The Gravitational Constant and the Planck's Constants Planck is Consistent With Mathematical Atomism A Deeper Understanding of the Quantum Realm and Gravity

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March 17, 2016

Abstract

In this paper I suggest a new way to write the gravitational constant that makes all of the Planck constants: Planck length, Planck time, Planck mass, and Planck energy much more intuitive and simpler to understand. Most importantly this opens up the way for several new interpretations in physics. By writing the gravitational constant in a Planck functional form, we can rewrite all of the Planck constants (without changing their values) to a form that surprisingly is fully consistent with mathematical atomism. Further I have quantized the escape velocity to Planck scale and shows that it gives the correct value for planets. This strongly indicates that particles have a spatial dimension and that atomism is the correct interpretation of fundamental physics, including the physics of the quantum realm. Unfortunately very few physicists have studied mathematical atomism and we are afraid we may be speaking to deaf ears.

Key words: Gravitational constant, Planck: length, time, mass, energy, Haug mathematical atomism, Quantum physics, Golden ratio.

1 A New Perspective

We suggest that the gravitational constant should be written as a function of Planck's reduced constant

$$G_p = \frac{\aleph^2 c^3}{\hbar} \tag{1}$$

where $\hbar$ is the reduced Planck's constant and c is the well tested round-trip speed of light. We could call this Planck's form of the gravitational constant. The parameter $\aleph$ is an unknown constant that is calibrated so that G_p matches our best estimate for the gravitational constant. However, we will also suggest an exact and interesting value for $\aleph$ later in this paper, as we will see it must be close to $\Phi \times 10^{-35}$.

The Planck form of the gravitational constant enables us to rewrite Planck's constants in a form that, in our view, simplifies and gives much deeper insight and opens up the path for totally new interpretations in physics. Based on this, the Planck length can be simplified to

$$l_p = \sqrt{\frac{\hbar G_p}{c^3}} = \sqrt{\frac{\hbar \frac{\aleph^2 c^3}{\hbar}}{c^3}} = \aleph \tag{2}$$

Here the Planck length is simply our constant $\aleph$. Further, the Planck time in this context is

$$t_p = \sqrt{\frac{\hbar G_p}{c^5}} = \sqrt{\frac{\hbar \frac{\aleph^2 c^3}{\hbar}}{c^5}} = \frac{\aleph}{c} \tag{3}$$

In this view, the Planck time is simply the time it takes for the speed of light c to cross the Planck length. Next the Planck mass in this context results in

$$m_p = \sqrt{\frac{\hbar c}{G_p}} = \sqrt{\frac{\hbar c}{\frac{\aleph^2 c^3}{\hbar}}} = \frac{\hbar}{\aleph}\frac{1}{c} \tag{4}$$

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The Planck mass in this form is very interesting. In 2014, Haug showed that mass derived from ancient atomism had to be $\frac{H}{w}\frac{1}{c}$, where his H was the diameter of an indivisible particle and w the distance[1] between the indivisible particles in the mass.[2] between the particles. Significantly in that work, Haug shows that to truly understand what mass (matter) is relative to energy the very essence is in: $\frac{1}{c}$. This is what he defines or points out must be time-speed. Bear in mind that c is a velocity and a velocity is the length traveled divided by the time it takes for light to travel that distance. In other words, $c = \frac{L}{T}$ and this means $\frac{1}{c} = \frac{T}{L}$, that is how many seconds goes by per meter traveled. The time-speed of light is about 3 nanoseconds per meter. As discussed by Haug in 2014, the part $\frac{\hbar}{\aleph}$ only represents how much equivalent continuous mass (continuous time) this particular mass contains. To fully understand this and to get a completely new perspective on the interpretation of physics one must study Haug (2014) New Fundamental Physics in detail, in particular the chapter where he discusses energy and mass derived from atomism. Haug derives a complete new relativity theory from the postulates of ancient atomism and he obtains all of the same mathematical end results as Einstein when using Einstein synchronized clocks, but he also get a long series of additional equations. In addition, he obtains the famous equation $E = mc^2$ as well as the same relativistic mass energy relationship given by Einstein, however, in his work this is derived from the quantum realm of atomism. That the quantum realm of atomism gives exactly the same end results and matches up well with Planck seems to be no coincidence, but this has not been discovered until now.

