What is the Space?

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May 2018

Abstract. By the unified theory of dynamic space has been there a forecast of the follow observation that, parallel moving photons of different frequency, reduce locally the cohesive pressure of space, resulting to move with different speeds. So, the photons with higher frequency slow down against parallel moving photons with lower frequency, as on delay in gamma rays from galaxy Markarian 501 was observed. This observation proves that space contains unseen forces, which are evident as deformations of space, such as in the above theory are described. Accordingly, for the great problem of Physics and Philosophy, "What is the space?", there is the answer-solution: "The dynamic space".

Keywords: Unseen forces, space deformations, dynamic space.

PACS numbers: 11.10.-z

1. Forecast of delay in gamma rays from Markarian 501

In the unified theory of dynamic space\textsuperscript{1,2} the speed of light\textsuperscript{3}

\[ C_0 = \sqrt{\frac{P_0}{d_m}} \]  

(1)

is determined as the transmission speed of the disturbance into the tense dynamic space. So, the E/M wave-light\textsuperscript{4} could be considered as a disturbance of the elastic-dynamic space, where $P_0$ the cohesive pressure\textsuperscript{5} of space in our region and $d_m$ the Universal constant mass density.\textsuperscript{6}

Dividing the members of\textsuperscript{7}

\[ P_{0x} = \frac{P_0 x^2}{R_0^2} \]  

(2)

with $d_m$ and due to Eq. 1, we have

\[ P_{0x} = \frac{P_0 x^2}{R_0^2} \Rightarrow \frac{P_{0x}}{d_m} = \frac{P_0}{d_m} \cdot \frac{x^2}{R_0^2} \Rightarrow C_{0x} = \frac{C_0}{R_0} \cdot x, \]  

(3)
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where $C_{0x}$, $P_{0x}$ are respectively the light speed and the cohesive pressure of space in a region within a distance $x$ from the Universe center of constant radius $R_0^8$ and $C_{0p}$, $P_{0p}$ are respectively the constant speed of light and the constant cohesive pressure at its periphery.

It becomes obvious, that the light speed $C_{0x} = xC_{0p}/R_0$ (Eq. 3) depends on the distance $x$ from the Universe center and therefore it is not a Universal constant, but it is a local constant equal to $C_0 = 3 \cdot 10^3$ m/sec in our region.

However, the light speed $C = \sqrt{P/d_m}$ (Eq. 1), where

$$P = P_0 - \Delta P \tag{4}$$

is the remaining cohesive pressure of space, reduced at the pressure difference $\Delta P$, which is caused by the resultant force $F_p = 2f_\tau/\pi$ (Eq. 8) parallel to the motion of photon$^4$ of a frequency $\nu$ and energy$^{10}$

$$E = h\nu. \tag{5}$$

Therefore, parallel moving photons of different frequency, reduce locally the cohesive pressure, resulting to move with different speeds. So, the photons with higher frequency slow down compared to parallel moving photons with lower frequency, as in the follow theoretical proof is described.

\[\text{Figure 1. Accumulation of motion force } F \text{ on the particle spherical zone and parallel resultant force } F_p = 2F_p' = 2F_s/\pi\]

This forecast was made by the theory of dynamic space from October 2006.$^{11}$ One year later (October 2007), from researchers at the observatory (Magic telescope on La
Palma), it has been recorded a 4 min delay in high-energy photons (gamma rays) from
galaxy Markarian 501. Below it follows the theoretical proof of the phenomenon, as
formulated by the creator of this theory Professor Physicist N.Gosdas at congress of
Hellenic Physicists Society (Kavala, March 2008):

In Fig. 1 the accumulated force\(^{12}\) \(F_s/2\) on the hemisphere and the parallel resultant
\(F_p' = F_p/2\) are analogous respectively to the semi circumference \(\pi d/2\) of the particle
spherical zone and to the diameter \(d\), namely it is

\[
F_p' = \frac{F_p}{2} = \frac{F_s}{2} \cdot \frac{d}{\pi d/2} = \frac{F_s}{\pi} \Rightarrow F_p = \frac{2F_s}{\pi}.
\]  

(6)

So, \(F_p = 2F_s/\pi\) (Eq. 6) is the resultant force parallel to motion of the particle.

