

Is the Universe in Equilibrium?

The Schwarzschild / de Broglie Equilibrium

The stability of the physical constants suggests quite strongly some sort of cosmological equilibrium.

Equilibrium

A state of dynamic equilibrium exists in a process when the rate of the forward process equals the rate of the reverse process. The equilibrium condition may exist in relation to thermal, mechanical, or chemical changes, and may be dynamic.

The inverse relationship ($E=hf$) between energy and (time and length), has led to the idea of the point particle, the singularity. This reduction is only partially justifiable. We consider the existence of a universal quantum background, effectively dominated by a unique quantity, the force required to contain electromagnetic energy. This singular force value (required of all black holes) is in every case equivalent, making it likely that there is really only one force acting, and that the universe as a whole is in equilibrium.

The Equilibrium Universe Model

The Equilibrium Universe Model imagines that *An Infinite to Infinite interaction*, hosts an *Infinite to finite interaction*, which produces the *Finite to finite interactions* that together dominate all reality within our universal confines.

The 2nd interaction series effectively promotes *quantum space*, and when considered from within the limits of the quantum world view, presents a certain contrasting similarity to Catastrophe theory (see René Thomas) a branch of bifurcation theory in dynamical systems; the *Infinite to finite interaction* can be visualized as something like this figure below.

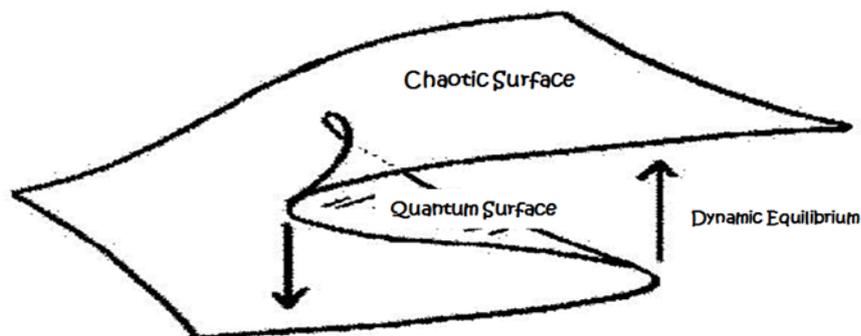


Figure 1. Infinite-finite interactions reflect a *probabilistic bias* (found in the Infinite to Infinite interaction) towards equality of exchange: thus, we have the formation of *the quantum surface*; i.e. *the beginnings and creation of quantum space* which develops from initially chaotic beginnings where real yet separated attractors interact between themselves on many scales.

How this can occur is discussed in;

https://www.academia.edu/37553069/Feynman_Mechanism_as_a_Low-Entropy_Beginning_for_a_Universe_in_Equilibrium ,

and in the following;

https://www.academia.edu/37930511/Coherence_from_an_Infinite-finite_series_Einstein_s_Dice_and_Feynman_s_Solution .

For this model of “A Universe in Equilibrium”, four results are postulated.

1. The stability of the physical constants suggests strongly a single Cosmological equilibrium, this equilibrium is met at all Schwartzchild radii.
2. The universe is a simple case of a gravitational/electro-static equilibrium which expresses within Planck quantum fluctuations.
3. With a general appearance of expansion (when viewed from within,) localized gravitational influences accumulate and generate co-aligned black holes, yet, never surpassing the singular force required to contain electromagnetic energy. Gravitational accelerations may thus vary greatly, yet the acting force in all cases is equivalent to the perimeter force.
4. There exists an active equilibrium between Schwarzschild and de Broglie fields that gives to all mass its character, as in a state of fugue or flight (a well), and which within the Universal well (*or frame*) determines its inertia.

Introduction

Suppose we take Ernst Mach seriously, and determine that the universal constant (G) is actually the acceleration result expected from a sum total of all the available, and equally distributed mass in the universe. Let us also accept that at some radius, the acceleration of universal gravity (G) can hold passing light in its feather grasp.

