}{G_\beta} = \frac{\alpha \times c^9}{e^2\ \times (2\pi) \times G} \times \sqrt{\frac{\hbar}{G \times c}} = \mathbf{9.640342 \times 10^{104}}\ \boldsymbol{N}.$

Density= $\frac{c^5}{\hbar_\beta \times G_\alpha \times G_\beta} = \mathbf{4,149526 \times 10^{157}}\boldsymbol{Kg.m^{-3}}$ (the Big Rip time)

Pressure= $\frac{c^7}{\hbar_\beta \times G_\alpha \times G_\beta} = \mathbf{3,738726 \times 10^{174}}\boldsymbol{Pa}$ (the Big Rip time)

Current= $\sqrt{\frac{c^6 \times 4 \times \pi \times \varepsilon_\alpha{'}}{G_\beta}} = \frac{\alpha \times c^7}{e^2\ \times G} \times \sqrt{\frac{c \times \hbar \times \varepsilon_0{'}}{\pi}} = \mathbf{2,7717975 \times 10^{86}}$A

Tension= $\sqrt{\frac{c^4}{G_\beta \times 4 \times \pi \times \varepsilon_\beta{'}}} = \frac{\alpha \times c^8}{e^2 \times (4\pi) \times G} \times \sqrt{\frac{\hbar}{\pi \times c^3 \times \varepsilon_0{'}}} = \mathbf{8,311409 \times 10^{87}}\boldsymbol{V}$

## VI. Surface Gravity And Quantum Speed At The Horizon Of A Quantum Black Hole (Quantum Universe):

A-Quantum speed at the horizon of a quantum black hole:

The "quantum speed" at the horizon of a quantum black hole likely refers to a characteristic velocity defined by your dimension-defining constants, governing dynamics where quantum gravity and information interplay at sub-Planckian scales. Unlike the classical speed of light (c), which sets the event horizon's causal boundary, this quantum speed could describe the quantum fluctuations, or effective motion in a discrete space-time framework, potentially scaling with sub-Planck constants. Its precise value depends on the constants' mathematical form, but it may approach c in quantum gravity regimes, reflecting non-classical behavior.

$$\left(\left(\frac{e^2\times(2\pi)}{\alpha}\right)\times\sqrt{\frac{G}{\hbar\times c^7}}\right)=\left(\left(\frac{8\times\pi^2}{\mu_0}\right)\times\sqrt{\frac{G\times\hbar}{c^9}}\right)=$$

$$=\left(\left(\frac{2\times\pi^3}{\alpha\times\Phi_0{}^2}\right)\times\sqrt{\frac{\hbar^3\times G}{c^7}}\right)=\left(\left(\frac{2\times\Phi_0\times e^3}{\alpha}\right)\times\sqrt{\frac{G}{c^7\times\hbar^3}}\right)=\left(\left(\frac{2\times\pi\times e^2}{\alpha}\right)\times\sqrt{\frac{G\times\pi}{c^7\times e\times\Phi_0}}\right)=\left(\left(\frac{8\times\pi\times\Phi_0\times e}{\mu_0}\right)\times\sqrt{\frac{G}{c^9\times\hbar}}\right)=$$

$$\left(\left(\frac{8\times\pi^2}{\mu_0}\right)\times\sqrt{\frac{G\times e\times\Phi_0}{c^9\times\pi}}\right)$$

$$=\mathbf{3,759833\times10^{-53}}\,{}^{\boldsymbol{m}}\!/_{\boldsymbol{s}}$$

B-Surface gravity at the horizon of a quantum black hole:

To address "quantum acceleration" in the context of this manuscript, I'll assume it's a quantity derived from or related to the "quantum speed" discussed previously, operating at the horizon of a quantum black hole or within the broader framework of dimension-defining constants, focusing on its physical meaning, mathematical formulation, and implications.

$$\left(\frac{e^2\times(2\pi)}{\hbar\times\alpha\times c}\right)=\left(\frac{8\times\pi^2}{\mu_0\times c^2}\right)=\left(\frac{8\times\Phi_0{}^2\times e^2}{\hbar^2\times\mu_0\times c^2}\right)=\left(\frac{2\times\Phi_0\times e^3}{\alpha\times c\times\hbar^2}\right)=\left(\frac{2\times\pi^3\times\hbar}{\alpha\times\Phi_0{}^2\times c}\right)=\left(\frac{2\times\pi^2\times e}{\alpha\times c\times\Phi_0}\right)$$

$$=\mathbf{6,9861501\times10^{-10}}\,{}^{\boldsymbol{m}}\!/_{\boldsymbol{s^2}}$$

## VII. The Quantum Black Hole Dimensions:

Time $=\frac{(3{,}759833\times10^{-53})^2}{c\times(6{,}9861501\times10^{-10})}$= 6, 75673× $\mathbf{10^{-105}}$ s

$\boldsymbol{length}=\frac{(3{,}759833\times10^{-53})^2}{(6{,}9861501\times10^{-10})}$ =2, $\mathbf{0256163\times10^{-96}}$ m

