Nonexistence of Point Charges

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ABSTRACT: Starting from the singularity of Coulomb's potential and the singularities of the logarithmic potential (of equation of field) the result about the nonexistence of point charges has been concluded. The logarithmic potentials have been presented as the additional potentials. Next, the consequences of the expansion of the exponence of the potential of the confinement of quarks have been analyzed for the nonexistence of point charges.

1. Nonexistence of point charges

There aren't point charges. It is proved by the potentials of the type V(r) = αr and more generally $V(r) = \beta_n r^n$, which are an expansion of an exponence in the potential of confinement of quarks [1]. However, the point-like charges with the dimensions smaller than the resolution of the measurement equipment can exist.
The potential in the most general form is [2]:

$$V(r) = \sum_{n=1}^{\infty} a_n r^n \quad + \quad \sum_{m=1}^{\infty} b_m \frac{1}{r^m} \quad + \quad \sum_{l \cup \{0\}}^{\infty} c_l \underbrace{\int \dots \int}_{l} \quad \ln r \; \underbrace{dr \dots dr}_{l}$$

The potential of the type $\frac{1}{r}$ appears as a derivative of the potential of the type of the third term of this equation, although there aren't point charges.

$$V \;=\; V_0 \, e^{kx} \;=\; V_0 \sum_{n=0}^{\infty} \frac{(kx)^n}{n!}$$

One storey of confined objects is connected with each n [1]. These facts support an idea of nonexistence of point charges. Apart from the power term arising from the expansion of

$V(x) = V_0\, e^{kx}$ and the second term arising by the change $x \rightarrow \frac{1}{x}$, the logarithmic integral member exists. It means that besides the power potential the logarithmic integral exists which grows at infinity to infinity. This potential isn't determined for x = 0, which is the next argument against the point character of charges.

This potential is an additional potential existing probably at the case of the dimensions perpendicular to our dimensions and to the loop dimensions [2]. The indetermination of the Coulomb potential for r = 0 proves the nonexistence of point charges and the tunneling to the parallel universes at this point [3].

The electron surely has the space structure and surely isn't a point although its sizes may be smaller than the resolution of our days' experiments. Nevertheless, the electron can have a developed structure in the additional dimensions.

2. Open problem

If the point charges existed, then according to Heisenberg's uncertainty principle the broadening of their position would be equal zero. Then $\Delta x = 0$ and $\Delta p = \infty$ and the problems with their localization would not be to outstrip. Nevertheless the electrons and other "point" particles are localized.

If they had the point character, they wouldn't be described by the Heisenberg relation. So their mass and position would be characterized by the special type of general quaternion, whose square of module was less than zero, what made possible the breaking of Heisenberg's uncertainty principle. The particles with mass equal zero don't have to have point dimensions. It is implicated by Heisenberg's relation $p = 0$, $\Delta p = 0$, so $\Delta x = \infty$.

References:

[1] Z. Morawski, "Mechanism of Confinement of Quarks", this website

[2] Z. Morawski, "Equation of Objects and Equation of Fields", this website

[3] Z. Morawski, "Black Holes and Parallel Universes", this website