Character and Dynamics of Loops

Zygmunt Morawski

ABSTRACT: Starting with the Witten formula one has proved that the loops can increase or decrease. This phenomenon can be bound with the complex time or with the Duff oscillating time. It has been testified that the rest mass of the loop must be equal zero $(m_0=0)$ in purpose that there is not a distinguished reference system.

The dynamics of the loop, consisting in this, that a small, decreasing loop can into an increasing loop, has been presented. One has argued that loops, similarly to photons, conjugate with machyons and tachyons.

It has been stated that the curve of the space-time is reduced by the deformation, compression and decompression of loops.

Witten's loops increasing or decreasing with the time [1] will oscillate in the Duff oscillating time too [2]. Similarly they will oscillate in the complex time.

These loops are weaving the space-time [3]. If the time has both real and complex component of the complex number, an increase and decrease of the loop overlaps on its oscillations.

The loop must move with the velocity v = c in purpose that there isn't a distinguished reference system.

As:

$$c \stackrel{L}{+} v = c$$

so the points placed on the increasing, decreasing or oscillating loops, although they make an additional matter, always move with the velocity v = c.

If the loop only increase or decrease, then after some time there wouldn't be loops with the intermediate size weaving the Ashtekar space-time.

So the big decreasing loops and small increasing loops must be generated (created).

It isn't contradictory to the principle of conservation of energy because the loops moving with the velocity v = c have the rest mass equal zero ($m_0 = 0$).

Although there isn't a distinguished reference system in the ether, because there isn't any distinguished layer, this principle isn't fulfilled in the case of the loops.

It is so, because there are the distinguished layers between the loops; certain loops increase, other decrease, yet other oscillate.

The fact that the rest mass of the loop is equal zero doesn't disturb, because zero is an equally good number as every other number from the mathematical point of view. However, the loop has the kinetic energy:

$$E = \hbar \omega$$

Where ω is the frequency of the oscillations and may be a complex number.

 $\omega = \omega_1 + i\omega_2$

 ω_1 describes oscillations

 ω_2 describes the effects connected with the increase or decrease.

It is a total analogy with the light. The photon is said to have the rest mass equal zero, but photon has energy. As same as in the case of all photons, the kinetic energy of all loops is concerned.

In a certain sense $0 = \infty$, because in these both points the singularities happen, so the loop (whose radius as the result of decreasing neared in the limit to ε is comparable to zero), can transform into a decreasing loop with the huge radius and vice-versa.

There is another possibility too: a decreasing loop with the small radius may change into an increasing loop.

However, the loops, similarly to the photons, may conjugate with tachyons or machyons obtaining the velocity oscillating around c [5].

Here there isn't however the distinguished system of the loops, because these small fluctuations of the velocity are accidental and homogeneously placed in the space.

The mass curves the space-time curving, compressing or decompressing and deforming the loops.

The change of the character of the loops from decreasing into increasing ones occurs in the case of the small radii and increasing into decreasing ones in the case of the huge radii.

It is a kind of macroscopic oscillations.

The fifth Kaluza-Klein dimension behaves similarly, because it is a closed loop too.

The attenuated oscillations can propagate along the loop. The oscillations have the non dashed character if the de Broglie formula is satisfied

$$2\pi R = n\lambda$$

Naturally the particles correspond with these waves.

The length of the wave λ increases decreases or oscillates together with the loop. These particles are connected in the loop and oscillate together with it.

The energy of these particles stems from the energy of the loop. These particles are confined in the loops as quarks in the nucleon.

References:

[1] M. J. Duff, R. Minasian, E. Witten, Nuclear Physics B 465, 1996, p. 413-438
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[3] A. Ashtekar, C. Rovelli, L. Smolin, Physical Review D, vol. 44, no. 6, 15
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[4] Z. Morawski, "Loops in Effects of Absorption", this website

[5] R. P. Feynman, "Strange Theory of Light and Matter"