$\boldsymbol{mass}=\frac{(3{,}759833\times10^{-53})^2}{(6{,}9861501\times10^{-10})\times G}\times\boldsymbol{c^2}$= 2, 7276761× $\mathbf{10^{-69}}$ Kg

Energy= $\frac{(3{,}759833\times10^{-53})^2}{(6{,}9861501\times10^{-10})\times G}\times\boldsymbol{c^4}$ = 2, 4515365× $\mathbf{10^{-52}}$ J

Force = $\frac{(3{,}759833\times10^{-53})\times c^3}{G}=\mathbf{1.516842\times10^{-17}}\,\boldsymbol{N}$

Power= $\frac{(3{,}759833\times10^{-53})\times c^4}{G}=\mathbf{4.5631229\times10^{-9}}\,\boldsymbol{W}$

Momentum= $\frac{(3{,}759833\times10^{-53})^2}{(6{,}9861501\times10^{-10})\times G}\times\boldsymbol{c^3}=\mathbf{8.1859965\times10^{-61}}\,\boldsymbol{N.s}$

$\boldsymbol{density}=\frac{(\mathbf{6,9861501\times10^{-10}})^2}{\boldsymbol{c^2\times G}}=\mathbf{8,1253467\times10^{-26}}\boldsymbol{Kg.m^{-3}}$

Angular frequency= $\frac{(6{,}9861501\times10^{-10})}{c}=\mathbf{2.3287167\times10^{-18}}\boldsymbol{rad.s^{-1}}$

$$\boldsymbol{pressure}=\frac{(\mathbf{6,9861501\times10^{-10}})^2}{\boldsymbol{G}}=\mathbf{7,31271214\times10^{-9}}\boldsymbol{Pa}$$

current= $(\mathbf{3,759833\times10^{-53}})\times\sqrt{\frac{(6{,}9861501\times10^{-10})\times c^4}{2\pi\times G}}=\mathbf{4,3676154\times10^{-36}}\,\boldsymbol{A}$

tension= $(\mathbf{3,759833\times10^{-53}})\times\sqrt{\frac{2\times\pi\times c^2}{(6{,}9861501\times10^{-10})\times G}}=\mathbf{1,3093781\times10^{-34}}\boldsymbol{V}$

## VIII. The Planck Dimensions:

Planck time $=\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}}$= 5, 3899187× $\mathbf{10^{-44}}$ s

$\boldsymbol{planck\ length}=\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}}\times\boldsymbol{c}$ =1, 6169$\mathbf{756\times10^{-35}}$ m

$\boldsymbol{Planck\ mass}=\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}\times G}\times\boldsymbol{c^3}$= 2, 18049235× $\mathbf{10^{-8}}$ Kg

Planck energy= $\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}\times G}\times\boldsymbol{c^5}$ = 1, 96244311268× $\mathbf{10^{9}}$ J

Planck temperature = $\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}\times G\times k}\times\boldsymbol{c^5}$ = 1, 4213918× $\mathbf{10^{32}}$ K

k; Boltzmann Constant= 1.380649× $\mathbf{10^{-23}}$ j$\boldsymbol{K^{-1}}$

Planck charge = $\frac{3{,}759833\times10^{-53}}{\sqrt{2\pi\times6{,}9861501\times10^{-10}\times G}}\times\boldsymbol{c^3}$=1,875× $\mathbf{10^{-18}}$ c

Planck Force = $\frac{c^4}{G} = \mathbf{1.213650 \times 10^{44}\ N}$

Planck's Power= $\frac{c^5}{G} = \mathbf{3.645 \times 10^{52}\ W}$

Planck momentum= $\frac{3{,}759833\times10^{-53}}{6{,}9861501\times10^{-10}\times G} \times c^4 = \mathbf{6.541477 N.s}$

$$\boldsymbol{Planck\ density} = \frac{(6,9861501 \times 10^{-10})^2}{(3,759833 \times 10^{-53})^2 \times G} = 5,1575586 \times 10^{96} Kg.m^{-3}$$

Planck angular frequency= $\frac{6{,}9861501\times10^{-10}}{3{,}759833\times10^{-53}} = \mathbf{1.855 \times 10^{43} rad.s^{-1}}$

$$\boldsymbol{Planck\ pressure} = \frac{(6,9861501 \times 10^{-10})^2}{G \times (3,759833 \times 10^{-53})^2} \times c^2 = 4,6418 \times 10^{113} Pa$$

Planck current= $c^3 \times \sqrt{\frac{6{,}9861501\times10^{-10}}{2\pi\times G}} = 3,46798 \times 10^{25}\ A$

Planck tension= $c^2 \times \sqrt{\frac{2\times\pi}{6{,}9861501\times10^{-10}\times G}} = 1,049891 \times 10^{27} V$

$\boldsymbol{Planck\ accelerations} = \frac{6{,}9861501\times10^{-10}}{3{,}759833\times10^{-53}} \times c = 5.560 \times 10^{51}\ m/_{s^2}$