Based on the gravitational constant, the Planck energy can be simplified to

$$E_p = m_p c^2 = \sqrt{\frac{\hbar c}{G_p}} c^2 = \frac{\hbar}{\aleph}\frac{1}{c}c^2 = \frac{\hbar}{\aleph}c \tag{5}$$

We can see from the derivation above that c^2 factor in the famous Einstein formula $E = mc^2$ is just a conversion factor to convert time-speed to speed as already proven by Haug (2014). In the Planck energy formula, $\frac{\hbar}{\aleph}c$ is simply equivalent continuous meters per second (passing a detector). In other words, as proven elegantly and intuitively by Haug (2014) energy is simply speed and mass is time-speed. The Planck equations are fully consistent with ancient atomism.

And finally we will also rewrite the reduced Compton wavelength:

$$\frac{\hbar}{m_p c} = \frac{\hbar}{\frac{\hbar}{\aleph}\frac{1}{c}c} = \frac{1}{\frac{1}{\aleph}} = \aleph \tag{6}$$

We summarize or results in the table below, the Planck form and the Haug form derived from ancient atomism are identical. Based on Haug (2014), the interpretation of mass and energy is quite different and much more profound and logical than the standard interpretations given in modern physics.

As shown more elegantly by Haug (2014) the factor $\frac{1}{c}$ in the mass is time divided by distance, that is $\frac{T}{L}$ and c is $\frac{L}{T}$. This means that in its most pure form the relationship between energy and mass is nothing more than $\frac{L}{T} = \frac{T}{L}\frac{L^2}{T^2}$ that can be written on the compact form $c = \frac{1}{c}c^2$. Einstein (1905) famous formula $E = mc^2$ is ultimately nothing more than $c = \frac{1}{c}c^2$, but this is also the extreme beauty of the formula. Time is indivisible particles traveling back and forth counter-striking (creating or we could say maintaining the mass) and energy is indivisible particles freed from this. This explains why a small amount of mass can give so much energy. Continuous pure energy is time-speed times c^2. Again c^2 is simply a conversion factor between mass (time-speed) and energy (speed). This is hard to fully understand at the deepest level without seeing how this can be derived from atomism as published by Haug in 2014. Bear in mind that $\frac{\hbar}{\aleph}$ actually just is a factor adjusting for how much equivalent continuous mass or continuous energy there is in this particular mass or energy.

As I am Haug, I have to admit I had no idea that the energy and mass relationships I derived years ago directly from atomism are basically the same equations as Planck's, but derived from a deeper and much simpler and more logical perspective. From atomism we automatically get quantization, but we do not get the silly point particles of modern physics interpretations.

Again the term $\frac{\hbar}{\aleph}$ is basically just a term showing how much pure continuous energy or pure continuous mass there is in given "object". When looking at the very fundament of physics in its purest forms we can remove this constant to see the true beauty and extreme simplicity of fundamental physics derived and as understood from mathematical atomism.

[1] What Haug (2014) calls the i-distance in his theory, which is the distance center to center, or front to front, or back to back between two indivisible particles; it is the equivalent to the wave-length in modern physics. This distance must be larger or equal to the diameter of the indivisible particle. One should not compare the indivisible particles in Haug's theory with the standard idea of particles in modern physics. The indivisible particles are very different than the particles in modern physics, please study some mathematical atomism before attacking the indivisible particles.

[2] Haug (2014) uses a slightly different notation in his book.

Table 1: The table shows the standard Planck constants and those as rewritten by Haug. They are identical, but atomism provides much deeper insight into the quantum realm in relation to mass and energy, but still the end results are the same.

