

# Relativity, Magnetic Charge, and Weak Bosons Mass

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## Abstract

This paper continues our analysis of the Universons hypothesis and its compatibility with existing knowledge.

We analyze massive bosons mass and resonances and find harmonic numbers consistent with existing mass measurements or estimates, including the possible Higgs signal detected at CERN. Using quarks and massive bosons, resonances imply strong symmetry breaking for the first quarks generation and the W boson, but the same numbers possibly relate to a hidden harmony.

We find two distinct logics to explain Mikhaïlov magnetic charge. The first is based on our analysis of charge/energy ratio and inertia, and the second uses particles resonances.

The constraints imposed by inertia to the properties of absorption imply that pseudo-quantization of magnetic charges is consistent with Special Relativity if the flux propagates at the speed of light or much faster. In both cases, the consequence is the existence of an aether drift effect when measuring one-way light propagation, in agreement with existing positive confirmations, but no drift is measurable using the classical Michelson-Morley experiment.

We discuss the interest the theory and compare briefly with current advanced concepts.

**Keywords:** Universons, origin of mass, mass quantization, weak bosons, relativity, aether drift, Mikhaïlov charge, Dirac charge

## 1. Introduction

This paper is a continuation of Consiglio (2012) recent publication, where our ambition was to check if Poher's Universons hypothesis (2011-2012) could be acceptable with regards to current knowledge. In doing so, we are essentially motivated by experimental results from different authors (Podkletnov & Nieminen, 1992; Podkletnov & Modanese, 2003; Tajmar et al., 2006; Poher, 2011) which seem to defy analysis based on the Standard Model as well as common sense; in particular energy/momentum conservation laws *seem* broken.

Our initial study partly answered the question and did not rule out the Universons hypothesis; on the contrary, we found ground in existing knowledge (basic Quantum physics, particles mass, and gravitation) but some important and basic aspects are left open. Let us word them as questions:

- Does the mass quantization equation work with massive bosons?
- Is there a link between this theory and quantified magnetic charges?
- How can inertia work with a flux of monopole pairs; is there a link with gravitation?

Similar questions can be added almost ad-infinitum, and then in this paper we will try to answer solely these three questions, which we judge most fundamental. More important, our analysis leads to considering them together as our answers are closely related.

The structure of this paper was made parallel to the progression of our ideas, and in order to highlight possible experimental confirmations. This order can be surprising and a different one would certainly be better for a theoretical presentation; we believe however that our logic and deductions are properly presented this way.

## 2. Background

In order to understand this paper, concepts and equations from our previous publication are necessary; see Consiglio (2012) for details. We provide hereafter solely with a synthetic view of our concepts together with the equations that we will use.

## 2.1 Main Concepts and Assumptions

From Poher (2011, 2012):

We assume the existence of a universal flux, possibly of particles, so called Universons, and initially defined as elementary momentum carriers. We assume, after Poher (2011), that particles inertia is created by a mechanism of absorption/retention/reemission. The mechanism imagined by Poher is permanent, and enables particles to acquire energy from the flux, this is absorption. During retention, this energy is assumed static, and then accounts for particles mass. Reemission takes place after a fixed time  $\tau_0$ , and then the particle mass is stable over time and depends on a specific cross-section. Particles mass is represented in a generic way:

$$m = 4\pi F_u S_0 \tau_0 / c \quad (A0)$$

$F_u$  represents the Universons flux; it is momentum per square meter per second, a pressure ( $\text{N/m}^2$ ), thus the flux can also be interpreted as a pressure field or an energy density ( $\text{J/m}^3$ );  $4\pi$  is the full solid angle;  $S_0$  is the cross-section ( $\text{m}^2/\text{sr}$ ) of the particle interaction with the flux;  $\tau_0$  is a constant time (seconds);  $c$  is the speed of light (m/s). Only  $S_0$  depends on the particle type.

From Consiglio (2012):

Gravitation is created by particles interaction with the Universons flux and directly related to the transformation of the flux (entropy/momentum spectrum) during its interaction with matter. The cross-section of particles with the re-emitted flux is half their cross-section with the background flux. This point is of particular importance for several concepts developed in this paper, and then the demonstration is repeated in Appendix B.

The flux is assumed composed of neutral pairs of magnetic monopoles consistent with the geometry of Lochak (1995–2003) theory. A pair is composed of two identical charges with opposite chirality. In previous publication, we showed that this assumption agrees with SU(3) and P and CP symmetry breaking.

We depart from Poher concept on the mechanism of retention. Instead of assuming that captured energy is static, we make one more step and assume that energy is in perpetual movement and that particles are dynamic systems whose constituents are circulating and in resonance. This leads in particular to a mass equation quantization, consistent with regards to electrons and quarks masses.

## 2.2 Formulas

All equations in this section are deduced in previous publication (Consiglio, 2012), please refer to it for details and demonstrations; in particular for the mass quantization equation (A3).

General:

Elementary particles physical properties obey the following equation:

$$A = h \tau_0 \nu + h \exp(i 2\pi \nu t) / 2 = E \tau_0 = h S / k = 2\pi J \quad (A1)$$

$A$  is an action,  $E$  the particle energy,  $J$  its total angular momentum,  $S$  its entropy,  $\nu$  its frequency and  $\tau_0$  the retention time, which is Lorentz invariant and independent of the particle type. Equation (A1) is linked to a quantum of absorption/reemission,  $2P_0$ , exchanged with the flux at each period of a particle wave, which is also Lorentz invariant and independent of the particle type:

$$2P_0 = h / \tau_0 c \quad (A2)$$

Mass/resonance equation:

The particle mass is in reverse proportion to a volume that we analyze based on resonances. It is computed using three integers (named  $N$ ,  $P$ , and  $K$ ) and electrons mass  $m_e$  according to:

$$m_x = m_e ((1/4 + 2d)^3 + \mu/X) / ((1/NP + Kd')^3 + \mu/X) \quad (A3)$$

Numbers  $1/4$ ,  $1/NP$ ,  $d$  and  $d'$  represent relative distances and depend on the particles family;  $(1/4 + 2d)$  is the resonance found for electrons (repeated in Table 3 in this paper);  $\mu$  represents a small energy ( $\mu \approx 242 \text{ eV}/c^2$  for electrons, muons, tauons),  $X$  is a natural constant ( $\text{kg m}^3$ ). We do not deduce the rules governing  $N$ ,  $P$ , and  $K$  then we search resonances (values of  $N$ ,  $P$ , and  $K$ ). Obviously, such method bears sense on three conditions:

- 1) If numbers  $N$ ,  $P$ ,  $K$  are small, as a mass can always be approximated using such formula using large numbers.
- 2) Numbers  $N$ ,  $P$ ,  $K$  exhibit some logic, because particles of the same family should share a common geometry, and this should be seen in the resonances in the form of rules governing those numbers.
- 3) Values of  $d$  (and  $\mu/X$ ) are somehow related between different particles families.