Suppose that universal gravitation G, is proportional to the universal mass M_u .

$$G \propto M_U$$

It is a remarkable fact that the square root of any mass x is equal to that same mass's radius, for which induced acceleration towards it becomes equal to the universal gravitational constant “G”. So therefore if an object weighs 100 kilograms, its “ $g=G$ ” radius, at which it provokes an acceleration of “G” is ten meters.

$$\sqrt{M_x} = R_{x"_{g=G}}$$

Except that the constant G is universal, what amount of mass would be sufficient to produce this force required to contain electromagnetic energy at its natural radius. A unique relation to this is found in the Universal Event Horizon ⁽¹⁾ which displays an acceleration of “G” as well, but this radius is also its Schwarzschild Radius (R_{SU}), so;

Eq. 2

$$\sqrt{M_U} = R_{S_U} = R_{U^{g=G}}$$

In a singular and unique relation, the square root of the Universal Equilibrium Mass M_U is equal to its Schwarzschild Radius, which is also its own “ $g=G$ ” radius.

$$R_{U^{g=G}} = \sqrt{\frac{GM}{(6.674e^{-11})}} = \sqrt{M_U}$$

But what might be this universal radius? And what might be this universal mass?

Fortunately, thanks to modern astronomy, we have reasonable estimations for both.

Below in Table 1 are possible solutions for the radius of the universe.

Description	Mass (kg)	Event Horizon Radius (m)	Event Horizon Gravity
WMAP Total (including Dark Energy)	3.140E+54	4.663E+27	9.636E-12
WMAP Dark and Visible Mass	8.855E+53	1.315E+27	3.417E-11
WMAP in Atoms (Visible Mass)	1.520E+53	2.257E+26	1.991E-10
Planck Total (including Dark Energy)	3.041E+54	4.516E+27	9.950E-12
Planck Dark and Visible Mass	8.857E+53	1.315E+27	3.416E-11
Planck in Atoms (Visible Mass)	1.460E+53	2.168E+26	2.072E-10
Average of Masses of Observed Stars	1.700E+53	2.525E+26	1.780E-10
Hoyle in Atoms	1.680E+53	2.495E+26	1.801E-10
Hoyle Total	3.500E+54	5.198E+27	8.645E-12
Comoving Hubble Radius	2.963E+53	4.400E+26	1.021E-10
Equilibrium Universe	4.534E+53	6.733E+26	6.674E-11

Table 1 - The mass values for WMAP, and The European Space Agency’s Planck Telescope here are all derived from the appropriate density parameters and the commoving radius ($4.3e^{26}$ m).

As we can see, most of these estimates are clearly in the “same ballpark” so to speak, but for our proposal, no current estimate quite fits. We propose that the natural radius is that radius naturally generated by the total mass at G, and yet also contains all passing light as well. So we propose an Equilibrium universe as shown on the bottom line. The column, where the Schwartzchild radii are shown serves as evidence that our intuition was correct; there is a single unique solution to the universal frame, Where G can genuinely be a universal constant, and secure electromagnetic energy as well. It is this universe that we propose, and it is within this model that the various natural constants consist, and from which the equilibrium that involves them is discernible and is derived.