## IX. The Universe Dimensions: (End Of The Triassic Era About 199 Million Years Ago);

Universe time = $\frac{c}{(6.9861501\times10^{-10})} = \mathbf{4,2942106 \times 10^{17}}$ s

$\boldsymbol{universe\ Ray} = \frac{c^2}{(6{,}9861501\times10^{-10})} = \mathbf{1,2882206 \times 10^{26}}$ m

$\boldsymbol{universe\ mass} = \frac{c^4}{6{,}9861501\times10^{-10}\times G} = \mathbf{1,7367754 \times 10^{53}}$ Kg

Universe energy= $\frac{c^6}{6{,}9861501\times10^{-10}\times G} = \mathbf{1,5583892 \times 10^{70} Jouls}$.

Universe charge= $\frac{c^4}{\sqrt{2\pi\times6{,}9861501\times10^{-10}\times G}}$ ==1, 4938547× $\mathbf{10^{43}}$C

Universe Force = $\frac{c^5}{G\times(3{,}759833\times10^{-53})} = \mathbf{9.640342 \times 10^{104}\ N}$.

Universe Power= $\frac{c^6}{G\times(3{,}759833\times10^{-53})} = \mathbf{2.891306 \times 10^{113} w}$.

Universe momentum= $\frac{c^5}{6{,}9861501\times10^{-10}\times G} = \mathbf{5.1985346 \times 10^{61} N.s}$

Universe $\boldsymbol{density_{Big-Rip\ era}} = \frac{(6{,}9861501\times10^{-10})^2\times c}{(3{,}759833\times10^{-53})^3\times G} = \mathbf{4,149526 \times 10^{157} Kg.m^{-3}}$

Universe angular frequency= $\frac{6{,}9861501\times10^{-10}\times c}{(3{,}759833\times10^{-53})^2} = \mathbf{1.477841 \times 10^{104} Hertz}$

Universe $\boldsymbol{pressure_{Big-Rip\ era}} = \frac{(6{,}9861501\times10^{-10})^2}{(3{,}759833\times10^{-53})^3\times G} \times c^3 = \mathbf{3,738726 \times 10^{174} Pa}$

Universe current= $c^4 \times \sqrt{\frac{6{,}9861501\times10^{-10}}{2\pi\times G\times(3{,}759833\times10^{-53})^2}} = \mathbf{2,7717975 \times 10^{86}}$

Universe tension= $c^3 \times \sqrt{\frac{2\times\pi}{6{,}9861501\times10^{-10}\times G\times(3{,}759833\times10^{-53})^2}} = \mathbf{8,311409 \times 10^{87}}$V

$\boldsymbol{Universe\ Power_{big-rip\ era}} = \frac{c^7}{G\times(3{,}759833\times10^{-53})^2} = \mathbf{2.3568804 \times 10^{174}}$W

$$\boldsymbol{Universe\ accelerations} = \frac{6,9861501 \times 10^{-10}}{(3,759833 \times 10^{-53})^2} \times c^2 = 4.433528 \times 10^{112} ms^{-2}$$

## X. Introduction To The Redefinition Of SI Base Units:

The International System of Units (SI) serves as the foundation for global scientific measurements. Historically rooted in physical artifacts and empirical definitions, the SI has undergone transformative revisions to align with the evolving precision of modern science. A landmark moment in this evolution occurred on 20 May 2019, marking the 144th anniversary of the Meter Convention, when four of the seven SI base units—the kilogram, ampere, Kelvin, and mole—were redefined based on fundamental physical constants.

This redefinition represents a paradigm shift: rather than relying on physical objects or empirical setups, the units are now anchored to invariant properties of nature. Specifically:

The kilogram is defined via the Planck constant (h)

The ampere via the elementary charge (e)

The Kelvin via the Boltzmann constant (k)
The mole via the Avogadro constant ($N_a$)

These constants are assigned exact numerical values, expressed in SI units, ensuring that the units remain stable, universally accessible, and reproducible across time and space. Notably, the second, meter, and candela had already been redefined using physical constants in prior revisions, completing the transition of all SI base units to a system grounded in the laws of physics.

The redefinition was unanimously approved at the 26th General Conference on Weights and Measures (CGPM) in November 2018, following rigorous experimental validation and decades of metrological research. The decision was guided by the International Committee for Weights and Measures (CIPM), which confirmed that the necessary conditions—such as reproducibility and measurement precision—had been met.

This milestone not only enhances the robustness and scalability of the SI but also ensures continuity with existing measurements, preserving the practical utility of the units while future proofing them for scientific advancement. Intriguingly, 20 May 2019 now serves as a temporal anchor in cosmological calculations, including those estimating the age of the universe, symbolizing the profound intersection between metrology and fundamental physics.