### Magnetic Charges:

Magnetic monopoles are pseudo scalar charges quantified according to their momentum; we use the ampere-meter convention, and then express magnetic charges as  $C\ m/s$ . Denoting  $|g|$  the absolute value of a magnetic charge, and  $P$  its momentum:

$$|g| / P = \text{const. } (C / kg) \quad (A4)$$

The rationale for (A4) is that the quantum of momentum reemission is Lorentz invariant; as seen by a moving observer, only particles rate of reemission is variable. It is then possible that the quantum of charge and momentum are also Lorentz invariant. Then (A4) is a minimal formulation.

### Associated Velocity:

A velocity  $\sigma$  is computed based on Poher (2011) estimate of Universons energy,  $E_u \approx 8.5 \cdot 10^{-21} J$ , and his initial formula linking  $E_u$  and  $\tau_0$ :  $E_u \tau_0 = 9 h / 4 \pi$  (Poher, 2005). Denoting Dirac charge  $g_D$ , using  $\mu$ , the mass in (A3), we define a velocity "associated to" Dirac charge:

$$\sigma = (g_D / 2P_0 c) / (e / \mu c^2) = 6.6827 \cdot 10^{13} \text{ m/s} \quad (A5)$$

We see equations (A4-A5) as a convenient manner to link a geometry involving space, time and charge with measurable energies. We do not mean for instance that  $\sigma$  is a real velocity. The use of  $2P_0$  is a choice that will be explained in a later section.

### 3. Weak Bosons Resonances

CERN (2012) announced candidate Higgs signal detection and mass range; we assume that this signal corresponds to a third massive boson continuing the weak particles family and use the available mass estimate ( $125.3 \pm 0.6 \text{ GeV}/c^2$ ). This assumption is necessary in order to analyze the resonances of the weak bosons, as we need at least three masses to find matching parameters for our formula. Our method is not an exhaustive search, nor is it for quarks or electrons; we rely on insight and iterations to match the three masses. It proved efficient for electrons and quarks, and then we just repeated it. Table 1 shows the results of our search for weak bosons (a detailed spreadsheet is provided as supplementary material).

Table 1. Weak Bosons Mass and Resonances

Particle	P	N	K	NP	Measured (*)	Computed (*)	Difference
W	12	12	-15/8	144	80,396	80,394.53	- 4.3 $10^{-5}$
Z	12	12	-7	144	91,187.6	91,187.62	2.5 $10^{-7}$
Higgs?	12	12	-19	144	125,300	125,258.7	- 3.3 $10^{-4}$

\*MeV/c<sup>2</sup>

The mass formula (A.3) is modified as compared to electrons and quarks. Modifications do not change the structure of the formula but concern parameters adjustments:

- $m_x = m_e R_e^3 / V_x$ . Using  $R_e = (1/4 + 2 d (\text{electrons}))$  for electrons.
- $\mu = 0.242 \text{ KeV}/c^2$ , identical as for electrons.
- $R_x = (1/NP) + K d (\text{bosons})$
- Distance:  $d (\text{bosons}) = 5.48947 \cdot 10^{-5} = d (\text{electrons}) / 15.5429$ .
- Particle exclusion volume:  $V_x = R_x^3 / (1.005613 \pi)$ .

The number 15.5429 is the following dimensionless ratio:  $1.007459 * m_e c^2 / 4 P_0 \sigma$ , with  $m_e$  the electron mass. (We started with  $m_e c^2 / 4 P_0 \sigma$  and then made the adjustment.) Then from (A4 - 1),  $4P_0 \sigma$  is two Universon energy multiplied by  $\sigma/c$ .

*This point is of importance as it reveals that the charge involved in the absorption-reemission process is not Dirac charge, but related to a charge  $g_U = g_D c/\sigma$ . Then  $P_0 \sigma$  is the energy of a Dirac charge, and  $m_e c^2 / 2P_0 \sigma$  is the ratio of energy between one electron and one Dirac charge. It is not surprising then that the distance  $d$  must be computed in this manner from that of an electron as it is the effect of a pressure. If we assume that for an electron, the pressure is exerted by small charges  $g_U$ , while for a weak boson it is exerted by larger charges  $g_D$ ,*

the idea to test such ratio is trivial.

However its physical meaning is not trivial at all, as the same calculus is relevant as well with muons mass, but results in a different ratio. Actually, we should consider  $m_e c^2 / 4P_0 \sigma$  as indicating that weak bosons are second order particles, or super-structures, built on a structure which is the number of Dirac charges in an electron – or close. The idea is too speculative to develop here, however, from (A5),  $2P_0 \sigma / c = g_D \mu / e$ ; this is the trivial equation that gives a momentum to a Dirac charge, and links it to electric poles charge and energy. Its use here can be interpreted as indicating Dirac charge physical existence.

We remark that the number 1.007459 is very close to the ratio  $d(\text{quarks}) / d(\text{electrons}) = 1.007467$ . We do not understand these adjustments, and we discuss their possible origin in Appendix A. However, using 1.007459 instead of 1.007467 for quarks leads to masses still well centered in known ranges, and then with regard to quarks, we have exact opposite adjustment coefficients for electrons and weak bosons – or close.

The use of  $Vx = R_x^3 / (1.005613 \pi)$  is quite strange as the factor  $\pi$  is not present in the calculus of other particles mass; it could relate with resonance geometry (e.g. circular versus radial). We tried without success to find numbers  $N, P$  different from 12 that would not need this factor.

In Table 1, numbers  $N, P$  and  $K$  are of interest:

- $NP = 144$  for all three particles, this means a single common resonance and then a common geometry.
- Numbers  $K$  are similar to  $N$  of quarks (see Table 2) for second and third generations, respectively: 7 for  $Z^0$  and second quarks generation (7 and 14), and 19 for Higgs and third quark generation (19 and 38).
- We use a fraction for the W boson  $K$  factor, as we find no other choice. This is still a strong resonance since  $NP = 144$  can be divided by 8. We could also divide  $d(\text{bosons})$  by 8, to get the same masses (ending with  $K = \{-15, -56, -152\}$  but the relation with quarks is less visible and we do not see a rationale for such high numbers).