Table 2 below shows an analysis that includes particles

Description	Mass (kg)	Schwartzchild radius (m)	de Broglie Radius λ (m)	Local BH gravity (g)	Local dB gravity (g)	Schwartzchild Force = 1/4 Planck Force	G parameter (u)
Electron-	9.110E-31	1.353E-57	3.861E-13	3.321E+73	6.080E-41	3.026E+43	6.080E-41
Muon-	1.884E-28	2.797E-55	1.868E-15	1.607E+71	1.257E-38	3.026E+43	1.257E-38
Proton-	1.673E-27	2.484E-54	2.103E-16	1.809E+70	1.116E-37	3.026E+43	1.116E-37
Neutron	1.675E-27	2.487E-54	2.100E-16	1.807E+70	1.118E-37	3.026E+43	1.118E-37
Higgs-	2.234E-25	3.317E-52	1.575E-18	1.355E+68	1.491E-35	3.026E+43	1.491E-35
1/2 Planck	1.088E-08	1.616E-35	3.232E-35	2.780E+51	7.263E-19	3.026E+43	7.263E-19
Planck	2.177E-08	3.232E-35	1.616E-35	1.390E+51	1.453E-18	3.026E+43	1.453E-18
1 kg water	1.000E+00	1.485E-27	3.518E-43	3.026E+43	6.674E-11	3.026E+43	6.674E-11
Earth	5.974E+24	8.872E-03	5.889E-68	5.065E+18	3.987E+14	3.026E+43	3.987E+14
Sun	1.989E+30	2.954E+03	1.768E-73	1.521E+13	1.327E+20	3.026E+43	1.327E+20
Quasar	2.486E+42	3.693E+15	1.415E-85	1.217E+01	1.659E+32	3.026E+43	1.659E+32
Milky Way	3.142E+39	4.666E+12	1.120E-82	9.632E+03	2.097E+29	3.026E+43	2.097E+29
Eq. Univ	4.534E+53	6.733E+26	7.759E-97	6.674E-11	3.026E+43	3.026E+43	3.026E+43
WMAP Univ	3.140E+54	4.663E+27	1.120E-97	9.636E-12	2.096E+44	3.026E+43	2.096E+44

Table 2 Demonstration of the force parameter

As might be expected, the acceleration of Local BH Gravity (the earth-like g-perimeter) increases in step with each decreasing Schwartzchild radius for all the examples. This agrees with Einstein's predictions that it is the curvature of space that determines the acceleration at the radius. We can also see the Schwartzchild force required to contain electromagnetic energy. However, in the case of the WMAP derived mass the Gravitational Parameter, a force value, exceeds the Planck force ($F_p = 1.21e44 N$), this would also be true for the Planck Telescope derived mass, making both of these derivations highly unlikely.

The Gravitational Parameter force, matches the Schwartzchild force value for the Equilibrium Universe model alone, at $\frac{F_p}{4}$.

The Greater "Infinite" Universe

Though undefined, the greater universe is indeed infinite, and our present local universe is in equilibrium with this greater universe which resides beyond ¹. An infinite state pre-exists all possible beginnings.

Einstein on Electrons

In "Relativity" Albert Einstein comments:

"In the theoretical treatment of these electrons we are faced with the difficulty that electro-dynamic theory by itself is unable to give an account of their nature.... since electrical masses constituting the electron would necessarily be scattered under the influence of their mutual repulsions, unless there are forces of another kind operating between them... the nature of which has hitherto remained obscure to us."

However, the Planck - Stoney scale energy cluster provides unity charge/gravitational force containment for all particles, at any radius... **Table 3.**

Description	Mass (kg)	Ratio of Columbic Force to Gravitational Force at Sch Radius	Ratio of Columbic Force to Gravitational Force at dB Radius
Stoney	1.859273E-09	1.000000E+00	1.000E+00
Planck	2.176000E-08	7.300767E-03	7.301E-03

Table 3. The ratio of Columbic force (F_c) to the Gravitational force (F_G) for Stoney and Planck particles at their de Broglie and Schwarzschild Radii; in **Figure 1**; at all radii conceivable, for the Planck mass it is the constant alpha, for the Stoney mass it is unity.