## XI. The Natural Physical Constants (May 20, 2019);

As of May 20, 2019, the SI base units defined in the International System of Quantities have been redefined in terms of natural physical constants,

Elementary charge: $\boldsymbol{e = 1.602176634 \times 10^{-19}}$ C
G: the gravitational constant = 6.67408× $\boldsymbol{10^{-11}\ m^3Kg^{-1}S^{-2}}$
C: 300000000 $\boldsymbol{^{m}/_{s}}$ (in End of the Triassic era)
$Ç = \frac{e^2}{\alpha\times 4\times\pi\times\hbar\times\varepsilon_0} = \boldsymbol{299792457{,}928\ ^{m}/_{s}\ (May\ 20, 2019)}$
The fine structure constant $\boldsymbol{\alpha = 7{,}2973525664 \times 10^{-3}}$
The Dirac's constant $\boldsymbol{\hbar = 1{,}054571818 \times 10^{-34}\ J.s}$
Vacuum permittivity: $\boldsymbol{\varepsilon_0}$= 8.85418781762039× $\boldsymbol{10^{-12}\ Kg^{-1}m^{-3}s^4A^2}$

## XII. The Age Of The Universe (May 20, 2019);

On this day, the age of the universe is:

$$\left(\frac{\alpha\times ç}{4\times\pi^2\times\varepsilon_0}\right) = \left(\frac{e^2}{16\times\pi^3\times\hbar\times\varepsilon_0^2}\right) = \left(\frac{\alpha^2\times ç^2\times\hbar}{e^2\ \times\pi}\right) = 6{,}2586053\times 10^{15}s$$

$$= \mathbf{198328665{,}11years\ after\ the\ Triassic - Jurassic\ extinction},$$

$$\left(\frac{\alpha\times c^2\times\hbar}{e^2\ \times(2\pi)}\right) + \left(\frac{\alpha\times ç}{4\times\pi^2\times\varepsilon_0}\right) = \left(\frac{\alpha\times c^2\times\hbar}{e^2\ \times(2\pi)}\times(1+2\alpha)\right) = 4{,}3567967\times 10^{17}s$$

$$= 13806233487{,}7\ years\ after\ big - bang$$

## XIII. The Universe Dimensions (May 20, 2019);

Time = $\left(\left(\frac{\alpha\times c^2\times\hbar}{e^2\ \times(2\pi)}\right) + \left(\frac{\alpha\times ç}{4\times\pi^2\times\varepsilon_0}\right)\right) = \left(\frac{\alpha\times c^2\times\hbar}{e^2\ \times(2\pi)}\times(1+2\alpha)\right) = \mathbf{4{,}3567967\times 10^{17}\ Second}$s.

Ray= $\left(\left(\frac{\alpha\times c^3\times\hbar}{e^2\ \times(2\pi)}\right) + \left(\frac{\alpha\times ç^2}{4\times\pi^2\times\varepsilon_0}\right)\right) = \left(\frac{\alpha\times c^3\times\hbar}{e^2\ \times(2\pi)}\times(1+2\alpha)\right) = \mathbf{1{,}307026\times 10^{26}}$ meters.

Mass = $\left(\left(\frac{\alpha\times c^5\times\hbar}{e^2\ \times(2\pi)\times G}\right) + \left(\frac{\alpha\times ç^4}{4\times\pi^2\times\varepsilon_0\times G}\right)\right) = \left(\frac{\alpha\times c^5\times\hbar}{e^2\ \times(2\pi)\times G}\times(1+2\alpha)\right) = \mathbf{1{,}7624902\times 10^{53}Kg.}$

$\mathbf{Energy}_{\mathbf{cosmic\ void}} = \left(\left(\frac{e^2\times(2\pi)}{\alpha\times c^2}\right) - \left(\frac{e^4}{\alpha\times\hbar\times\varepsilon_0\times ç^3}\right)\right) = \left(\frac{e^2\times(2\pi)}{\alpha\times c^2}\times(1-2\alpha)\right) = \mathbf{2{,}4199077\times 10^{-52}Jouls}$ .

$$\mathbf{Energy}_{\mathbf{The\ horizon\ ofa\ black\ hole}} = \left(\left(\sqrt{\frac{c^5\times\hbar}{G}}\right) - \left(\frac{e^2}{2\times\pi\times\varepsilon_0}\times\sqrt{\frac{ç^3}{\hbar\times G}}\right)\right) = \left(\sqrt{\frac{c^5\times\hbar}{G}}\times(1-2\alpha)\right)$$

$$= \mathbf{1{,}9309522\times 10^9}\boldsymbol{j}$$

$$\mathbf{Energy}_{\mathbf{the\ horizon\ of\ the\ universe}} = \left(\left(\frac{\alpha\times c^7\times\hbar}{e^2\ \times(2\pi)\times G}\right) + \left(\frac{\alpha\times ç^6}{4\times\pi^2\times\varepsilon_0\times G}\right)\right)$$

$$= \left(\frac{\alpha\times c^7\times\hbar}{e^2\ \times(2\pi)\times G}\times(1+2\alpha)\right) = \mathbf{1{,}5407926\times 10^{70}Jouls}$$

