THE KOTOV-LYUTY EFFECT: THE NEW COSMOLOGICAL INVARIANT?

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ABSTRACT. The analysis of the complete variation of the global constants using the world model with the positive cosmological constant, basis on radio astronomical data, was carried out. It was shown that, the simultaneous variations of the global constants are fulfilled in the limits of the self-confirmed solution, and the new cosmological invariant $T = \lambda/c$ appears. This allows to explain the existence of the 160-min period of the active galactic nuclei and quasars intensity variations independent of the redshift.

Key words: cosmological constants

1. Introduction

The dependence of numerical values of principle interaction constants from the interaction energy is predicted by theories. Because the energetic universe parameters may change in course of evolution, modifications of strong, electromagnetic, weak and gravitational quality of interactions should be expected also. As soon as the interaction constants, that contain the charge e, the Plank constant h, the speed light c, the gravitational constant G, are changing, then e, h, c, G changing with epoch should be expected as well.

On the other hand, there are known limitations on possible deviation range of interaction constants, connected with the existence of structural formations in the Universe with their actual set, with the formation of elements in the early epoch etc. That way, a solution of this problem in its full capacity is connected with considerable difficulties of the joint analysis of astrophysical data, results of cosmological investigations, elementary particles physic achievements. Hence, in treatment of this problem we cannot get by without certain assumptions.

Additionally, the appearance and accumulation of observant facts, that do not find a natural explanation in terms of modern astrophysical conceptions, lead us to the idea about the possibility of their solutions by manner of the secular "drift" of the global constants. The typical example of the such strange phenomenon is the Kotov-Lyuty effect (Kotov- Lyuty 1987), i.e. the availability of the 160-min period of fluxes variations in the active galactic nuclei and quasars independent of redshift of the observed object. Apparently, no satisfactory explanation of this effect exist at present, probably.

Authors themselves hold on the opinion, that the effect reflects cosmological conformity to natural lows. But we do not know of a natural cosmological explanation of this phenomenon for the reason of obviously contradictions of experimental data to modern scientific opinions.

Supposing the great cosmological importance of these questions we made the attempt to consider of the case of the global constants joint variation for the explanation of this effect using the world model with the positive cosmological constant on basis of radio astronomical, optical data and on the conception of the physical vacuum quantization (Larionov, 1997, 1999).

2. The possible global constants "DRIFT"

The closed Universe model with non-zero cosmological constant, deceleration parameter $q_0 = 0$ was used for determination of the principal cosmological correlations (Larionov 1997):

$$\frac{c}{R_0} = \frac{H_0}{\sqrt{2}} = Const; \quad \frac{c}{R_0} = \sqrt{\frac{4\pi G\rho_0}{3}};$$

$$\Lambda = \frac{4\pi G\rho_0}{c^2} = \frac{3}{R_0^2} = \frac{3H_0^2}{2c^2}; \quad l_{kv} = \frac{8\pi Gh}{3H_0c^2}. \quad (1)$$

The given correlation leads to dependencies showed in the table 1.

It is saw from the table, that the lows of changing m_{fot} and m_{pv} with epoch are the same, although the relations from which they were obtained are different ones. It is naturally because these effective masses have the identical roots: m_{fot} - a indignation in the PV matter, but the same PV environment have a characteristic of the effective mass m_{pv} of the STM sell including electron-positron virtual pairs (Larionov, 1997, 1999).

Table 1.

c=Const $\cdot R$	$E_{ph} = m_{ph}c^2 = Const/R^3$
$\lambda = Const \cdot R$	$l_{pv}^3 = Const/R^2$
$p = Const \cdot R^3$	$t_{pv} = Const/R^{5/3}$
$G = Const \cdot R^3$	$l_{pv}/t_{pv} = c = Const \cdot R$
$\Lambda = Const/R^2$	$t = Const/R$
$\sqrt{\Lambda} \cdot h \cdot c = Const/R^3$	$m_{pv} = Const/r^5$
$h = Const/R^3$	$e = Const/R$
$m_{ph} = Const/R^5$	

where c - the speed light, λ - the quantum wavelength, ρ_o - the matter density,
G - the gravitational constant, Λ - the cosmological constant,
$\sqrt{\Lambda} \cdot h \cdot c$ - the energy of the CTM cell,
h - the Plank constant, m_{fot} - the photon effective mass,
l_{kv} - the size of the STM cell, t_{kv} - the time existence of the STM cell having energy $\sqrt{\Lambda} \cdot h \cdot c$, t - the accompany system time, $m_{pv} = 2 \cdot 10^{-65} g$ - the effective mass of the STM cell,
e-the elementary charge.

The character of dependence of constants from the radius curvature of the Universe (R) give the possibility to determine of invariants (constants that do not depended of the epoch), from that we picked out, at the first time, $T = \lambda/c$ (the table 2).

Table 2.

$T = \lambda/c = Const$	$\sqrt{\Lambda} \cdot c = Const$
$G \cdot p = Const$	$E_{ph} \cdot G - Const$
$G \cdot h = Const$	$\rho_0/\rho_{cr} = Const$
$\sqrt{\Lambda} \cdot h \cdot c \cdot G = Const$	$(h/m) \cdot \Lambda = Const$
$G \cdot \Lambda/c = Const$	$(G \cdot h)/(m \cdot c) = Const$
$p/h = Const$	

The becoming invariant explain formally the cosmological nature of the phenomenon. This invariant is the direct consequence of the closed universe model and the introducing of the quantum PV matter.

The principal point is the interpretation of the redshift (z) by stretching PV environment, but not Doppler explanation (Larionov 1997). This is permitted to connect z with the scale factor or curvature radius R and physically comprehended of the itself constant $T = \lambda/c$.

Finally, the dependence $t = Const/R$ means, that processes in accompanying co-ordinate systems are passing according to the terrestrial clock with proportional coefficient R.

3. Conclusion

1. On the basis of the closed universe model with the positive cosmological constant, deceleration parameter $q_0 = 0$ and the quantum PV matter conception we get dependencies the principal constants on the epoch.

2. It is leads to the determination of invariants from them we examined $T = \lambda/c$.

3. The availability of the connection $T = \lambda/c$, do not depending on the epoch, given the possibility to state the cosmological nature of this invariant and the 160-min periods of the fluxes variable for quasars and galactic nuclei.

It is still necessary to find out the reason of the 160-min period changing of the global cosmological parameters, that is leading to the origin of this period.

References

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