The reduction of space cohesive pressure \(P_0\) that is caused by the accumulated force
\(F_s\) is equal to force talantonion\(^{10}\) of fundamental E/M wave,\(^4\) by which the photon\(^4\) of
frequency \(\nu\) has been constituted, namely it is

\[
F_s = f_\tau.
\]  

(7)

Therefore, the parallel resultant force (Eq. 6) to the motion of photon, due to Eq. 7,
becomes

\[
F_p = \frac{2F_s}{\pi} = \frac{2f_\tau}{\pi} \Rightarrow F_p = \frac{2f_\tau}{\pi}
\]  

(8)

and exerted on the cross section \(S\) of diameter\(^{12}\) \(d = \lambda/2\) (Fig. 2), that it is

\[
S = \pi d^2/4 = \pi \lambda^2/16 \Rightarrow S = \pi \lambda^2/16
\]  

(9)

and due to \(\lambda = C_0/\nu\) the Eq. 9 becomes

\[
S = \frac{\pi C_0^2}{16\nu^2}.
\]  

(10)

It is noted that the cross section \(S = \pi \lambda^2/16\) (Eq. 9) exists, due to the spin\(^4,^{14}\) of
the photon around the axis in the motion direction (Fig. 2). The pressure difference \(\Delta P\)
that the force \(F_p = 2f_\tau/\pi\) (Eq. 8) causes on the cross section \(S = \pi C_0^2/16\nu^2\) (Eq. 10)
will be reduced from \(P_0\) and will be then

\[
\Delta P = \frac{F_p}{S} = \frac{32f_\tau\nu^2}{\pi^2 C_0^2} \Rightarrow \Delta P = \frac{32f_\tau\nu^2}{\pi^2 C_0^2}.
\]  

(11)

So, the reduced speed of photon \(C = \sqrt{P/d_m}\) (Eq. 1), due to Eqs 1, 4 and 11, becomes

\[
C = \sqrt{\frac{P}{d_m}} = \sqrt{\frac{P_0 - \Delta P}{d_m}} = C_0 \sqrt{1 - \frac{32f_\tau\nu^2}{\pi^2 C_0^4 d_m}}
\]  

(12)

and

\[
C = C_0 \sqrt{1 - \frac{32f_\tau\nu^2}{\pi^2 C_0^4 d_m}}.
\]  

(13)

Therefore, H/M waves with higher frequency have lower speeds and are slower than
those with lower frequency.
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We set in Eq. 13 the
\[ f_\tau = 11.87 \cdot 10^{25} \text{N}, \]
\[ C_0 = 3 \cdot 10^8 \text{m/sec} \] and
\[ d_m = 0.864 \cdot 10^{134} \text{Kg/m}^3, \]
so
\[ C = 3 \cdot 10^8 \sqrt{1 - \frac{0.55}{10^{141}} \nu^2} \] (14)
and approximately
\[ C = 3 \cdot 10^8 (1 - \frac{1}{2} \cdot \frac{0.55}{10^{141}} \nu^2) \Rightarrow C = 3 \cdot 10^8 (1 - 0.275 \cdot 10^{-141} \nu^2). \] (15)
The reduction, of course, of the photons speed with an increased frequency is very small, but not negligible for the gamma rays from galaxy Markarian 501, which is half a billion light-years away.

![Figure 2. Correlation of a meridians pair (talantonion) with a fundamental E/M wave (d = λ/2, s = 14,14 and u_α = 1 the constant timeless speed of light)](image)

This observation proves the high-energy photons was moved in space that is not empty but contains unseen forces, which are evident as deformations of space,\(^{16}\) such as are described in the unified theory of dynamic space.\(^{1,2}\) Accordingly, for the great problem of Physics and Philosophy, “What is the space?”, there is the answer-solution: “The dynamic space”.

2. References

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