$$\mathbf{Force}_{\text{cosmic void}} = \left(\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{G\times\hbar\times c}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0\times\sqrt{G\times\hbar^3\times\varsigma^3}}\right)\right)=\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{G\times\hbar\times c}}\times(1-2\alpha)\right)$$
$$= 1,4988342\times10^{-17}\ \text{N.}$$

$$\mathbf{Force}_{\text{The horizon ofa black hole}} = \left(\left(\frac{c^4}{G}\right)-\left(\frac{e^2\times\varsigma^3}{2\times\pi\times\hbar\times\times\varepsilon_0\times G}\right)\right)=\left(\frac{c^4}{G}\right)\times(1-2\alpha)$$
$$= 1,1959865\times10^{44}\ \text{N}$$

$$\mathbf{Force}_{\text{the horizon of the universe}} = \left(\left(\frac{\alpha\times c^9}{e^2\ \times(2\pi)\times G}\times\sqrt{\frac{\hbar}{G\times c}}\right)+\left(\frac{\alpha\times\varsigma^7}{4\times\pi^2\times\varepsilon_0}\times\sqrt{\frac{\varsigma}{G^3\times\hbar}}\right)\right)=\left(\frac{\alpha\times c^9}{e^2\ \times(2\pi)\times G}\times\sqrt{\frac{\hbar}{G\times c}}\right)\times(1+2\alpha)=9.8244314\times10^{104}\ \text{N.}$$

$$\mathbf{power}_{\text{cosmic void}} = \left(\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{\frac{G\times\hbar}{c}}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0\times\sqrt{G\times\hbar^3\times\varsigma}}\right)\right)=\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{\frac{G\times\hbar}{c}}}\right)\times(1-2\alpha)=4,49654854\times\ 10^{-9}\text{W.}$$

$$\mathbf{power}_{\text{The horizon ofa black hole}} = \left(\left(\frac{c^5}{G}\right)-\left(\frac{e^2\times\varsigma^4}{2\times\pi\times\hbar\times\times\varepsilon_0\times G}\right)\right)=\left(\frac{c^5}{G}\right)\times(1-2\alpha)$$
$$= 3,5879962\times\ 10^{52}\text{W}$$

$$\mathbf{power}_{\text{the horizon of the universe}} = \left(\left(\frac{\alpha\times c^9}{e^2\ \times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)+\left(\frac{\alpha\times\varsigma^8}{4\times\pi^2\times\varepsilon_0}\times\sqrt{\frac{\varsigma}{G^3\times\hbar}}\right)\right)=\left(\frac{\alpha\times c^9}{e^2\ \times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)\times(1+2\alpha)=2.947265\times10^{113}\text{w.}$$

$$\mathbf{Density}_{\text{cosmic void}} = \left(\left(\frac{4\times\pi^2\times e^4}{\alpha^2\times c^4\times\hbar^2\times G}\right)-\left(\frac{e^6\times(2\pi)}{\alpha^2\times\varsigma^5\times\hbar^3\times G\times\varepsilon_0}\right)\right)=\left(\frac{4\times\pi^2\times e^4}{\alpha^2\times c^4\times\hbar^2\times G}\right)\times(1-2\alpha)=8.\ 0064309\times10^{-26}\ \text{Kg m}^{-3}$$

$$\mathbf{Density}_{\text{The horizon ofa black hole}} = \left(\left(\frac{e^2\times(2\pi)}{\alpha\times\hbar\times G}\times\sqrt{\frac{c}{G\times\hbar}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0\times\sqrt{\hbar^5\times G^3\times\varsigma}}\right)\right)=\left(\frac{e^2\times(2\pi)}{\alpha\times\hbar\times G}\times\sqrt{\frac{c}{G\times\hbar}}\right)\times(1-2\alpha)=6.3886885\times10^{35}\ \text{Kg m}^{-3}$$

$$\mathbf{Density}_{\text{the horizon of the universe}} = \left(\left(\frac{c^5}{\hbar\times G^2}\right)+\left(\frac{e^2\times\varsigma^4}{2\pi\times\hbar^2\times G^2\times\varepsilon_0}\right)\right)=\left(\frac{c^5}{\hbar\times G^2}\right)\times(1+2\alpha)=5,2482958\times10^{96}\ \text{Kg m}^{-3}$$

$$\mathbf{Pressure}_{\text{cosmic void}} = \left(\left(\frac{4\times\pi^2\times e^4}{\alpha^2\times c^2\times\hbar^2\times G}\right)-\left(\frac{e^6\times(2\pi)}{\alpha^2\times\varsigma^3\times\hbar^3\times G\times\varepsilon_0}\right)\right)=\left(\frac{4\times\pi^2\times e^4}{\alpha^2\times c^2\times\hbar^2\times G}\right)\times(1-2\alpha)=7.19582126\times10^{-9}\ \text{Pa}$$

$$\mathbf{Pressure}_{\text{The horizon ofa black hole}} = \left(\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{\frac{G^3\hbar^3}{c^5}}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0}\times\sqrt{\frac{\varsigma^3}{\hbar^5\times G^3}}\right)\right)=\left(\frac{e^2\times(2\pi)}{\alpha\times\sqrt{\frac{G^3\hbar^3}{c^5}}}\right)\times(1-2\alpha)=5,741867\times\ 10^{52}\text{Pa .}$$