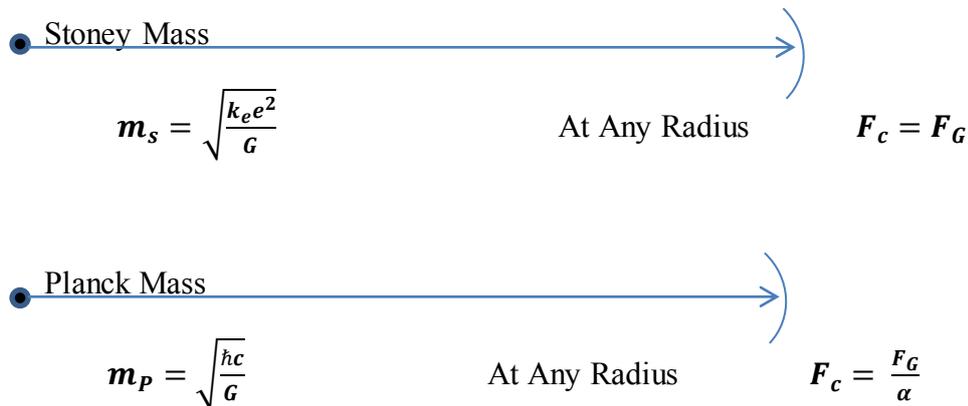


Figure 1. Ratio of Columbic force (F_c) to the Gravitational force (F_G) for Stoney and Planck mass respectively, unity, and the fine structure constant α , for any radii conceivable.

It is now widely accepted that at the center of nearly every galaxy, there is a supermassive black hole. For having used the estimated total dynamical mass for the galaxies, the consequent size of the radii are overstated, yet the study (Table 2) above does predict a black hole at each center, and this would occur for all known galaxies.

Data for the observable universe, derived from the WMAP study for the Hubble constant, and the resulting critical density of $9.3e^{-27}$, place it plainly within its own black hole with a total mass of $3.14-3.35e^{54}$ kg. Yet, as seen above in Table 1, what most catches the attention is that the gravitational acceleration at the event horizon falls below the universal constant G . More importantly, the force relation of all black holes (in any model) is in every case equivalent. This value is important for having a direct connection with the universal frame.

The Universal Frame

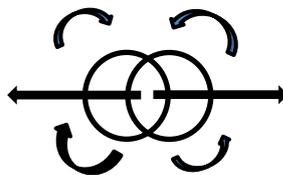
At this point, we consider this universal quantum background, where all existence is effectively dominated by a unique quantity, the force required to contain electromagnetic energy.

It turns out that the universal fine structure constant α is a simple force derivation made from the ratio of the Columbic force at a Planck particle's Schwartzchild radius, and the gravitational Schwarzschild radius force. It is also derivable from the Columbic force at the de Broglie radius in ratio to the Planck force. Similar relationships are obvious for the Planck energy ground state. This may be more clearly represented by Table 4 below.

Item	Mass (kg)	Schwartzchild radius (m)	de Broglie Radius λ (m)	Columb force at Sch radius	Columb force at dB radius	Schwartzchild Force (FSc)	Planck Force (Fpl)	→	Results
Planck	2.177E-08	3.232E-35	1.616E-35	2.208E+41	8.832E+41	3.026E+43	1.210E+44	→	7.297E-03
0.5 Planck	1.088E-08	1.616E-35	3.232E-35	8.832E+41	2.208E+41	3.026E+43	1.210E+44	→	7.297E-03

Table 4. The alpha constant here shown is unique in that it is a purely force derivation. If Planck background energies really do exist, we can assume a cycle repeating; a universal source for the quantum fluctuation, and reality.

This graphic shows a single point of the Planckian background field, an “ever-continuing moment of creation”, in a dynamic universal equilibrium, where space-time is quantized through the Planck interaction.



The Planck Interaction

In this model, the universal radius is simply the square root of the universal mass, (in meters of course), it is a singular solution which resolves to its own Schwartzchild radius, and is unique to this universal mass value alone.

$$R_u = \sqrt{M_U} = \frac{c^2}{2G}$$

Intuitively, wherever you are on the interior of a black hole, your universe appears to be expanding, and because of space-time deformation, the relative views of all accelerations at the apex* is not discernible from the view at the event horizon.

* The “apex” (Lorentz space) is postulated to be that limit beyond which, accelerations produce velocities approaching the velocity of light, and at which point masses approaching

the Planck mass “transform” into the larger perimeter electromagnetic containment well. This limit exists for all matter and at any location within the universal event horizon.

The Lorentz space

As an example we consider a particle (or a galaxy full of particles) being accelerated towards the speed of light.

Where, $E_v = \frac{E_0}{\sqrt{1-\frac{v^2}{c^2}}}$, the limit being the Planck mass/energy for approaching the speed of light, energy increases, until approaching the Planck energy, (The reason for this limit is that it (whatever energy it contains) is engulfed in its own black hole, thus rendering it impossible to add further attractive force). Rather, the envelope expands in (accordance with Bekenstein’s area law), and continues being held by Schwartzchild force (F_{sc}) gravity.

