An Interpretation of the "Black Energy" in Universe by Using a Hydro-Dynamical Analogy with Newton Gravity

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Abstract: *There are arguments proving that what we see now as "normal energy" (including the equivalent mass-energy) represents only 5% of the total energy of the Universe [1]. The rest is invisible meaning that no widely accepted experimental proof exits to put it in evidence. In addition, there is no accepted theory to explain the nature of this so-called "black energy".*
This paper deals with an interpretation of the "black energy" also giving the possibility to follow its evolution in time by using an author hydro-dynamical model of the Newton gravity and a model of the early Universe; a connection between a part of this energy and the "black holes" is as well proposed.

Key Words: *fluid of HD-gravitons, variable gravity coefficient, emission, absorption*

1. INTRODUCTION

The supposition that the known matter and energy observed in our Universe does not represent all the existing ones is probably old enough. However, in the last time quantitative values for the possible existing percentages of "black energy" (68.3%) and "black matter" (26.8%) were given [1]. A possible interpretation of such big percentages is suggested by our hydro-dynamical analogy with gravity [2]. The main idea of this model is the analogy between the Newton gravity force and the sources interaction in an incompressible fluid. In this case the fluid is formed of photon-like particles that we call "HD-gravitons". Our HD-graviton is the weakest possible particle in Universe having the wave length equal to the radius of the Universe. Thus it is very hard (if not impossible) to detect. Therefore, at BIG BANG (better said BIG FLASH as the sound does not propagate through vacuum) the whole energy of the Universe is in the form of a single HD-graviton; that means that in fact what is now called "black energy" is the very energy of the created Universe and what one has rather to do is to explain the formation of the visible energy. To this aim we use the simple

physical- geometrical model of the early Universe given in [3]. In this model one attaches to any amount of energy a photon-like particle of the same energy whose wave length is used to associate a radius of a sphere. Then by considering a simple geometrical model coming from the observation that the minimum number of equal spheres that can enter in a sphere is eleven one attaches a structuring scheme where all the spheres are filled successively with 11 spheres. The number of the structuring steps should be clearly integer. The question is whether following this process one can obtain spheres having the same radius and energy as their associated photon. This is possible as we shall prove further.

According to our hydro-dynamical analogy, if E is an arbitrary amount of energy (other than HD-graviton) it can emit/absorb a rate of energy E' equal to:

$$E' = \theta_g E \,, \tag{1}$$

θ_g being the "rate intensity" ($\sec^{-1}$), which is positive for emission and negative for absorption.

There is force of attraction for both emission and absorption, similar to the gravity force. By comparing the Newton and the source forces one obtains an expression for the intensity θ_g .

The form given in Ref. [2] is adapted to take into account the diminution of the HD-graviton intensity due to the Universe expansion and the variation of the universal coefficient of gravity with the age of universe t_u .

2. DETERMINATION OF THE TOTAL ENERGY OF THE UNIVERSE. TRANSFORMATION OF HD-GRAVITONS IN SUBSTANCE

As mentioned above, according to our model of the early Universe [3], after the BIG BANG (BIG FLASH) the created primary spherical photon-like particle is submitted to a process of divisions in eleven equal spheres (the minimum number of equal spheres that can be inscribed in a given initial sphere, Fig. 1). By attaching to any amount of energy E a photon of the same energy one obtains a value for the radius of the 11 spheres equal to the wave length of the associated photon. Then the radius of an inscribed sphere is increased 11 times, as the energy of the attached photon has been diminished 11 times.