Table 2. Quarks Masses and Resonances

Particle	C	P	N	K	Computed (*)	Min (*)	Max (*)
Up	2/3	3	14/7 (15/7)	-6	1.93 (2.39)	1.7	3.3
Down	1/3	3	19/7	-6	5.00	4.1	5.8
Charm	2/3	3	14	-6	1,255.2	1180	1340
Strange	1/3	3	7	-6	106.4	80	130
Top	2/3	3	38	-6	172,498	171700	173300
Bottom	1/3	3	19	-6	4,286	4130	4370

(\*) MeV/c<sup>2</sup>

But then using a fraction for quarks, we would change the  $N$  and  $P$  factors for the Up and Down ( $P = 3, N(\text{Down}) = 19/7$  and  $N(\text{Up}) = 14/7$  or  $15/7$ ) as this gives better centered calculated masses with regard to known ranges and  $P = 3$  for all quarks. This results in Table 2 for quarks, modified from Consiglio (2012). For the sake of clarity, we repeat also Table 3 for electrons, from the same publication, as it will be used in the following discussions.

Table 3. Electron, Muons, Tauons Masses and Resonances

Particle	P	N	K	Computed (*)	Measured (*)
Electrons	2	2	2	N/A	0.5109989184
Muons	5	5	3	105.6583667	105.6583667
Tauons	9	9	5	1776.840037	1776.840

\* MeV/c<sup>2</sup>

Now looking at the three tables together, the numbers we find match all criteria of significance discussed before: Numbers  $N, P,$  and  $K$  are small, they exhibit different logics, one for each particle family, and different values of  $d$  are clearly related between particles families. Each particle family has its specific resonance scheme, and then

geometry.

Moreover:

- The resonances of electrons, muons, and tauons are based on primes 2, 3, and 5, with  $N = P$  variable.
- The resonances of quarks are based on 7, and 19, with  $P = 3$ ,  $K = -6$  constant;  $N$  based only on primes 2, 7, and 19, are clearly related to the electric charge for second and third generation. We can see a form of symmetry in second and third generations, but this symmetry is inverted for the first generation.
- The weak bosons resonances are given by 3, 5, 7, 8, and 19, with  $N = P = 12$  constant (all primes from electrons and quarks are used). This is interesting as 12 is the product of  $NP = 4$  of the electron, and  $P = 3$  constant for quarks, and this possibly relates first to our reasoning on the value of  $d$  (electrons) /  $d$  (weak), and second to the opposite adjustment factors.
- Again, we have a form of symmetry in second and third generation of weak bosons ( $K = -7$  and  $-19$ ), but with respect to quarks ( $N = 7$  and  $19$ ); again, it does not apply to the first generation.
- All particles with unitary electric charge are based on 2, 3, 5 only; all other particles use 7 or 19, and never use 5.

As a consequence, our analysis results in all elementary particles resonances (and masses) built from combinations of five prime numbers {2, 3, 5, 7, and 19} and two fraction denominator {7, 8}.

*A trivial interpretation is that the mass interaction is based on a matrix or a ratio defined by these numbers.*

#### 4. Magnetic Charges Observation

Mikhailov (1987) gave an empirical magnetic charge quantum that departs from Dirac prediction:  $g_M \approx \alpha^2 g_D / 3$  (denoting  $\alpha$  the fine structure constant). This empirical value is based on Mikhailov and other authors experiments.  $g_M = 5.8418 \cdot 10^{-14} \text{ C m/s}$ .

A real mystery in our equations is (A5), which can be read as  $(g_D / 2P_0) / (e / \mu) = 2.23 \cdot 10^5$ ; this huge difference in the charge/energy ratio between electric and magnetic poles would result in a universe full of Dirac charges; we should have noticed. But (A5) is based on the assumption that the reemission charge is  $g_D$ . If instead we use Mikhailov charge, we find a much smaller difference  $(g_M / 2P_0) / (e / \mu) = 3.96 \approx 4$ . We should still live in a universe full of magnetic charges, but their detection would be a lot more difficult.

However, in the analysis of weak bosons mass, we had to adjust the distance  $d$  using the velocity  $\sigma$ . This point was interpreted as the fact that  $P_0 c$  is the energy of an elementary charge  $g_U = g_D c / \sigma = 1.4764 \cdot 10^{-14} \text{ C m/s}$ . This charge is associated to velocity  $c$ , a natural constant, and is defined from (A5) as:  $g_U = 2e P_0 / \mu$ .

Interestingly,  $g_U$  is a sub-multiple of  $g_M$ :  $4 g_U = 5.9056 \cdot 10^{-14} \text{ C m/s} \approx g_M + 1\%$ ; then if the charge  $g_U$  or  $2g_U$  is involved in the reemission process, Mikhailov charge can be explained as a natural exchange. This is a first approach consistent with observation. *As far as we know, this reasoning is the first that leads to a charge compatible with Mikhailov empirical estimate.* Let us now look at a second aspect of  $g_U$ .

Dirac charge is a theoretical result of Quantum Physics to which Mikhailov estimate seems incompatible (this can be seen as an agreement with our assumption of a sub-quantum reality – or even a good justification). However, we use Dirac charge energy (velocity  $\sigma$ ) to compute weak bosons masses. Then we believe that Dirac charge  $g_D$  has physical significance, but in an emerging quantum order, and that the ratio between the two charges links quantum and sub-quantum. The link is related to particles mass, wave, and frequency and then it should be visible in our resonances. On one side  $g_U$ , a very small charge, relates to absorption/reemission; on the other side, we find ground to assume that  $g_D$ , quite a large charge, relates to retention. Then  $g_D$  should split into sub-quanta  $g_U$  (and conversely sub-quanta merge), and the split must be compatible with *all* resonances.

Therefore we should have the ratio  $g_D/g_U$  related to integers and fractions in our tables. Let us analyze the most trivial relation:  $g_D = n g_U$ , with  $n$  integer multiple of any prime in  $N$ ,  $P$  and maybe  $K$  of our tables. Intuitively, it should be a valid approximation:

- 1) As a first step, from electrons and quarks, we simply multiply our primes {2, 3, 5, 7, 19}  $\rightarrow 3990$ .
- 2) But we also find the denominator 7 under 19 (Down quark); then  $7 \times 3990 \rightarrow 27930 (\approx g_D / 2 g_M)$ .
- 3) Now if we use also the denominator of  $K = -15/8$  of the  $W$  boson, then:  $8 \times 27930 \rightarrow 223440$ .
- 4) Comparing  $g_D / g_U = 222919.24$  with 223440, we find a tiny difference of 0.23%.

*Our trivial relation holds, and this second approach is also consistent with observation.*

It is also important to notice that the second step results in a charge  $\approx 2 g_M$ . We chose  $2P_0$  in (A5), as one of the solutions that fits with pairs of monopoles, but other choices would fit as well, using for instance  $P_0$  or  $4P_0$ .