$$\mathbf{Pressure}_{\text{the horizon of the universe}} = \left(\left(\frac{c^7}{\hbar\times G^2}\right)+\left(\frac{e^2\times\varsigma^6}{2\pi\times\hbar^2\times G^2\times\varepsilon_0}\right)\right)=\left(\frac{c^7}{\hbar\times G^2}\right)\times(1+2\alpha)=4,716933\times10^{113}\text{Pa .}$$

$$\mathbf{charge}_{\text{cosmic void}} = \left(\left(\sqrt{c\times4\pi\times\hbar\times\varepsilon_0}\right)-\left(\frac{e^2}{\sqrt{\varsigma\times\pi\times\hbar\times\varepsilon_0}}\right)\right)=\left(\sqrt{c\times4\pi\times\hbar\times\varepsilon_0}\right)\times(1-2\alpha)=1,847627\times10^{-18}c$$

$$\mathbf{charge}_{\text{The horizon ofa black hole}} = \left(\left(\frac{c^2\times\varepsilon_0}{\sqrt{\frac{\pi\times G}{\varepsilon_0{}'}}}\times\left(\frac{\hbar\times\alpha\times c^2}{e^2}\right)^2\right)-\left(\frac{\alpha^2\times\varsigma^5\times\hbar}{2\pi\times e^2}\times\sqrt{\frac{\varepsilon_0}{\pi\times G}}\right)\right)=\left(\frac{c^2\times\varepsilon_0}{\sqrt{\frac{\pi\times G}{\varepsilon_0{}'}}}\times\left(\frac{\hbar\times\alpha\times c^2}{e^2}\right)^2\right)\times(1-2\alpha)$$
$$= 1,\ 1747973\times10^{42}\text{c}$$

$$\textbf{charge}_{\text{The horizon of universe}} = \left(\left(\left(\frac{c^3\times\alpha}{e^2}\right)^3 \times \sqrt{2\times\left(\frac{c\times\varepsilon_0'}{2\pi}\right)^3\times\frac{\hbar^5}{G^2}}\right) + \left(\frac{\alpha^3\times\varsigma^9}{4\times\pi^2\times G\times e^4}\times\sqrt{\frac{\varepsilon_0\times\varsigma\times\hbar^3}{\pi}}\right)\right) = \left(\left(\frac{c^3\times\alpha}{e^2}\right)^3\times\sqrt{2\times\left(\frac{c\times\varepsilon_0'}{2\pi}\right)^3\times\frac{\hbar^5}{G^2}}\right)\times(1+2\alpha) = 9.649869\times 10^{102}\,\mathbf{C}$$

$$\textbf{Current}_{\text{cosmic void}} = \left(\left(\frac{4\times\pi\times e^2}{\alpha}\times\sqrt{\frac{\pi\times\varepsilon_0'}{c^3\times\hbar}}\right) - \left(\frac{2\times e^4}{\alpha\times\varsigma^2}\times\sqrt{\frac{\pi}{\varsigma\times\hbar^3\times\varepsilon_0}}\right)\right) = \left(\frac{4\times\pi\times e^2}{\alpha}\times\sqrt{\frac{\pi\times\varepsilon_0'}{c^3\times\hbar}}\right)\times(1-2\alpha) = 4.3052916\times 10^{-36}\,\text{A}$$

$$\textbf{current}_{\text{The horizon ofa black hole}} = \left(\left(\sqrt{\frac{c^6\times4\pi\times\varepsilon_0'}{G}}\right) - \left(\frac{e^2\times\varsigma^2}{\hbar\times\sqrt{G\times\varepsilon_0\times\pi}}\right)\right) = \left(\sqrt{\frac{c^6\times4\pi\times\varepsilon_0'}{G}}\right)\times(1-2\alpha) = 3,4353864\times 10^{25}\,\text{A}$$

$$\textbf{current}_{\text{The horizon of universe}} = \left(\left(\frac{\alpha\times c^7}{e^2\times G}\times\sqrt{\frac{c\times\hbar\times\varepsilon_0'}{\pi}}\right) + \left(\frac{\alpha\times\varsigma^6}{2\times\pi^2\times G}\times\sqrt{\frac{\pi\times\varsigma}{\hbar\times\varepsilon_0}}\right)\right) = \left(\frac{\alpha\times c^7}{e^2\times G}\times\sqrt{\frac{c\times\hbar\times\varepsilon_0'}{\pi}}\right)\times(1+2\alpha) = 2,8220214\times 10^{86}\,\text{A}$$