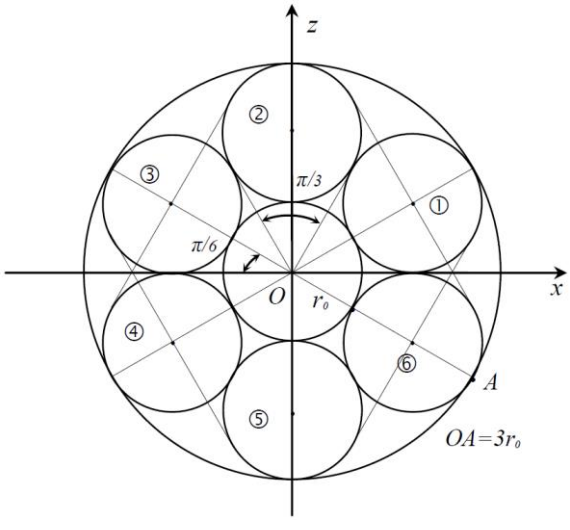

Fig. 1 Six of the eleven inscribed spheres (one configuration)

From Fig. 1 one can see that at each division the radius of the initial sphere becomes three times the radius of an inscribed sphere. Thus, the radius of the surrounding sphere increases 33 times at each division.

Let R_0 be the radius of the Universe at BIG FLASH, equal to the wave length of the photon associated to the total energy E_{U0} . One can write:

$$R_0 = \frac{h c_V}{E_{U0}} \ . \tag{2}$$

Further let us take:

$$E_{U0} = 11^S E_{ne0} \ , \tag{3}$$

E_{ne0} being the energy of the neutron at rest and *S* a number of divisions. One can write the following relations:

$$R_S = 33^S R_0 \ ; \ t_{uS} = R_S / c_V \ ; \ E_{gS} = h c_V / R_S = E_{U0} 33^{-S} = 3^{-S} E_{ne0} \ , \tag{4}$$

E_{gS} being the energy of a HD-graviton at time $t_u = t_{uS}$. The wave length of the photon attached to a sphere (energy) for *S=77* divisions (having the energy of a neutron at rest) is $\lambda_{77} = 1.318610^{-15} m$, whereas the radius of neutron as nucleon is very close: $r_{ne} = 1.2\ 10^{-15} m$ (possible smaller in nucleus). Therefore one can consider that, for *S= 77,* the spheres obtained by division have the energies and the radii equal to a neutron at rest and this **represents a form of resonance permitting the transformation of energy in substance.** Thus one obtains a neutron from 3^{77} HD-gravitons. Of course, the 11^{77} spheres are at different speeds and the transformation itself will take a certain time from t_{u77} . For *S=77* one obtains:

$$\begin{aligned} &E_{U0} = 2.320 \times 10^{70} \, Joule; \ R_{u77} = 7.2186 \times 10^{21} m; \\ &t_{u77} = 2.406 \times 10^{13} \sec. = 7.62473 \times 10^5 \, l.ys.; \left(t_{u\,act} = 1.38 \times 10^{10} \, l.ys. \right) \end{aligned} \tag{5}$$

One leaves time for the transformation of all HD-gravitons in substance and one introduces a time t_{uHD} representing the age of the Universe from where the hydro-dynamical analogy with Newton gravity law can be applied.

3. EQUATION OF TRANSFORMATION ENERGY-MATTER VIA GRAVITY

From time t_{uHD} the hydro-dynamical analogy with Newton gravity starts to work. One will consider at $t_u = t_{uHD}$ that almost the whole Universe contains normal matter. Then the first transformation will be emission of HD-gravitons.

The global equation of transformation via emission/absorption of the average HD-graviton energy E_{gu} is.

$$\frac{d\,E_{gu}}{d\,t_u}=\theta_g(t_u)(E_{U0}-E_{gu})\ , \tag{6}$$

The solution of the differential equation (6) depends on the intensity $\theta_g(t_u)$ which can be put under the form:

$$\theta_g(t_U)=\pm t_{uHD}\sqrt{\frac{3f_{N\,ref}E_{gU}}{c_v^5 t_{u\,ref}}}\left(t_u\right)^{\frac{\nu-5}{2}}. \tag{7}$$

where ν is the exponent of variation of the gravity coefficient f_N with the age of Universe. We have used the expression:

$$f_N\left(t_u\right)=f_{Nref}\left(\frac{t_u}{t_{u\,ref}}\right)^{\nu};\nu=-1. \tag{8}$$

