

Klaus Theodor Ruthenberg, 30 October 2023

Seven arguments in favour of the non-atomic constitution of space

Over the last two thousand years, two basic concepts have structured and determined human scientific images of our natural world.

Two "exact sciences" formed the basis

- a "geometric" basic concept:

Natural and human tools, devices and theories for exploring and utilising the natural world are **basically** built (and usable on our planet) according to the mathematical **axioms** of **Euclid**.

- a "physical" basic concept:

Natural and human tools, devices and theories for exploring and utilising the natural world are **basically** built from physical **atoms**, for example in the sense of **Democritus**.

Against the background of the 2022 Nobel Prize in Physics, i.e. the experimental observation of physical entanglements and my geometric interpretation of these phenomena, which Einstein still judged to be spooky, **new images** of the basic constitution of our natural world are emerging:

1. A complete system of **numbers** was historically discovered step by step as the mathematical system **of quaternions**.

The historical name characterises the form of their original representation: these super-complex numbers were first placed geometrically by Hamilton in a **4-dimensional** Cartesian **point space**.

This created a notable **gap** between the "2-dimensional" ordinary complex numbers and the "4-dimensional" quaternions, which has been a major obstacle to the appropriate interpretation and practical technical and scientific use of these numbers to this day.

2. This historically evolved situation is now fundamentally changed by my proof: The unwieldy gap between the "two-dimensional" ordinary complex numbers and the "four-dimensional" quaternions - with their uniquely complete mathematical structure as a **maximum** mathematical **oblique** body - disappears completely, because these numbers can also be understood as basic elements of a natural **three-dimensional** world, if these numbers are not understood as points, but as centred and directed **tetraglobes**.

3. The simplest and first elements of the natural world are **not atoms in the sense of Democritus**; the first and simplest elements of the natural world are tetraglobes, directed and centred. A tetraglobe does not exist as a single point (or as a single line); it exists only as a first elementary basic structure - dual in 4 points and 4 lines.

With the exception of the HIGGS particle, the 24 elements of the traditional

physical particle zoos not as "smallest, most elementary" individuals, but are the 2 x 12 angle perspectives of a HIGGS tetraglobe:

The conformal angles of this TETRA ("all-tetra") are the geometric image of the physical quarks. Proton and neutron charges are the two sums of the angles in the right- and left-orientated HIGGS tetra.

4. It is clear from the purely mathematical background described here:

It is absurd to leave the three-dimensional space of our natural world as a matter of principle in order to reform our scientific thinking in order to artificially expand it to the extreme by adding 5-6 "wrapped dimensions" in line with the flood of sprawling string and superstring theories.

This energy-sapping tendency of modern theoretical physics is also absurd because the path I have described is a more direct and easier way of replacing the traditional theoretical element "point" not with "strings", but with the basic mathematical figure of the **centred and directed tetraglobe**.

5. This substitution seems more obvious and is easier to grasp visually, although it may not be easy for our traditional habits of thought to imagine the simplest, purely mathematically clearly defined first building block of our natural world as arbitrarily small/large and not - in the sense of Democritus - as "atomic-small"; because conformally structured first elements of the natural world are originally neither small nor large. For this all-encompassing world with a naturally conformal all-metry (not only: geo-metry) does not originally recognise lengths in space and time.

For this requires the **additional introduction and practical use of** spatial and temporal **lengths** for the complete theoretical mastery and measurement of the natural phenomena that are commonplace for us earthly planetarians.

6. As a student of the exact-theoretical conformal-mathematical foundations of our natural world described here, you will have to realise this:

The scientifically orientated human eye only sees each tetraglobe as a Euclidean triangle (with circumcircle) if one of its four points is a far point. Thus, an image of the tetraglobe "in traditional Euclidean position and constitution" is obtained simply as a **Euclidean triangle with a circumcircle**.

In this special "earthly" perspective, each of the three conformal lines through the far point appears as a Euclidean **straight line**.

And only in this special position is the conform line through the three "earthly" corner points of the triangle a **circle** in Euclid's sense.

In a general - three-dimensional - position, the four conformal lines of the TETRA still look like four Euclidean circles; however, each of these "circles" becomes visible as a Euclidean straight line if one of the three points on one of these "circles" is a far point: The temptation is great to generally address a conformal line as a circle; because each conformal line is closed in itself; as closed in itself as (also) usual with a Euclidean circle.

7. A reform of the foundations of our theoretical physics is not only about a reform of the Euclidean concept of points, it is also about a reform of the Euclidean concept of straight lines; and in particular about a differentiated discussion of the concept of "circle". Through its three different perspectives in graphical representation, my concept of the

TETRAGLOBE clear:

Even before the birth of Euclid, the Ancient Egyptians were presumably well able to design the four roofs of their enormous pyramids in the form of a regular isosceles triangle in advance and to realise them with structural precision. However, it was only Euclid - historically later, beyond the art of practical surveying and the practical building techniques of his Egyptian ancestors - who developed an "exact mathematical" science; the axiomatically founded Euclidean geometry named after him.

After two thousand years with Euclid, mathematicians and physicists are now realising: From a mathematical and scientific point of view, the Euclidean concepts of "point", "line" and "circle" also require critical revision and reform.

The TETRA model now makes it clear:

From a scientific point of view, a "point", a "straight line" does NOT appear SINGULARLY as a single element: a geometric line is only defined by three points; a geometric point is only defined by three elementary lines. For two thousand years, people used Euclid to see a TETRA compound of 4 points and 4 lines from only one perspective in such a way that one of the four tetra points is a point at infinity: the all-metric tetra degenerated into a geometric triangle with a circumcircle.

Because empirically there is only a dual compound of four points and four lines - as the first, simplest natural TETRA element - we humans, as mathematically thinking, abstracting and acting beings, cannot only view and grasp these two Euclidean concepts from an earthly perspective:

A mathematician does NOT necessarily have to view the natural world only in such a way ("Euclidean") that one of the four points of a TETRA disappears as a point at infinite distance.

Such a one-sided earthly view degrades a natural line to a Euclidean straight line. (For example, there are also empirically specific lines - Euclidean "parallels" - which have the same distance everywhere).

This one-sided earthly view degrades a natural point to a singularly existing point, which always has a Euclidean distance - in space and time - to a second - singular - point. This is how the concept of "distance" was born.

More generally, however, it is scientifically necessary that the Euclidean concept "point" and the Euclidean concepts "straight line" and "circle" are theoretically only restrictively unambiguous as dual elements of a TETRA, as 4 first urelements k together with 4 first urelements p as a unit: All-metry does not have three, but only two building blocks: each all-tetra has 4 p-lines and 4 k-points. In particular, in terms of basic theory, the conformal mathematical term "line" must not be seen and misunderstood twice in perspective, sometimes as a "circle", sometimes as a "straight line" in Euclid's sense.