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Physicists Calculate But Do Not Explain 2/7

Inconsistent fields in the spacetime continuum.

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Abstract.-A major flaw in the use of continuum spacetime in modern physics' explanation of force fields is revealed here, particularly of the decrease with the distance to the center of the fields of the intensity of the corresponding forces. A serious incorrectness caused by the misuse of mathematical infinitist continuity, and which reveals to what extent the tragedy of the actual infinity is, in fact, a tragedy for the scientific knowledge of the physical world.

Keywords: Force fields, separation of lines of force, actual infinity, explanation and disclosure of radial force fields.

1. An inconsistency in field theory

For this discussion, I choose the simplest force field I can think of because the discussion using it is independent of the nature and complexity of the field considered. I will therefore use the electric field of a proton, i.e. the field created by the unit electric charge (1.6×10^{-19} C). This particle, which we can consider spherical (any other shape would be equally usable in the arguments that follow), has a diameter of 1.2×10^{-15} m, and creates a central electric field whose lines of force start from the center of that sphere and are distributed radially outward. This is how that field is invariably represented in graphic terms, taught and used. But, as far as I know, it does not go into further qualitative or quantitative detail about the lines of force of the field. In particular, it is not specified whether the lines of force pass through every point of the proton's surface (whether or not they start from the center of the proton) or whether they pass through only some points and not others of that surface.

I will first consider the case in which the lines of force pass through every point of the proton surface, which is the generally accepted case. Since that surface is a densely ordered set of points of the spacetime continuum, there are no contiguous (adjacent) points: between every two of them there are always other, different points (exactly $2^{\aleph_0}$ points). Consequently, there are no contiguous lines of force either. In any other sphere concentric with the proton's sphere where the lines of force of the proton's electric field arrive, the same thing will happen: there cannot exist contiguous lines of force because those lines would also be contiguous when they started from the proton. Therefore, it is impossible for two lines of force of that field to open (without other lines between them) with distance from the

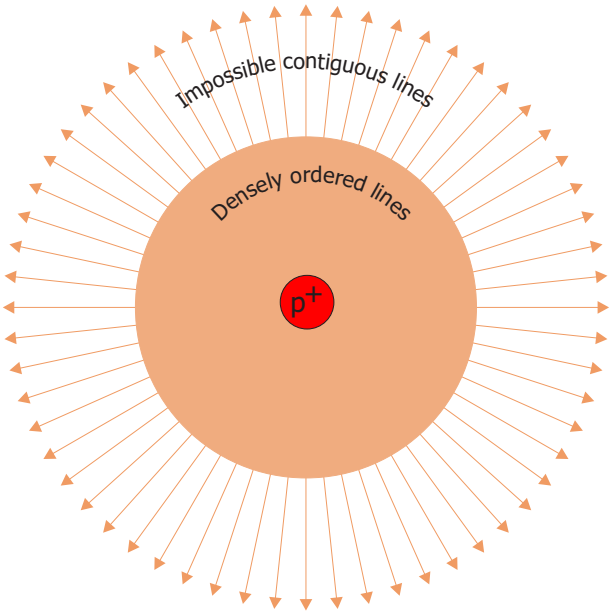

Figure 1 – Assumed lines of force of the electric field of a proton

proton: when they open they would become impossible contiguous lines, i.e. lines without other lines between them. Or in other words:

1.- The separation of two lines of force is impossible without there being other $2^{\aleph_0}$ lines of force between them.

2.- It is impossible to increase the space between two lines of force without having other $2^{\aleph_0}$ lines of force between them.

3.- It is impossible to increase the space free of lines of force.

4.- The same number of lines, exactly $2^{\aleph_0}$ lines, will always exist between any two lines, both on the first surface and on the second, and for the same reason: the same number of points always exists between every two points on the first surface as between two on the second, again $2^{\aleph_0}$; which is also the same number of points in the whole three-dimensional universe. (see Figure 1).

The alternative would be that an infinite non-numerable number of lines of force suddenly disappear at a certain distance from the center of the field, which is not contemplated by field theory. Therefore, the explanation that this model gives for the decrease of the proton's electric field strength with distance from the center of the proton is inconsistent. The argument can be applied to any other force field in the spacetime continuum.

I will now consider the case in which the lines of force of the proton's electric field pass through some points on its surface but do not pass through others. In this case, the field theory should specify which are the points on the proton surface through which the lines of force of the field pass, and why they pass through those points and not through others on the same surface. But field theory does not consider either of these two problems, as if they were not problems. The current field theory would therefore be an incomplete theory. In conclusion, the spacetime continuum does not seem to be the most appropriate theoretical framework for developing a field theory. It happens, moreover, that this continuum is inconsistent, although it is taking a lot of time and effort to convince of this inconsistency. The reader can draw his own opinion by examining a very short demonstration in [1].

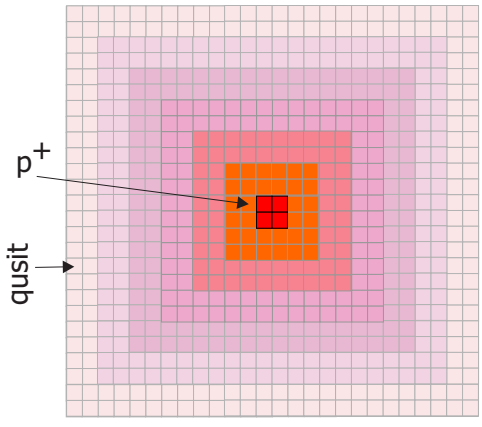

Figure 2 – (Very) schematic representation of the discrete electric field of a proton.

There is an alternative based on the discreteness of space and time which, besides not being inconsistent, could be useful for the construction of a consistent discrete field theory. Figure 2 is a simple illustration that points to what the discrete electric field of a photon might look like, although the discrete space units (qusits, quantum space units) occupied by the proton should be 2.14×10^{59} instead of the four qusits used in the figure, if the qusits were Planck volumes, in which case the universe would occupy 7×10^{184} of such qusits.

Bibliographical Reference

[1] A. León Sánchez. The Axiom of Infinity Is Inconsistent. *The General Science Journal*, 2024. PDF.