## 5. Inertia and Relativity

According to Consiglio (2012), space-time curvature is seen as an appearance or an emergence of the mass-giving mechanism (see Appendix B for reasoning and details); because curvature is so intimately linked to the very nature of space-time, it would be shocking that space-time and its curvature are not a single emergence or appearance. Then, as far as mass is concerned, the entire problem is to find what determines the so-called relativistic mass variation. We find gravitation in the flux transformation during its interaction with matter, and then assuming a single mechanism for inertia and gravitation, we should find the mass variation emerging in a similar way. We will first assume a quasi-Galilean universe, not bounded by light velocity, with a rest frame defined by flux isotropy; then we will check our logic using Minkowski space and highlight differences.

### 5.1 Quasi-Galilean Space

For an observer of velocity  $v$  with respect to the rest frame seeing a charge with an incidence angle  $\theta$ , we logically define a Galilean transformation based on charges associated velocities:

$$g_U = g_D c/\sigma; g_D(v, \theta) = g_D(v \cos \theta + \sigma) / \sigma; g_U(v, \theta) = g_U(v \cos \theta + c) / c \quad (1)$$

Equation (1) supposes velocities composition for a pseudo-scalar charge based on its associated velocity.

Then, using (A4), the momentum associated to  $g_U$  is:

$$P(v, \theta) = P_U(v \cos \theta + c) / c \quad (2)$$

The energy of a magnetic pole in the field of an electron is proportional to the product of charges, and then we must use a relativistic-like formula to define energy:

$$E(v, \theta) = E_U(v \cos \theta + c) / c \quad (3)$$

Equations (1-2-3) define a convenient way model pseudo-scalar charges with a non-Lorentz transformation that we assume valid as long as  $v < c$ . It is similar to Galilean approximation in Minkowski space, but authorizes a flux of velocity  $C \gg c$ . We also assume no time dilation as long as  $v < c$ . Since we are searching a mechanism by which Relativity emerges, it is natural to start free of limit velocity, and then to deduce it, together with time dilation and mass variations.

Equations (1-2-3) are the definition of our quasi-Galilean space. In practice, it could be for instance a Minkowski space with a limit velocity  $C \gg c$ , or simply a Galilean space, or anything else where (1-2-3) are a good approximation as long as  $v < c$ .

### 5.2 Emergence

We are now going to analyze charges captured from the front and the back of a particle of velocity  $v$  (with  $\theta = 0$  and  $\theta = \pi$ ). Denoting  $N_U$  the number of charges received each second by a particle at rest, for a moving particle of constant cross-section:

$$\text{Back:} \quad N_1 = N_U (C - v) / C \quad (4.1)$$

$$\text{Front:} \quad N_2 = N_U (C + v) / C \quad (4.2)$$

We now compute the momentum received from two opposite directions by a particle of velocity  $v$ , as seen by a quasi-Galilean observer accompanying the particle.  $S(P(v))$  is the cross-sections of the particle for received momentum  $P(v, \theta)$  in (2).

$$\text{Back:} \quad N_1 P_1 = N_1 P(-v) S(P(-v)) \quad (5.1)$$

$$\text{Front:} \quad N_2 P_2 = N_2 P(v) S(P(v)) \quad (5.2)$$

According to the law of inertia, we need  $N_1 P_1 - N_2 P_2 = 0$ , and then we need a momentum-dependent cross-section:

$$S_U = S(P_U); S(P(v)) = S_U c C / ((c + v) (C + v)) \quad (6)$$

From (3-6), but using  $C \gg c$ , we can neglect  $C / (C + v)$  in (6), then from (3-5-6), using T for temperatures:

$$\text{Back:} \quad N_1 = N_U c / (c + v); T_1 = T_U (c + v) / c \quad (7.1)$$

$$\text{Front:} \quad N_2 = N_U c / (c - v); T_2 = T_U (c - v) / c \quad (7.2)$$

(Note that a Galilean space in which charges propagate at their ‘‘associated velocity’’ would lead to the same result.)

We see from (7) that  $N_1 T_1 + N_2 T_2 = 2 N_U T_U$ , but:

$$N_1 + N_2 = 2 N_U c^2 / (c^2 - v^2) = 2 N_U \gamma^2 \quad (8)$$

From (3-7), the absorbed energy rate is constant:  $2 N_U E_U$ , the energy input of the particle does not change. But from (8) the number of charges absorbed increase as  $\gamma^2$ . This implies a merge of elementary charges, logically to the middle-point  $\gamma$ . Using double arrows to symbolize the flux interaction with matter, between absorption and reemission we have:

$$2 N_U \gamma^2 \rightarrow 2 N_U \gamma; \{N_1 T_1 \& N_2 T_2\} \rightarrow 2 (N_U \gamma) (T_U / \gamma) \quad (9)$$

Then, as we assume no time dilation,  $\tau_0$  must also evolve according to  $\gamma$ , then energy is retained longer and because the reemission temperature is lower particle pulsation increases:

$$\tau_0 \rightarrow \tau_0 \gamma; E_U \rightarrow E_U \gamma; \omega_0 \rightarrow \omega_0 \gamma; P_U \rightarrow P_U / \gamma \quad (10)$$

Time  $\tau_0$  is the “tick” of particles clock, its variation in (10) creates time dilation.

In consequence, our reasoning on flux transformation and equation (10) describe Minkowski space-time emergence from the same mechanism as the emergence of its curvature. But if we redo the same demonstration with another charge  $\lambda g_U$ , we will find  $\lambda c$  as limit velocity. *Then our Galilean approximation leads to the charge  $g_U$ , but also requires a quite specific composition of velocities.*

### 5.3 Lorentz Transformation

For an observer at rest the flux is isotropic and from (10), time elapses quicker with respect to moving observers at the same location. Then Lorentz transformation is absolute with respect to this observer. For any two co-moving observers  $A$ , and  $B$ , using  $t (A \rightarrow B)$  the apparent time for light to propagate from  $A$  to  $B$ , for our observer at rest, we have:

$$t (A \rightarrow B \rightarrow A) = t (B \rightarrow A \rightarrow B) \quad (11)$$

But for the same observer:

$$t (A \rightarrow B) / (1 + \beta) = t (B \rightarrow A) / (1 - \beta) \quad (12)$$

Distance  $|AB|$  is then seen different from distance  $|BA|$ , while distance  $|AB| + |BA|$ , is constant.

$$|AB| (1 + \beta) = |BA| (1 - \beta) \quad (13)$$

From (9-11-12-13), it can be easily verified that this transformation is identical to Lorentz when applied to any pair of co-moving observers as long as their velocities with respect to the rest frame is lower than  $c$  (using (10) for their own time dilation). This form of transformation is already known, and there will be a difference with Lorentz transformation when measuring one-way light propagation, so called aether drift; although the flux is no static aether in the Lorentz sense. Several experimenters report positive confirmation: Marmet (2004), Gift (2010, 2012); Selleri (2004) concludes with similar ideas.