$$\textbf{tension}_{\text{cosmic void}} = \left(\left(\frac{e^2}{\alpha}\times\sqrt{\frac{\pi}{\varepsilon_0'\times c^5\times\hbar}}\right) - \left(\frac{e^4}{2\times\alpha}\times\sqrt{\frac{1}{\varepsilon_0^3\times\pi\times\varsigma^7\times\hbar^3}}\right)\right) = \left(\frac{e^2}{\alpha}\times\sqrt{\frac{\pi}{\varepsilon_0'\times c^5\times\hbar}}\right)\times(1-2\alpha) = 1.2897886\times 10^{-34}\,\text{V}$$

$$\textbf{tension}_{\text{The horizon ofa black hole}} = \left(\left(\sqrt{\frac{c^4}{G\times4\pi\times\varepsilon_0'}}\right) - \left(\frac{e^2\times\varsigma}{\sqrt{8\times\pi^3\times\varepsilon_0^3\times\hbar^2\times G}}\right)\right) = \left(\sqrt{\frac{c^4}{G\times4\pi\times\varepsilon_0'}}\right)\times(1-2\alpha) = 1,0228729\times 10^{27}\,V$$

$$\textbf{tension}_{\text{The horizon of universe}} = \left(\left(\frac{\alpha\times c^8}{e^2\times(4\pi)\times G}\times\sqrt{\frac{\hbar}{\pi\times c^3\times\varepsilon_0'}}\right) + \left(\frac{\alpha\times\varsigma^5}{8\times\pi^2\times G}\times\sqrt{\frac{\varsigma}{\hbar\times\varepsilon_0^3\times\pi}}\right)\right) = \left(\frac{\alpha\times c^8}{e^2\times(4\pi)\times G}\times\sqrt{\frac{\hbar}{\pi\times c^3\times\varepsilon_0'}}\right)\times(1+2\alpha) = 8,4544383\times 10^{87}\,\text{V}$$

$$\textbf{Momentum}_{\text{cosmic void}} = \left(\left(\frac{2\times\pi\times e^2}{\alpha\times c^3}\right) - \left(\frac{e^4}{\alpha\times\varsigma^4\times\hbar\times\varepsilon_0}\right)\right) = \left(\frac{2\times\pi\times e^2}{\alpha\times c^3}\right)\times(1-2\alpha) = 8,0662761\times 10^{-61}\,\text{N.s}$$

$$\text{Momentum}_{\text{the horison of black hole}} = \left(\left(\sqrt{\frac{c^3\times\hbar}{G}}\right) - \left(\frac{e^2}{2\pi\times\varepsilon_0}\times\sqrt{\frac{\varsigma}{\hbar\times G}}\right)\right) = \left(\sqrt{\frac{c^3\times\hbar}{G}}\right)\times(1-2\alpha) = 6,4047711\,\text{N.s}$$

$$\text{Momentum}_{\text{the horison of universe}} = \left(\left(\frac{\alpha\times c^6\times\hbar}{e^2\times(2\pi)\times G}\right) + \left(\frac{\alpha\times\varsigma^5}{4\times\pi^2\times\varepsilon_0\times G}\right)\right) = \left(\frac{\alpha\times c^6\times\hbar}{e^2\times(2\pi)\times G}\right)\times(1+2\alpha) = 5.9691468\times 10^{61}\,\text{N.s}$$

$$\text{acceleration}_{\text{cosmic void}} = \left(\left(\frac{2\times\pi\times e^2}{\alpha\times c\times\hbar}\right) - \left(\frac{e^4}{\alpha\times\hbar^2\times\varsigma^2\times\varepsilon_0}\right)\right) = \left(\frac{2\times\pi\times e^2}{\alpha\times c\times\hbar}\right)\times(1-2\alpha) = 6,8841187\times 10^{-10}\,\text{ms}^{-2}$$

$$\text{acceleration}_{\text{the horizon of black hole}} = \left(\left(\sqrt{\frac{c^7}{\hbar\times G}}\right) - \left(\frac{e^2}{2\pi\times\varepsilon_0}\times\sqrt{\frac{\varsigma^5}{\hbar^3\times G}}\right)\right) = \left(\sqrt{\frac{c^7}{\hbar\times G}}\right)\times(1-2\alpha) = 5,4119865\times 10^{51}\,\text{ms}^{-2}$$

$$\text{acceleration}_{\text{the horison of universe}} = \left(\left(\frac{\alpha\times c^8}{2\times\pi\times e^2\times G}\right) + \left(\frac{\alpha\times\varsigma^7}{4\times\pi^2\times\varepsilon_0\times G\times\hbar}\right)\right) = \left(\frac{\alpha\times c^8}{2\times\pi\times e^2\times G}\right)\times(1+2\alpha) = 4.44778\times 10^{112}\,\text{ms}^{-2}$$

$$\text{frquency}_{\text{cosmic void}} = \left(\left(\frac{2\times\pi\times e^2}{\alpha\times c^2\times\hbar}\right) - \left(\frac{e^4}{\alpha\times\hbar^2\times\varsigma^3\times\varepsilon_0}\right)\right) = \left(\frac{2\times\pi\times e^2}{\alpha\times c^2\times\hbar}\right)\times(1-2\alpha) = 2,2962948\times 10^{-18}\,\text{Hertz}$$

$$\text{frequency}_{\text{the horizon of the black hole}} = \left(\left(\sqrt{\frac{c^5}{\hbar\times G}}\right) - \left(\frac{e^2}{2\pi\times\varepsilon_0}\times\sqrt{\frac{\varsigma^3}{\hbar^3\times G}}\right)\right) = \left(\sqrt{\frac{c^5}{\hbar\times G}}\right)\times(1-2\alpha) = 1,\ 8052444\times 10^{43}\,\text{Hertz}$$

