Fundamental Objects and Interactions

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ABSTRACT: It has been presented that the potentials of interactions can increase with the distance. Next, one has presented the arguments for an existence of the physical sense of the states described by the negative norm and the sense of certain divergences. In the end it has been referred to the facts from the physical literature confirming the physical meaning of at least some terms of the polynomial-logarithm equation.

1. There are the following potentials increasing at infinity to infinity:
- the potential of confinement of quarks in strong interactions
- the potential of inertia in gravitation (General Relativity)
- the potentials in electromagnetism, but here they are unnecessarily removed because the undereducated assistants could not to credit the test.

It testifies to the possibility of the unification of interactions. The conception that the gravitational forces can increase with the distance can be supported by the following arguments:
- the gravitational forces and the forces of inertia have the same physical nature and the latter increase with the distance
- the interactions are unified by unification of their forces [1] but after all both in the strong and electromagnetic interactions there are the forces increasing with the distance.

2. The Witten formula describing an expansion of the loop [2] is given by:

$$Exp_{loop} = \sum_{n > n_0} a_n \, e^{n\phi} + \sum_{m > m_0} b_m \, e^{-m\phi}$$

ϕ - the field of dilaton.

ϕ may be identified with the time, because the time is the field of all charges and interactions [3]. We do not have any ghost theorem for the non–compact current algebra [4]. One shouldn't remove at any price the state with negative norm. The excited states of the string in the curved space-time may be described by the negative norms and complex masses. They shouldn't be removed at any price. These states are described by the generalized quaternions [5-7].

The gravitons correspond to the loops. The loops weave the space [8]. The ground state of the loop disappears after renormalization. It corresponds to the superconducting character of the unempty vacuum. The ground state of the superconductivity BCS isn't renormalizable, either.

The unwanted divergences are connected with the tunneling of every particle to another Universe for example even to MEGAVERSE (it means the loop graviton).

3. We have the following formulas [9]:

$$f_1 = 1 + \sum_{i=1}^{N} \frac{\varrho_i^2}{|x - a_i|^2}$$

for multinstanton solution;

$$e^{2\Phi} = e^{-2\sigma} = e^{2\Phi_0}\left(1 + \sum_{i=1}^{N} \frac{m_i}{|x - a_i|}\right)$$

for four-dimensional monopole solution when in the Kaluza-Klein theory g_{44} is exchanged for the scalar field e^{-26} ;

$$e^{2\Phi} = e^{-2\sigma} = e^{2\Phi_0}\left(-\sum_{i=1}^{N} \lambda_i \ln|x - a_i|\right)$$

for four-dimensional string soliton solution for reduced action;

$$f_0 = 1 + \sum_{i=1}^{N} \Lambda_i |x - a_i|$$

for domain wall structure with the confining potential;

$$e^{2\Phi} = e^{-2\sigma} = e^{2\Phi_0} \left(1 + \sum_{i=1}^{N} \Lambda_i \, |x - a_i| \right)$$

for the gravitational sector for the four-dimensional domain wall solution.

The potential of the type $\frac{1}{r^2}$, $\frac{1}{r}$, $\ln r$, r appear, each of them describes another object. So we have the next argument for the equation of objects and equation of field [10].

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