### 5.4 Inertia in Minkowski Space

We now analyze inertia in Minkowski space. The flux propagates at light speed, we will modify (1  $\rightarrow$  10). We consider the absorption/reemission process as seen by an observer accompanying the particle, but we still assume a rest frame defined by the flux isotropy and we must verify that particle characteristics are invariant for this observer.

$$(1): \rightarrow g_U = g_D c / \sigma; g_D (v, \theta) = g_D \gamma (v \cos \theta + c) / c; g_U (v, \theta) = g_U \gamma (v \cos \theta + c) / c \quad (14)$$

$$(2): \rightarrow P (v, \theta) = P_U \gamma (v \cos \theta + c) / c \quad (15)$$

$$(3): \rightarrow dE (v, \theta) = dE_U \gamma (v \cos \theta + c) / c \quad (16)$$

Number of absorbed charge *with constant particle cross-section*:

$$\text{Back:} \quad (4.1): \rightarrow N_1 = N_U \gamma (c - v) / c \quad (17.1)$$

$$\text{Front:} \quad (4.2): \rightarrow N_2 = N_U \gamma (c + v) / c \quad (17.2)$$

Momentum-dependent cross-section:

$$(6): \rightarrow S_U = S (P_U); S (P (v)) = S_U c^2 / \gamma^2 (c + v)^2 \quad (18)$$

Number of particles received per second and temperature with momentum-dependent cross-section:

$$\text{Back:} \quad (7.1): \rightarrow N_1 = N_U c / \gamma (c - v); T_1 = T_U \gamma (c - v) / c \quad (19.1)$$

$$\text{Front:} \quad (7.2): \rightarrow N_2 = N_U c / \gamma (c + v); T_2 = T_U \gamma (c + v) / c \quad (19.2)$$

Total number of particles received:

$$(8): \rightarrow N_1 + N_2 = 2 N_U c^2 / \gamma (c^2 - v^2) = 2 N_U \gamma \tag{20}$$

Average temperature/energy:

$$N_1 T_1 + N_2 T_2 = 2 N_U T_U \tag{21}$$

From (20–21), flux transformation includes an increase of entropy creation as:

$$(9): \rightarrow 2 N_U \gamma \rightarrow 2 N_U; \{N_1 T_1 \ \& \ N_2 T_2\} \rightarrow 2 N_U T_U \tag{22}$$

As seen by an accompanying observer, the particle is identical as at rest:

$$\tau_0 \rightarrow \tau_0; E_U \rightarrow E_U; \omega_0 \rightarrow \omega_0; P_U \rightarrow P_U; S \rightarrow S \tag{23}$$

We note that (18) is in agreement with (A3-6) as the total cross-section of the particle evolves as  $1/\gamma^4$ , but it conflicts with special Relativity that implies no evolution for this observer and  $1/\gamma^2$  for an observer at rest – but  $1/\gamma^2$  instead of  $1/\gamma^4$  for our observer according to Lorentz as we consider an absolute flux. In any case, we find the same absolute transformation as in (11-12-13), modified with  $\gamma$  of time dilation when considering a moving observer.

5.5 Conclusion

*Our analysis of inertia provides with a third logic compatible with charge  $g_U$ . A direct measurement of emitters beam velocity should indicate if Lorentz transformation is appropriate or not.*

Table 4 presents the link between Minkowski and our quasi-Galilean spaces as deduced. Italicized lines highlight differences; symmetric arrows address the symmetry of situations in Special Relativity.

Table 4. Minkowski and quasi-Galilean spaces

	Relative Rest	Relative Motion	Absolute Rest	Absolute Motion
<i>Retention time</i>	$\tau_0$	$\tau_0 \leftrightarrow \tau_0 (*)$	$\tau_0$	$\tau_0 \gamma$
Clock	T	$t \leftrightarrow t / \gamma$	T	$t / \gamma (**)$
<i>Temperature</i>	$T$	$T \leftrightarrow T$	$T$	$T / \gamma$
<i>Capture</i>	$dE_0$	$dE_0 \leftrightarrow dE_0 \gamma$	$dE_0$	$dE_0$
<i>Absorption – Reemission</i>	$N_0$	$N_0 \leftrightarrow N_0 \gamma$	$N_0$	$N_0 \gamma^2 \rightarrow N_0 \gamma$
Energy	$E_0$	$E_0 \leftrightarrow E_0 \gamma$	$E_0$	$E_0 \gamma$
Entropy	S	$S \leftrightarrow S \gamma$	S	$S \gamma$
Pulsation	$\omega_0$	$\omega_0 \leftrightarrow \omega_0 \gamma$	$\omega_0$	$\omega_0 \gamma$

(\*) time  $\tau_0$  is invariant as per (A1 – A2), conflicting with Relativity but consistent with interpretation of its origin.

(\*\*) time  $t$  in quasi-Galilean space defined as the interval for a given number of particles tick.

Table 5 displays particles collisions scenarios. The only difference is when a target moving at high speed hits a particle at rest, as the particle energy is defined absolutely in quasi-Galilean space. Symmetric arrows address Special Relativity, simple arrows the movement with regard to a target or a particle at rest. Dissymmetric collisions are consistent with aether drift measurements.

Table 5. Particle Collision

Collision	Relativity	Abs. Motion
Particle hits a fixed target	$E_0 \leftrightarrow E_0 \gamma$	$E_0 \rightarrow E_0 \gamma$ hits $E_0$
Symmetric particles collision	$2 E_0 \leftrightarrow 2E_0 \gamma$	$2 E_0 \rightarrow 2 E_0 \gamma$
<i>Particle hits a moving target</i>	$E_0 \leftrightarrow E_0 \gamma$	$E_0 \rightarrow E_0$ hits $E_0 \gamma$

6. Theoretical Values

Using exactly 223440, we can compute theoretical charges and constants of our equations:

$$g_U = g_D / 223440 = 1.472904 \cdot 10^{-14} \text{ C m/s} \quad (24)$$

$$g_M = 4 g_U = g_D / 55860 = 5.891617 \cdot 10^{-14} \text{ C m/s} \quad (25)$$

The constant in (A2) is:

$$g / P = 7.41985 \cdot 10^{14} \text{ C / Kg} \quad (26)$$

To be compared with electric poles, twice more energy per Coulomb:

$$e / \mu = 3.71884 \cdot 10^{14} \text{ C / Kg} \quad (27)$$

This result is of particular importance: if we also account for the fact that  $g_U$  is so small as compared to  $e c$ , it shows how much easier it is for Nature to build magnetic poles than electric ones in terms of energy expense (we do not address the separation of charges but solely the creation of poles).