Units:	**Planck-form:**	**Haug-form:**
Gravitational constant	$G \approx 6.67408 \times 10^{-11}$	$G_p = \frac{\aleph^2 c^3}{\hbar}$
Planck length	$l_p = \sqrt{\frac{\hbar G_p}{c^3}}$	$l_p = \aleph$
Planck time	$t_p = \sqrt{\frac{\hbar G_p}{c^5}}$	$t_p = \frac{\aleph}{c}$
Planck mass	$m_p \sqrt{\frac{\hbar c}{G_p}}$	$m_p = \frac{\hbar}{\aleph}\frac{1}{c}$
Planck energy	$E_p = \sqrt{\frac{\hbar c^5}{G_p}}$	$E_p = \frac{\hbar}{\aleph} c$
Relationship mass and energy	$E_p = m_p c^2$	$E_p = \frac{\hbar}{\aleph}\frac{1}{c} c^2$
Reduced Compton wavelength	$\frac{\hbar}{m_p c}$	$\aleph$
Planck area	$l_p^2 = \frac{\hbar G_p}{c^3}$	$l_p^2 = \aleph^2$
Planck volume	$l_p^3 = \left(\frac{\hbar G_p}{c^3}\right)^{\frac{3}{2}}$	$l_p^3 = \aleph^3$
Planck force	$F_p = \frac{E_p}{l_p} = \frac{\hbar}{l_p t_p}$	$F_p = \frac{\hbar}{\aleph}\frac{c}{\aleph}$
Planck power	$P_p = \frac{E_p}{t_p} = \frac{\hbar}{t_p^2}$	$m_p = \frac{\hbar}{\aleph}\frac{c^2}{\aleph}$
Planck energy	$E_p = \sqrt{\frac{\hbar c^5}{G_p}}$	$E_p = \frac{\hbar}{\aleph} c$
Planck density	$\rho_p = \frac{m_p}{l_p^3} = \frac{c^5}{\hbar G_p^2}$	$\rho_p = \frac{\frac{\hbar}{\aleph}\frac{1}{c}}{\aleph^3} = \frac{\hbar}{\aleph}\frac{1}{c\aleph^3}$
Planck energy density	$\rho_p^E = \frac{E_p}{l_p^3} = \frac{c^7}{\hbar G_p^2}$	$\rho_p^E = \frac{\frac{\hbar}{\aleph} c}{\aleph^3} = \frac{\hbar}{\aleph} c\aleph^3$
Planck frequency	$\omega_p = \frac{1}{t_p} = \sqrt{\frac{c^5}{\hbar G}}$	$\omega_p = \frac{1}{\frac{c}{\aleph}} = \frac{\aleph}{c}$
Planck pressure	$p_p = \frac{F_p}{l_p^2} = \frac{\hbar}{l_p^3 t_p} = \frac{c^7}{\hbar G^7}$	$p_p = \frac{\hbar}{\aleph}\frac{c}{\hbar^3}$
Newton gravity force	$F_G = G_p \frac{m_1 m2}{r^2}$ Newton	$F_G = G_p \frac{m_1 m2}{r^2} = \frac{\aleph^2 c^3}{\hbar}\frac{\frac{\hbar}{\aleph}\frac{1}{c}\frac{\hbar}{\aleph}\frac{1}{c}}{\aleph^2} = \frac{\hbar}{\aleph}\frac{c}{\aleph}$
Escape velocity from single Planck mass		$v_{e,p} = c\sqrt{\frac{2\aleph}{r}}$
Escape velocity from any mass	$v_e = \sqrt{\frac{GM}{r}}$ Einstein	$v_{e,p,N} = c\sqrt{\frac{2N\aleph}{r}}$
Escape velocity at $r = \aleph$		$v_{e,p} = c\sqrt{\frac{2\aleph}{\frac{1}{2}\aleph}} = c$
Radius indivisible particle		$\frac{1}{2}\aleph$
Diameter indivisible particle		$\aleph$

2 Escape velocity at the Quantum Scale

Next lets see if we can take some of Einstein's gravity theory down to Planck scale. The escape velocity is from general relativity is given by

$$v_e = \sqrt{\frac{2GM}{r}} \tag{7}$$

where G is the traditional gravitational constant and M is the mass of the object we "try" to escape from, and r is the radius of that object. In other words, we stand at the surface of the object, for example a hydrogen atom or a planet. Based on the gravitational constant written in the Planck form introduced in this chapter we can find the escape velocity at Planck scale. It must be

Table 2: This table show the purest forms of the fundaments of physics given by insight from atomism. With purest form I mean the densest possible forms of energy and mass as observed from the rest frame. The limitation is given by the fundament of atomism, see Haug 2014.

Unit name:	**The Haug pure forms from atomism:**
Gravitational constant	$G_p = \aleph c^3$
Diameter indivisible (= Planck length?)	$l = \aleph$
Time to cross particle diameter	$t = \frac{\aleph}{c}$
Pure continuous mass (time-speed)	$m = \frac{1}{c}$
Pure continuous energy (speed)	$E = c$
Relationship mass and energy A)	$E = mc^2$
Relationship mass and energy B)	$c = \frac{1}{c}c^2$
Area	$l^2 = \aleph^2$
Volume	$l^3 = \aleph^3$
Force	$F = \frac{c}{\aleph}$
Haug version of Newton gravitation	$F_G = G_p \frac{m_1 m2}{r} = \aleph c^3 \frac{\frac{1}{c}\frac{1}{c}}{\aleph^2} = \frac{c}{\aleph}$
Power	$m = \frac{c^2}{\aleph}$
Density	$\rho = \frac{1}{c\aleph^3}$
Energy density	$\rho^E = c\aleph^3$
Frequency	$\omega = \frac{\aleph}{c}$
Pressure	$p = \frac{c}{\hbar^3}$
Escape velocity from indivisible	$v_{e,p} = c$