$\text{frequency}_{\text{the horison of universe}} = \left(\left(\frac{\alpha\times c^7}{2\times\pi\times e^2\times G}\right)+\left(\frac{\alpha\times ç^6}{4\times\pi^2\times\varepsilon_0\times G\times\hbar}\right)\right)=\left(\frac{\alpha\times c^7}{2\times\pi\times e^2\times G}\right)\times(1+2\alpha)=1.46106\times 10^{104}\text{Hertz}$

$$\text{Linear density}_{\text{cosmic void}}=\left(\left(\frac{2\times\pi\times e^2}{\alpha}\times\sqrt{\frac{1}{c^5\times G\times\hbar}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0\times\sqrt{\hbar^3\times G\times ç^7}}\right)\right)$$

$$=\left(\frac{2\times\pi\times e^2}{\alpha}\times\sqrt{\frac{1}{c^5\times G\times\hbar}}\right)\times(1-2\alpha)=1{,}6655163\times 10^{-34}\text{Kg m}^{-1}$$

$$\text{Linear density}_{\text{the horison of black hole}}=\left(\left(\frac{c^2}{G}\right)-\left(\frac{e^2\times ç}{2\pi\times\varepsilon_0\times G\times\hbar}\right)\right)=\left(\frac{c^2}{G}\right)\times(1-2\alpha)$$

$$=1{,}3288467\times 10^{27}\text{Kg m}^{-1}$$

$$\textit{Linear density}_{\textit{the horison of universe}}=\left(\left(\frac{\alpha\times c^6}{e^2\times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)+\left(\frac{\alpha\times ç^5}{4\times\pi^2\times\varepsilon_0}\times\sqrt{\frac{ç}{\hbar\times G^3}}\right)\right)$$

$$=\left(\frac{\alpha\times c^6}{e^2\times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)\times(1+2\alpha)=1.0572653\times 10^{88}\text{Kg m}^{-1}$$

$\text{Mechanical impedance}_{\text{cosmic void}}=\left(\left(\frac{2\times\pi\times e^2}{\alpha}\times\sqrt{\frac{1}{c^3\times G\times\hbar}}\right)-\left(\frac{e^4}{\alpha\times\varepsilon_0\times\sqrt{\hbar^3\times G\times ç^5}}\right)\right)=\left(\frac{2\times\pi\times e^2}{\alpha}\times\sqrt{\frac{1}{c^3\times G\times\hbar}}\right)\times(1-2\alpha)=4{,}9930773\times 10^{-26}\text{ Kg s}^{-1}$

$$\text{Mechanical impedance}_{\textit{the horison of black hole}}=\left(\left(\frac{c^3}{G}\right)-\left(\frac{e^2\times ç^2}{2\pi\times\varepsilon_0\times G\times\hbar}\right)\right)=\left(\frac{c^3}{G}\right)\times(1-2\alpha)$$

$$=3{,}986518\times 10^{-26}\text{ Kg s}^{-1}$$

$\text{Mechanical impedance}_{\text{the horison of universe}}=\left(\left(\frac{\alpha\times c^7}{e^2\times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)+\left(\frac{\alpha\times ç^6}{4\times\pi^2\times\varepsilon_0}\times\sqrt{\frac{ç}{\hbar\times G^3}}\right)\right)=\left(\frac{\alpha\times c^7}{e^2\times(2\pi)\times G}\times\sqrt{\frac{\hbar\times c}{G}}\right)\times(1+2\alpha)=3.169589\times 10^{96}\ Kg\ s^{-1}$

## XIV. Conclusion: Toward A Dimensional Unification

These new constants offer a dimensional framework that spans the quantum, Planckian, and cosmological scales. They are designed not merely as mathematical constructs, but as physical quantities that encode the geometry, energy, and information content of the universe. By embedding these constants into our theoretical models, we move one-step closer to a unified description of nature—where the smallest black hole and the largest cosmic horizon are governed by the same dimensional logic.

## References:


[1]. Cosmic Acceleration: IOSR Journal Of Applied Physics (IOSR-JAP) E-ISSN: 2278-4861.Volume 17, Issue 1 Ser. 1 (Jan. – Feb. 2025), PP 52-57

[2]. The Accelerating Universe: Insights From Astronomical Scales To Heliospheric Boundaries: IOSR Journal Of Applied Physics (IOSR-JAP) E-ISSN: 2278-4861.Volume 17, Issue 2 Ser. 4 (Mar. – Apr. 2025), PP 28-35