The velocities “associated to” charges are:

$$g_U \rightarrow c; g_M \rightarrow 4 c; g_D \rightarrow \sigma = 6.6827 \cdot 10^{13} \text{ m/s} \quad (28)$$

We can complete our formula linking constants and charges:

$$\sigma / c = g_D / 2 g_U = 2 g_D / g_M \quad (29)$$

In previous publication, we showed that the cross-section of re-emitted Universons with matter is half the cross-section of the background flux, as it fits with gravitation (see Appendix B for details). Then using (6), at each period of its wave, a massive system will absorb 2 pairs of monopoles of individual charge  $g_U$  (for a total of  $4 g_U$ ) and reemit one pair of monopoles of individual charge  $2 g_U$  (for the same total charge). Then, a massive system can be seen as a quantified magnetic transformer with integer gain 2. Denoting  $g_R$  the reemission charge, we have:

$$g_R = 2 g_U = g_M / 2; g_R \rightarrow 2 c \quad (30)$$

Then  $2 \times 2g_U \rightarrow 2 g_R$  is the flux transformation deduced in our analysis of gravitation. The fact that  $g_R = g_M/2$  is our reason for using  $2P_0$  in (A5), as an exchange resulting in a charge  $g_M$  corresponds to the reemission of a pair of monopoles of identical charge and opposite chirality. Now if the universe is filled with a flux of pairs of massless monopoles of charge  $g_M/4$  and  $g_M/2$  and opposite chirality, individual pairs are almost impossible to detect; first because the charge is small and massless, second because according to Lochak (1995), the resulting magnetic current is null.

## 7. Discussion and Remarks

The theoretical interest of our study lies in several aspects from our previous publication or in the present paper. We see interest at two levels, relating to the foundations of Physics models and to the processes of Nature.

*Models:*

Quantum and Relativity might not be the end of the story. This is certainly the most important theoretical aspect of our study:

- Particles action variation in (A1) leads to de Broglie wave, Schrodinger equation, and uncertainty in their usual form (see Consiglio, 2012). But these three pillars of quantum theories result from classical physics applied to our supposed sub-quantum Universons field.
- We find in the same field a possible origin of Special Relativity and gravitation.
- The mass building mechanism can be consistent with faster than light propagation.

Then, to compare in a very general way with advanced theories, instead of using Quantum and Relativity as roots of our theory, we find their possible foundations in a single mass-giving flux/interaction. This makes detailed comparisons quite difficult and somewhat irrelevant as we do search an opposite direction.

An obvious example is that using Quantum, the minimal magnetic charge is Dirac's, and then any other charge observation cannot be understood as it is ruled-out by the foundations of the theory.

A second example is that of non-locality. Vigier-Bohm (1954) interpretation of quantum physics is a good example. If the flux exists, there is no need for a relativistic Vigier-Bohm theory, but to use invariant absorption/reemission (and possibly faster than light propagation) to implement the mysterious quantum potential and proto-consciousness of this theory.

A third example is virtual particles. Using (A1), a virtual particle should be defined as:

$$A = h (1 + \exp (i 2\pi \nu t)) / 2 \quad (31)$$

According to Quantum physics, its life cannot exceed  $\Delta t = h / E = 1 / \nu = \tau$ , one period of its pulsation, and then  $1/2$  in (31). Consequently, it should be possible to build any Quantum field theory from (31), but the reverse is not true because Quantum fields are not supposed to be a deterministic flux carrying momentum. Moreover this equation has a simple physical meaning: a virtual particle is maintained at best for the time needed to reemit action  $h$ : one period of its pulsation.

#### *Processes of Nature:*

Let us first list relevant results.

- At least to the extent of current measurements, the three massive particles families (electrons, quarks and weak bosons), obey the same general quantization equation, based on resonances that use quite small integers.
- The interaction of magnetic poles with electric ones leads to symmetry breaking (P and CP) and combinations of magnetic poles comply with SU(3) (Consiglio, 2012).
- We find two different theoretical justifications of Mikhaïlov charge, consistent together and with our assumption of a flux of pairs of magnetic monopoles at the origin of mass.

Mainstream research assumes a unique complex symmetry that is spontaneously broken at low energies. We found SU(3) combining magnetic poles, and broken P and CP symmetries in the interaction between electric and magnetic charges; but actually, there is no symmetry breaking at the most elementary level of unitary charges; instead, we have different symmetries for elementary electric and magnetic poles. Then comparisons are even more irrelevant as instead of three forces and particles families decaying from a broken symmetry, logic leads to a building process which naturally includes gravitation. Instead of three forces unifying at high energies, we should find the four of them building-up from the lowest energies, and creating more and more complexity:

*Electric + magnetic + dyons sub-particles  $\rightarrow$  12 massive particles + 4 forces  $\rightarrow$  nucleons, atoms, etc ...*

The first arrow of this process authorizes different types of symmetries, one for each particle family, depending on the sub-particles and geometry involved in resonances. But of course more theoretical work is needed on geometry and forces to validate or rule-out this logic.

For us, the immediate interests lie on practical grounds and applications. We can interpret the Podkletnov and Poher experiments as flux manipulations (instead of a big question mark) and find *simple macroscopic explanations of the observed effects*, which in turn provide with interesting directions of research.

- First, a tiny deviation of the flux can create a strong reaction force as predicted and reported by Poher (2011).
- Second, a large directional flux entropy decrease will conversely increase the cross-section of the flux sub-particles and create an acceleration of distant matter as measured by Podkletnov (2003), and Poher (2011).
- Third, it can easily be verified using (A1 – A2) and the value of  $\tau_0$  that the reemission of the moving electrons in an emitter is largely sufficient to account for observed energies, at least with respect to public experimental data.

Then, there is no problem in these experiments with respect to energy and momentum conservation, *and this is probably a prerequisite for any valid and predictive theory of these experiments.*

Based on the above points, immediate applications of the principles of this theory are straightforward, as initially searched by Poher: Propulsion and energy production. Energy and momenta conservation laws apply, but in an unexpected manner.

Moreover, if the flux is actually causal and faster than light, interstellar communications can exist which remain undetectable to our current technology. A direct detection of the natural flux, if physically possible, could open a new window to observe the universe.