$$
\begin{aligned}
v_{e,p} &= \sqrt{\frac{2G_p m_p}{r}} \\
v_{e,p} &= \sqrt{\frac{2\frac{\aleph^2 c^3}{\hbar}\frac{\hbar}{\aleph}\frac{1}{c}}{r}} \\
v_{e,p} &= \sqrt{\frac{2c^2\aleph}{r}} \\
v_{e,p} &= c\sqrt{\frac{2\aleph}{r}} \qquad (8)
\end{aligned}
$$

under atomism the radius of a Planck mass must be half the diameter of the Planck length $r = \frac{1}{2}\aleph$. This gives us

$$
\begin{aligned}
v_{e,p} &= c\sqrt{\frac{2\aleph}{\frac{1}{2}\aleph}} \\
v_{e,p} &= c \qquad (9)
\end{aligned}
$$

The escape velocity for a particle with Planck mass is c, as expected. From atomism this makes perfect sense. When a indivisible particle collides with another it escapes with velocity c. The indivisible particles are always moving at velocity c relative to the void, see Haug (2014) for detailed discussion on the discussion and derivations of the speed of indivisible particles. This also means there can be no Black-Holes, as the densest mass possible will reflect light; study atomism to understand this properly. Only if the Planck scale escape velocity was larger than c could Black Holes exist.

To "check" if this is correct (as it must be) we can look at the escape velocity of earth. The earth's mass is $5,972 \times 10^{24}$ kg. We must convert this to number of Planck masses. The Planck mass is

$$m_p = \frac{\hbar}{\aleph^2}\frac{1}{c} \approx 2,17651 \times 10^{-8}$$

The Earth's mass in terms of the Planck mass must be $\frac{5.972\times10^{24}}{2,17651\times10^{-8}} \approx 2.74388 \times 10^{32}$. Further the radius of the Earth is $r \approx 6371000$ meters. We can now just plug this into the Planck scale escape velocity:

$$v_{e,p} = c\sqrt{\frac{2N\aleph}{r}} \tag{10}$$

where the N simply is the numbers of Planck masses. This gives us

$$\begin{aligned} v_{e,p} &= c\sqrt{\frac{2N\aleph}{r}} \\ v_{e,p} &= 299792458 \times \sqrt{\frac{2 \times 2.74388 \times 10^{32} \times 1.61622837 \times 10^{-35}}{6371000}} \approx 11185.7\text{meters/second} \end{aligned}$$

Which is equal to 40269 km/s, which is the well-known escape velocity from the Earths gravitational field. We think our new way of looking at gravity could have major consequences for the understanding of gravity. Gravitation must come in discrete steps and the escape velocity must also come in discrete steps for a given radius; this is because the amount of matter comes in discrete steps as a function of the number of indivisible particles making up the mass.

3 The Golden Ratio and the ℵ Factor

Above we introduced the following functional form for the gravitational constant

$$G_p = \frac{\aleph^2 c^3}{\hbar} \tag{11}$$

Measurement of the gravitational constant interestingly gives a value of ℵ very close to the Golden ratio $\Phi \times 10^{-35}$. An alternative to try to measure the gravitational constant approximately is simply to set $\aleph = \Phi \times 10^{-35}$, this gives us

$$G_p = \frac{(\Phi \times 10^{-35})^2 c^3}{\hbar} \approx 6.68900061 \times 10^{-11} \tag{12}$$

That is well inside the "band" of recent gravitational constant measurements, for example Fixler, Foster, McGuirk, and Kasevich (2007) reported a gravitational constant of $6.693(34) \times 10^{-11}$ while Schlamminger (2014) reported a gravitational constant of $6.67191(99) \times 10^{-11}$. We do not claim that ℵ must take the value $\Phi \times 10^{-35}$, to use the Golden ratio could very likely just be a good approximation for the real value ℵ must take, or potentially Φ could contain an untapped secret of a beautiful gravitational constant, something we think is unlikely. [3]