To obtain the value $\nu=-1$ we have used information regarding the body systems with stable configuration on large time intervals.
Such is the system is the Sun- (Earth-Moon) known as being maintained for about 4 billion years. The value $\nu=-1$ is a very good approximation that will be extrapolated back in time up to $t_{u\,HD}$.
The equation (6) has the analytical solution given bellow:

$$\ln\left(\frac{1+X}{1-X}\frac{1-X_{ref}}{1+X_{ref}}\right)=\pm\frac{A(t_{uHD})}{t_{uref}^2}(1-(\frac{t_{uref}}{t_u})^2); \tag{9-a}$$

$$A(t_{uHD})=\frac{t_{uHD}}{2}\sqrt{\frac{3\,f_{Nact}t_{uact}E_{U0}}{c_V^5}}\ ;\ X=\sqrt{\frac{E_{gu}}{E_{U0}}}\ , \tag{9-b}$$

t_{uref} being a reference (initial) time.
The signs $(\pm)$ correspond to emission and absorption, respectively. One does not know exactly the critical values of the ratio $\frac{E_{gu}}{E_{U0}}$ for the emission or the absorption to start. Anyhow the emission should start when there is lack of HD-gravitons and the absorption, when there is excess of HD-gravitons. Therefore for the critical ratios at emission and absorption one writes:

$$A(t_{uHD})=\frac{t_{uHD}}{2}\sqrt{\frac{3\,f_{Nact}t_{uact}E_{U0}}{c_V^5}}\ ;\ X=\sqrt{\frac{E_{gu}}{E_{U0}}}\ , \tag{10}$$

As regards $t_{u\,HD}$ one takes two values larger then $t_{u\,77}$ given in relation (5), namely:

$$t_{uHD1} = 10^6\, ys.;\ t_{uHD2} = 10^7\, ys. \tag{11}$$

One interesting aim is to see whether the values for the "black energy" and "black matter" given in Ref. [1] are possible by using our model, staring from t_{uHD1} and t_{uHD2}. The calculations given in Table 1 indicate that several cycles emission-absorption are necessary to come in the neighborhood of a state from where one can arrive at the proposed values at $t_{uact} = 1.38\times10^{10}\, ys.$ In Table 1the critical ratio $\left(E_{gu}/E_{U0}\right)_{em}$ was taken equal for emission and absorption.

This way, one could execute an integer number of cycles emission- absorption: 729 for $t_u = t_{uHD1} = 10^6\, ys.$ and 71 for $t_u = t_{uHD2} = 10^7\, ys.$

The next transformations are emissions leading to a value X_{ref}^2 close enough to unity in order to start absorptions at times $t_{uabsref}$ capable to lead to the actual ratios $\left(E_{gu}/E_{U0}\right)_{act}$ of the "black energy" (see Table 1).

Table 1. Evolutions to the actual values of the "black energy"

$t_{uHD,}\ ys.$	$\left(X^2\right)_{act}$	$\left(X^2\right)_{729em}$	$10^{-7}t_{uem,}\ ys$	Cycle number	$10^7\left(1-X_{ref}^2\right)$	$10^{-7}t_{uabsref}$ $(ys.)$
10^6	0.683	10^{-8}	2.11628	729	1.23159	3.40550
	0.95	10^{-8}	2.11628	729	0.44877	
10^7	0.683	$10^{-8.2}$	7.39218	71	22.4474	15.2928
	0.95	$10^{-8.2}$	7.39218	71	8.19181	

Remark. As one can see from the Table 1, the evolution in cycles emission-absorption are taking place only in the early age of the Universe, representing at most 1% of the actual age, The transformation becomes more and more slow: only one transformation (absorption: there are reasons to consider that the Universe is now in absorption) takes place to arrive at the actual age.

