

The New Ether of Einstein

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(This English text may contain grammatical errors. We apologize to our readers.)

Main reference: the book - Einstein and the ether -
of L. Kostro

The belief that Einstein in his theory of relativity has definitively eliminated the concept of ether by modern physics is very widespread. This opinion is contained in physics and philosophy handbooks, encyclopedias, textbooks and scientific publications. However, this description does not reflect at all historical truth, rather in a major way deforms it.

Einstein primarily considered superfluous the concept of luminiferous ether postulated by Maxwell and also adopted by Poincaré, and all previous models.

In this sense it is true that until the end of his days he denied the existence of ether as it was conceived in nineteenth century.

But after General Relativity, Einstein introduced a new version of relativistic ether, then expressed in three models.

Therefore, historical truth is that Einstein denied existence of ether for eleven years, from 1905 to 1916. Unfortunately this is not said in University and it's not written in textbooks. Instead, university professors should clearly show the true thought of Einstein.

For example, in 1919 he wrote:

"It would have been more correct if in my first publications I were limited me to point out the impossibility of measuring the speed of ether, instead of mainly support its non-existence. Now I understand that with the word ether we just intend the need to

*represent space as a carrier of physical properties. »
(Albert Einstein, in a letter to A. H. Lorentz, 1919)*

And in 1920:

*"Even if in 1905 I thought physics could be absolutely no talk of ether, this judgment was too radical, as we can see with the next considerations of general relativity. It is then allowed to assume a means filling space..... However it is not allowed to attribute to this means a state of motion at each point in analogy with ponderable matter. This ether can't be conceived as consisting of particles. »
(Albert Einstein, Grundgedanken und Methoden der Relativitätstheorie in ihrer Entwicklung dargestellt, § 13, 1920)*

And at University of Leiden, 5 May 1920:

Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light...

The word ether has very old origins, derived from the Greek aither, descending from Sanskrit aidh, and has changed its meaning many times in the development of science. In nineteenth century were in use simultaneously fourteen different models of ether.

What Einstein called ether is no longer a separate medium from the space, contained within space, as previous models were, but it is precisely the space that, with its physical property, determines inertial and gravitational behavior of matter, and all electromagnetic phenomena that take place in empty space.

Remember that in physics, before E., space and time had played a purely passive role in which events took place. While the theories of E. turned them into active participants of cosmic dynamics.

Towards the end of nineteenth century, in addition to the idea of ether as an independent entity that filled space, also some models emerged already identifying ether with space, mainly thanks to P. Drude and M. Abraham.

Unfortunately, the homonymy of ether word creates confusion and it is used by his opponents to argue against it.

The workhorse of ether detractors is inability to measure the velocity with respect to space (just looking inside the laboratory). And with a leap of logic, they say: - If ether existed, then there would be a reference system connected to it, said privileged or absolute, which would define the absolute motion. While we know that it is impossible to determine the absolute motion (looking only inside the laboratory) –.

In reality, inability to determine the absolute velocity respect to space just means this: until now we have not been able to determine it experimentally.

In other words you can't experimentally establish a reference system linked with space, looking only inside the laboratory. But, absolutely, it does not mean that space has no physical substantiality.

Indeed the ether introduced by E. in 1916 can't serve as a frame of reference, because, with any known experiment, it is impossible to define a reference system bound to it. So its existence does not violate the principle of relativity.

In the interpretation of Lorentz instead there is a hypothetical privileged reference system in which space is at rest. And this second theory, abandoned by time, is coming back today, because since many years we are able to measure the speed with respect to the cosmic background radiation, and in opinion of Selleri, this may constitute a fundamental system that no one can ignore. So the reference system, in which the background radiation is isotropic, seems the most important.

Returning to Einstein, in his writings described ether as:

- physical space with physical properties -.

Definitions like this can also be found in previous work of Drude; but Einstein went on and proposed a new model in which particles are defined as particular states of ether products from energy, and they are no longer considered foreign bodies to space, as in previous models. And also this was a fundamental and decisive step further because in this way the problem of ether wind is solved.

In his third and final model of ether, he tried to formulate a unified field theory in which space-time, with its physical properties, not only determines inertia and gravitation, but also becomes the active medium of electromagnetic interactions. Since it is intended as a

total field of all types of interactions.

In the years between 1928 and 1931, words space-time, ether and field become basically synonymous.

Physical space, or space-time, and ether, for E. are so different expressions to say the same thing; and the fields and particles were physical states of space.

After 1931 the disappearance of the word ether then was determined from observation that physical space absorbed ether and assimilated his functions.

From 1935 to 1955, the word ether was first used by E. less and less, till to disappear. Its existence appears only with new editions of two works of relativistic ether. And between 1950 and 1955 total field gets the ontological privileged state.

But Einstein never again didn't deny physical property of space, because they are the base of General Relativity.

It is a strange thing that in Physics we can find some terms that no longer correspond to their original etymological meaning, but which are still in use, for example: atom and empty space.

For - atoms - it is evident and known that they are not atoms but "objects" complex and inexhaustible.

Instead for - empty space – the question is more difficult because many people identify it with - the nothingness -.

But space has real physical properties because with its states can define gravitation, inertia, polarization, fields, waves and a spatial distribution of energy. Then we have good reasons to support its physicality, and would be important and useful to go back and use the traditional word - ether - because it expresses clearly the physical substantiality of space.

But it should be specified that now ether is identified with space, and it is no longer something contained within the space, as the old models.

While continuing to use the word space, or space-time, its physical qualities are not highlighted in any way. Rather, it remains hidden behind the words - empty space -.

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