By using the Golden ratio $\Phi \times 10^{-35}$ for the ℵ we get the following Planck length

$$l_p = \sqrt{\frac{\hbar G_p}{c^3}} = \Phi \times 10^{-35} \approx 1.61803 \times 10^{-35} \tag{13}$$

Thus the Planck length is simply the Golden ratio times 10^{-35}. This makes it very easy to remember the Planck length and means that the Planck time is simply

$$t_p = \sqrt{\frac{\hbar G_p}{c^5}} = \frac{\Phi}{c} \times 10^{-35} \approx 5.39718 \times 10^{-44} \tag{14}$$

And the Planck mass is

$$m_p = \sqrt{\frac{\hbar c}{G_p}} = \sqrt{\frac{\hbar c}{\frac{(\Phi \times 10^{-35})^2 c^3}{\hbar}}} = \frac{\hbar}{\Phi}\frac{1}{c}\frac{1}{10^{-35}} \approx 2.17404 \times 10^{-08} \tag{15}$$

Further, the Planck energy must be

$$E_p = m_p c^2 = \sqrt{\frac{\hbar c}{G}} c^2 = \frac{\hbar}{\Phi}\frac{1}{c} c^2 \times \frac{1}{10^{-35}} = \frac{\hbar}{\Phi} c \times \frac{1}{10^{-35}} \approx 1953930970 \tag{16}$$

And finally based on this, the reduced Compton wavelength must be

$$r_p = \frac{\hbar}{m_p c} = \frac{\hbar}{\frac{\hbar}{\Phi}\frac{1}{c} c \frac{1}{10^{-35}}} = \frac{1}{\frac{1}{\Phi}\frac{1}{10^{-35}}} = \Phi \times 10^{-35} \approx 1.01664 \times 10^{-34} \tag{17}$$

[3] Well some physicists and mathematicians would possibly considering the Golden ratio in the gravitational constant to be ugly, as it would mean that the gravitational constant and the Planck constants have a infinite number of unknown digits.

Table 3: The table shows the Planck constants rewritten in the Haug form when, in addition ,we assume $\aleph$ is equal or approximately equal to the Golden ratio Φ. But again we do not claim that $\aleph$ must take exactly this value, Φ is possibly or even likely just an approximation.

	Planck-form	Haug-form
Gravitational constant	$6.67 \times 10^{-11} > G < 6.7 \times 10^{-11}$	$G_p = \frac{\Phi^2 c^3}{\hbar} \approx 6.68900061 \times 10^{-11}$
Planck length	$l_p = \sqrt{\frac{\hbar G}{c^3}}$	$l_p = \Phi \times 10^{-35}$
Planck time	$t_p = \sqrt{\frac{\hbar G}{c^5}}$	$t_p = \frac{\Phi}{c} \times 10^{-35}$
Planck mass	$m_p = \sqrt{\frac{\hbar c}{G}}$	$m_p = \frac{\hbar}{\Phi} \frac{1}{c} \times \frac{1}{10^{-35}}$
Planck energy	$E_p = \sqrt{\frac{\hbar c^5}{G}}$	$E_p = \frac{\hbar}{\Phi} c \times \frac{1}{10^{-35}}$
Reduced Compton wavelength	$\frac{\hbar}{mc}$	$\Phi \times 10^{-35}$

4 Conclusion

By making the gravitational constant a function form of the reduced Planck constant, we can rewrite the Planck equations into simpler and much more intuitive forms. This also enables us to find the escape velocity at quantum scale. Based on this it is, clear, for example, that Black Holes do not exist, but are instead an artifact of incomplete mainstream physics. We expect very few people to understand the beauty of this paper, as almost no physicists today are well studied in atomism and even fewer people have any clues about the wonders of mathematical atomism. We encourage the physics community to strongly consider mathematical atomism as the fundamental theory of everything. Haug has shown that a new mathematical physics derived from atomism gives all the same mathematical end results as Einstein's special relativity theory when using Einstein synchronized clocks, but with much deeper insight. However, Haug has also shown that Einstein's special relativity theory is incomplete and he has derived a long series of additional results. Do not take this the wrong way; all of Einstein's equations are correct under Einstein synchronized clocks. With this paper he has proven that the energy and mass equations he has derived from very simple and intuitive principles rooted in postulates from ancient atomism are the same equations as given by Max Planck. Any serious physicists hoping for a unified theory should now take a close look at mathematical atomism and skip flawed theories that cannot offer much hope, super-string theory being one prominent example.

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