4. CONSIDERATIONS REGARDING THE "BLACK MATTER". FUTURE EVOLUTION

According to Ref. [1] the "black matter" would represent now 26.8% of the total energy of the Universe (E_{U0}). We consider that a part of this "black matter" could be associated to black holes. Even in the vicinity of the critical value of the ratio mass/ radius ((M/R) *cr* = 6.747×10^{26} Kg/m, see [5]) for their formation, the black holes are surrounded by a high density fluid of HD-gravitons absorbed at their frontier. This could have been considered "black matter" being in fact "black energy".

The high density form of energy could be also connected to what is considered "particles creation by black holes", in Ref. [4]. In conclusion the "black energy" percentage is in our opinion larger than 68.3%.

In order to see the future evolution of the "black energy" as well as the intensity of HD-graviton flux certain data are given in Table 2.

Table 2. Absorption of HD-gravitons after $t_{uact} = 1.38 \times 10^{10}\ ys.$

$t_{u\,HD,}\ ys.$	$\left(\frac{E_{gu}}{E_{U0}}\right)_{ref}$	$-10^{22}\theta_{gref}$	$-10^{22}\theta_{gfin}$	$\left(\frac{E_{gu}}{E_{U0}}\right)_{fin}$	$10^{-10}\,t_{u\,fin,}\ ys$
10^6	0.683	2.88015	2.66596-	$0.683-10^{-6}$	1.41607
			1.00914	$0.683-10^{-5}$	1.95749
10^7	0.683	28.8015	28.5844	$0.683-10^{-6}$	1.38348
			26.6596	$0.683-10^{-5}$	1.41607
10^6	0.950	3.39667	3.25994	$0.950-10^{-7}$	1.39904
			2.11687	$0.950-10^{-6}$	1.61561
10^7	0.950	33.9667	33.8300	$0.950-10^{-7}$	1.38187
			32.5994	$0.950-10^{-6}$	1.39904

From Table 2 one can see that the rate of absorption increases with $t_{u\,HD}$ because of the increasing of the intensity θ_g proportionally with time $t_{u\,HD}$. This shorts the time interval for the same diminution of the total energy of HD-gravitons, E_{gu}. One also can see that small reductions of the "black energy" from now on requires hundred millions or even billions of years, the transformation being more and more slow.

As regards the intensity of the flux of HD-gravitons at the surface of a black hole, one can estimate for a black hole of mass *M* and radius *R* the value:

$$\frac{\theta_g E}{4\pi R^2}=\frac{\theta_g M c_V^2}{4\pi R^2}=\frac{\theta_g}{4\pi}\left(\frac{M}{R}\right)_{CR}\frac{c_V^2}{R}\geq\frac{10^{-22}\times 6.747E26\times 9E16}{4\pi R}=\frac{0.966\times 10^{21}}{R}(Watt/m^2), \qquad (12)$$

where the critical (minimum) value of ratio (M/R) for the black hole formation was considered. The ratio (12) can be compared with the thermal energy flux at our Sun surface which is $6.3\times 10^7\ Watt/m^2$. For $R = R_{SUN} = 7E8m$ one obtains at least twelve orders of magnitude!

5. CONCLUSIONS

The "black energy" in Universe is interpreted as the "fluid of HD-gravitons" which is emitted or absorbed by bodies and particles (other then HD-gravitons). It is essential for the creation of gravity in Universe. A HD-graviton is a photon-like particle having a wave length equal to the radius of Universe thus directly non-detectable. In fact, the existence of the "fluid of HD-gravitons" is proved by the gravity itself.

As regards the "black matter" a possible explanation of the percentage given in [1] is via the black holes even at the limit value of the ratio mass/radius $(M/R)_{CR}$ for their formation Thus the mass of such black holes could be over - estimated due to the high intensity "fluid of HD-gravitons" absorbed at their frontier. Therefore the main part of what is invisible comes to "black energy".

A balance equation for the behavior of the "black energy" is given. Calculations proving the possibility of its existence even in larger percentages than reported are also given.

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