## **8. Conclusion**

Our initial goal with this study was to determine if the Universons hypothesis could be valid with respect to current knowledge. Our answer at this point is positive. Moreover, analysis and simple reasoning led us to uncharted roads with quite unexpected results that we believe of interest. This is a good sign when exploring consequences of a new assumption.

On the theoretical basis we developed, a number of ideas came naturally about the inner mechanism of emitters, which we believe worth experimental verifications. We are therefore looking for an organization or a team willing to experiment and interested in the development of this technology.

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## Appendix A

### *A Hidden Harmony*

The list of primes  $\{2, 3, 5, 7, \text{ and } 19\}$  is well known of musicians even if they use different names; if the last two seem ignored as numbers, we know the first three of them as basic harmony. Then looking at this list, as numbers address frequencies and resonances, well, it looks like music! But harmony is the way to cancel or minimize the power of beat frequencies between different musical instruments vibrations and make them resonate together; then our study naturally leads to solving a similar problem with particles wave and frequency. But it is also the way for one instrument to resonate alone. We will then try and link particles resonances to a form of harmony.

We will start our harmony with a *C*; looking at Tables 3, 4, and 5, we find clear correspondences.

From Table 4 – Electrons, Muons, and Tauons:

Those relate with a common form of Just Intonation, the so-called 5-limit-tuning.

$1 \rightarrow 2$  is the octave.

$1 \rightarrow 3$ :  $3/2$  is the perfect fifth.

$1 \rightarrow 5$ :  $5/4$  is the major third.

$1 \rightarrow 9$ :  $9/8$  is the major second, and is also related to Pythagoras major third ( $81/64$ ).

The electrons family is built from 2, 3, 5, and 9. *C-E-G* (2, 5, and 3) is a perfect major chord; *D* (9) is added to make a major second chord. Looking at the last unitary charged particle, we find a *B* ( $K = 15/8$ ) from *W* boson to make a seventh major and  $N = P = 12$  is also a *G*. From Table 3 – Massive Bosons:

Using again 5-limit-tuning, the weak bosons define the elementary interval;  $N=P=12$  is the number of half tones in an octave;  $15/8$  is the *B* of the next octave and defines the repeat interval, a so called half tone.

The chord defined by these bosons is *Bb, B, D#*. It should be transposed, probably  $1 \rightarrow 36$ , using  $144/4$  as for electron  $NP = 4$ .

$NP = 12 \times 12 = 144$  defines the use of less than 6 octaves, as we start with  $NP = 4$  for the electron. The heaviest particle is the Top with  $NP = 114 < 144$ .

The use of  $15/8$  ( $3 \times 5/2 \times 2 \times 2$ ), 7 and 19 also define all basic tones or intervals used in all particles resonances.

From Table 4 – Quarks:

Harmonics 7 and 19 are ignored by all intonations that we examined. We searched using the equal temperament tuning, as a test case, where intervals are defined as: *Interval* ( $N, N + n$ ) =  $2^{n/12}$ , but 7 is not there. Then, because of  $SU(3)$  and  $P = 3$ , and  $K = -6$  for all quarks, we divided the octave in 36 intervals: *Interval* ( $N, N + n$ ) =  $2^{n/36}$ . Then, we had some results; for *P* and *K*:

$1 \rightarrow 3 \approx \text{Interval}(0, 57) - (0.11\%)$  (Same for 6).

For *N*:

$1 \rightarrow 14/7 = 2$  is an octave. (0%)

$1 \rightarrow 19/7 \approx \text{Interval}(0, 52) - (0.43\%)$

$1 \rightarrow 7 \approx \text{Interval}(0, 101) - (0.12\%)$  (Same for:  $1 \rightarrow 14$ ).

$1 \rightarrow 19 \approx \text{Interval}(0, 153) - (0.14\%)$  (Same for:  $1 \rightarrow 38$ ).

We have quite a good match; this is not surprising because we have small intervals, but it would not match so well with other scales (for instance a 14 or a 24 tones scale results in some differences higher than 1%).

If we want to estimate the distance between two tones, we must find the corresponding tones in the same octave. For a number corresponding to *Interval* ( $0, X$ ), the corresponding tone in the first octave is *mod* ( $X, 36$ ). Then:

$14/7 \rightarrow 0 \rightarrow 0$  (or 36)

$19/7 \rightarrow 52 \rightarrow 16$

$3 \rightarrow 57 \rightarrow 21$  (Same for 6)

$7 \rightarrow 101 \rightarrow 29$  (Same for 14)

$19 \rightarrow 153 \rightarrow 9$  (Same for 38)

Using 36 in place of 0, the list is  $\{9, 16, 21, 29, 36\}$ , we have:  $\{16/9 = 1.3333, 21/16 = 1.3125, 29/21 = 1.381,$

$36/29 = 1.24$ }. Bearing in mind that we begin with integer resonances from which we deduce tones, this distribution is close to perfection as it almost defines regular logarithmic intervals.

But our 36 tones also includes the usual 12 tones scale. Let us look at other numbers:  $15/8$  and 5, but also add the 9 from Tauons.

$$1 \rightarrow 15/8 \approx \text{Interval } (0, 33) - (0.68\%) \rightarrow 33$$

$$1 \rightarrow 5 \approx \text{Interval } (0, 84) - (0.79\%) \rightarrow 12$$

$$1 \rightarrow 9 \approx \text{Interval } (0, 114) - (0.23\%) \rightarrow 6$$

Now looking at the complete list  $\{6, 9, 12, 16, 21, 29, 33, 36\}$ , all intervals are at least 3. Let us compute the ratio between two successive numbers:  $\{6/9 = 1.5, 12/9 = 1.3333, 16/12 = 1.3333, 21/16 = 1.3125, 29/21 = 1.381, 33/29 = 1.138, 36/29 = 1.24\}$ . If we omit the W boson, this is close to a regular distribution, with one minor anomaly at each end.

Interestingly, our reasonings on harmony lead to a possible explanation to our list of primes  $\{2, 3, 5, 7, \text{ and } 19\}$ . Why do we miss for instance 11, 13, and 17? A hypothetical particle using one of these primes would resonate on harmonics too close to an existing one, and break the chord; simply because the energy of the beat frequency would become high. Using  $11 \rightarrow 125 \rightarrow 17$ , this is one interval next to 16, which is already used. The same reasoning does not apply to 13 and 17, ( $13 \rightarrow 133 \rightarrow 25$ ;  $17 \rightarrow 147 \rightarrow 3$ ), but those are quite close to harmonics 12, 14 and 16, 19 respectively, and should not be considered at all in a global harmony (this is also valid for 11 with 5 and 12).