But before this, at a certain density a simple quantization occurs according to the equation below. The equation holds true for any and all mass or energy including the Planck particle.

$$\frac{R'_{sw}\lambda'}{2} = l_p^2 = \lambda_p^2$$

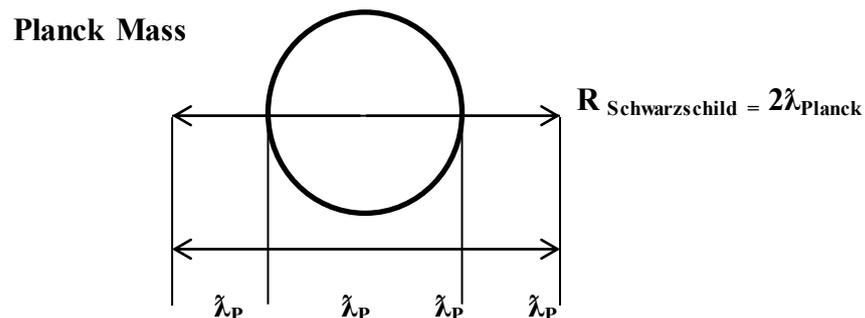
Where $l_p^2 = \lambda_p^2$ equals the Planck length²; R'_{sw} equals the Schwarzschild radius; and λ' equals the de Broglie radius of the particle.

For any event whatsoever, a general equilibrium is achieved according to its de Broglie and Schwarzschild radii. This is where we are today; all things are in a state of Fugue, producing a “well” through the continuing tension source found exclusively at the Planck Interaction Scale⁽²⁾.

The Universal Quantum Background

At this point the argument obviously diverges into gravitational and the electromagnetic viewpoints.

However, as shown above,



$$\frac{2Gm_P}{c^2} = 2\lambda_{Planck} = 2l_P = R_{Schwarzschild}$$

The Planck interaction (mentioned above) serves as the symmetric source for the fine structure constant α , and of charge, which as a field then delineate, the balance between gravitational attraction and electrostatic attraction and repulsion.

$$\alpha = \frac{k_0 e^2}{GM_P^2}$$

α is equal to the ratio of the general Columbic constant, to G times the Planck mass².

Discussion

The universe expresses equilibriums of all sorts, and seeks equilibrium.

Consider the de Broglie radius as a compliment to the Schwarzschild radius

All matter and energy are in a natural state of fugue (flight), towards the primary quantum field, where inertia might be viewed as this natural elemental interaction with the quantum background⁽³⁾.

All the known particle masses and radiant energy are derivable from the Planck constant (h). The relationship is ubiquitous, integral, and determines quantic availability for all particulate mass and energy.

Planck himself observed,

“There can be no doubt that the constant h plays a definite role at an emission center of the elementary oscillation process... The thermodynamics of radiation will have arrived at an entirely satisfactory conclusion only when the constant h is understood in its full universal significance”.

Given the entire above, several questions remain.

Is the density of the universe increasing?

In a black hole is contraction really equivalent to observed expansion?

A friend of mine commented, that since all of this occurs within a Schwartzchild radius, it might well explain why it is dark at night. The model leaves many questions, which, in any case is probably a good sign.

Special thanks to CNPq, LAQA, UFPB, and this beautiful country called Brasil, for all their support and patience.

David Harding

REFERENCES

1. https://www.academia.edu/36441748/Equilibrium_Universe_The_Whole_Universe_from_First_Principles
2. https://www.academia.edu/36456794/The_Cosmic_Microwave_CMB_and_Infra_Red_Background_CIRB_are_Simple_Effects_of_Continual_Quantum_Vacuum_Iteration
3. https://www.academia.edu/37213196/Space-time_itself_is_the_principal_motive_for_rejecting_the_Big_Bang_An_Equilibrium_Event_is_proposed_in_its_place