Moreover, musical harmony is always dealing with fine adjustments, and we found a few: the small adjustments in our mass formula between the three particles families. Looking at the coefficients, they seem to correspond to a specific harmonization as they are all comparable in range to the difference between equal temperament and exact harmonics. Then, possibly, particles resonances are based on a global harmonization and the small adjustments of our mass formula are deviations between our primes and an exact tuning that we did not find. Using equal temperament leads to approximations that almost match our adjustments, but we did not find how to link them together. In any case, particles masses might not be known with enough precision to find an exact tuning.

## Appendix B - Gravitation

### B.1 Flux Transformation

We assume the Universons flux momentum spectrum is wide. Equation (A2) implies that for any type of particle, for any observer, the re-emitted flux temperature or spectrum is constant. Then, for any observer,  $n T$  depending on the observer:

$$E = m c^2 = h \nu = P V = n k T \quad (\text{B1})$$

This defines a volume, a pressure, and a temperature. A particle re-emits its full energy in time  $\tau_0$ , then,  $n$  is the number of captured energy quanta. According to (A1-A2):

$$k T = 2 P_0 c = h / \tau_0 = \text{const.} \quad (\text{B2})$$

The entropy difference between the flux received and re-emitted must be positive:  $dS = dQ / T > 0$ . Therefore, the momentum spectrum of the re-emitted flux is different to the spectrum of the received flux. This leads to three possibilities, or situations:

- The interaction with matter leads to the destruction of Universons, in this case, the average energy of re-emitted Universons is higher than that of the received flux.
- The interaction with matter creates Universons, of lesser average energy than received.
- The interaction does not change the number of Universons, but the momentum spectrum is narrower.

In all cases, we know that the re-emitted flux momentum spectrum is the same in any frame of reference, for any particle. (Note: From section 2.1, we now see this as an approximation.)

Whatever happens in nature, this property is of great importance since it shows that the flux or pressure field is altered by its interaction with matter. Since the flux is carrying momentum, this alteration can be interpreted as gravitation.

## B.2 Gravitation

We therefore assume that inert mass and gravitational mass are two effects of the same phenomenon. In consequence, since gravitation is an attractive force, the reemitted flux must generate an absorption deficit compared to the background flux (at least in our epoch and at range lesser than the event horizon).

According to (A0), absorption deficit will reduce particles mass and pulsation; this effect is equivalent to space curvature and General Relativity uses this interpretation. But since we use a local directional effect associated to energy propagation, we cannot use this interpretation in this theory and we must use flat space.

We will first find a Schwarzschild metric equivalent using Newton potential and simple reasoning on the impact of the flux. Then we will show how the same result is reached using flux quantities.

Newton potential is:

$$\Gamma = -m_e G / R + const. \quad (B3)$$

Let us consider a particle at rest at distance R from a central mass; for an infinitely distant observer, from (A0-B3), particle energy and pulsation will be:

$$E_l = E_0 (1 - m_e G / c^2 R) \quad (B4)$$

$$v_l = v_0 (1 - m_e G / c^2 R) \quad (B5)$$

Then in (B3) the constant is  $c^2$ . But all energies will be impacted by (B4-B5), in the same way as particles pulsations; in particular, this will impact any measurement instrument. If we imagine a photon source at a given location, in flat space, photons energy is constant but measurement instruments at different altitudes ( $R_0$  and  $R_0 + \Delta r$ ) will be affected and a photon frequency shift will be measured; from (B5):  $\Delta v / v_0 = (-G m_e / R_0 c^2) \Delta r$ .

Then clocks and rulers will be seen differently by a distant observer:

$$dL_l^2 = dL_0^2 (v_0 / v_l)^2; dT_l^2 = dT_0^2 (v_l / v_0)^2 \quad (B6)$$

Using weak field ( $l \gg m_e G / R c^2$ ):

$$dS^2 = c^2 dT_l^2 - dL_l^2 = c^2 dT_0^2 (1 - 2G m_e / R c^2) - dL_0^2 / (1 - 2G m_e / R c^2) \quad (B7)$$

Equation (B7) is that of Schwarzschild metric, which we find as a consequence of matter interaction with the flux. *This result implies consistency with most verified predictions of General Relativity – if not all – but also that photons interact with the flux in the same manner as massive particles.*

We will now do the same reasoning using two results proven consistent with General Relativity (Poher & Marquet, 2012):

- A particle under acceleration does not capture Universons from a solid angle  $\Omega$  in the direction opposite to the acceleration:

$$\Omega = 2\pi A \tau_0 / c \quad (B8)$$

- The value of the gravitation constant G (using our notations):

$$G = c^2 / 4\pi F_u \tau_0^2 \quad (B9)$$

At distance R from a massive body of cross-section  $S_e$ , we model absorption deficit using a fictive flux  $F_e < 0$ :

$$F(R) = (F_u + F_e) S_e / R^2 \quad (B10)$$

Using the principle of equivalence, absorption deficit due to gravitation is equivalent to the non capture angle in acceleration. Then  $\Omega S_0 F_u$  is equal to the thrust of absorption deficit  $S_0 F(R)$ . Using (B8-B10):

$$F_e S_0 S_e / R^2 = -2\pi S_0 F_u A \tau_0 / c \rightarrow A = -F_e S_e c / 2\pi F_u \tau_0 R^2 \quad (B11)$$

Equation (B11) defines a “flux potential”  $\Gamma_l$ :

$$\Gamma_l = F_e S_e c / 2\pi F_u \tau_0 R + const. \quad (B12)$$

But using (A0) in (B3), Newton potential is:

$$\Gamma = -G S_e F_u \tau_0 / R c + const. \quad (B13)$$

Using (B9) in (B13), then comparing with (B12):

$$\Gamma_l = \Gamma \rightarrow F_e / F_u = -1/2 \quad (B14)$$

*Then in our model, the cross-section of a particle with the reemitted flux is half its cross-section with the background flux  $F_u$ . This is the signature of the flux entropy transformation we deduced.*

Particle energy and pulsation will be:

$$E_l = (F_u + F_e S_e / 2\pi \tau_0 c R) S_0 \tau_0 c \quad (\text{B15})$$

$$v_l = v_0 (1 + F_e S_e / 2\pi \tau_0 c F_u R) \quad (\text{B16})$$

Using (A0-B9-B14),  $F_e S_e / 2\pi \tau_0 c F_u R = -G m_e / c^2 R$ ; then (B15-B16) are identical to (B4-B5), and weak field leads to (B7) which is Schwarzschild metric. In conclusion, the existence of the Universon flux as a source of particles mass and gravitation is consistent with space-time curvature as an illusion or an emergence. An emergence would be that the flux itself is deviated by gravitation, an illusion that it is not. Accounting for the existence of black holes, it should not be an emergence, as they would inflate very quickly.