

# Einstein and the ether



Relativistic theory does not reject the existence of an ether. Dr Kostro, of the Institute of Experimental Physics, Gdansk University, has undertaken extensive research into Einstein's views; that his model of space-time is a model of a new ether.

LUDVIK KOSTRO

Viewpoints are often expressed in *Electronics and Wireless World* which assume that Einstein's theory and the existence of an ether are conflicting and incompatible. It is time, therefore, that some of the truths of historical record, concerning Einstein's views on the ether, were given a hearing.

## 'ETHER' TERMINOLOGY

This is a distortion of the truth. Einstein did deny the existence of the fixed and immobile ether of the nineteenth century, but he, nevertheless, in 1916, proposed a completely new conception of the ether. In a sense, one can say that he was provoked into doing this by the influence of H.A. Lorentz and P. Lenard.

Lorentz wrote a letter to Einstein in which he maintained that the general theory of relativity admits of a stationary ether hypothesis. In reply, Einstein introduced his new non-stationary ether hypothesis. He wrote to Lorentz on the 17th June 1916:

*I agree with you that the general relativity theory is nearer to an ether hypothesis than is the special relativity theory. However, this new ether theory would not violate the principle of relativity, because its state  $g_{\mu\nu}$  — aether would not be that of a rigid body in an independent state of motion, but its state of motion would be a function of position determined via the material processes\*.*

Physical space (connected closely with time) whose state, in relativity theory, is described by the fundamental metrical tensor  $g_{\mu\nu}$ , is regarded by Einstein as the relativistic ether. Einstein did not publish his new ideas on this in 1916 or 1917 as he advanced his work on the general theory. The first appearance of the new conception in print was provoked by Lenard. In 1918 Lenard published a paper opposing Einstein's relativity theory<sup>1</sup> in which he maintained that in the general theory the disqualified ether came back under the new name 'space'. In reply Einstein wrote an essay<sup>2</sup> in which he published the above-presented new definition of the ether. Indeed, in the period 1918-1955 Einstein published about 15 papers in which he interpreted his models of space-time as models of a new ether.

In these papers we can discriminate three models of the relativistic ether:

The first is that of the special relativity theory. In its mathematical description of this ether the ten components of the  $g_{\mu\nu}$  tensor are constant. The related ether is rigid, flat and infinite. Its metric is pseudo-

Euclidean.

The second is that of the general relativity theory. In its mathematical description the ten components of the  $g_{\mu\nu}$  tensor are no longer constant. The states described by the tensor can change not only from one place to the other, but also in time. This ether is no longer rigid and flat. Its metric is pseudo-Riemannian.

The third ether is that of the unitary relativistic field theory. In its mathematical description of this ether the symmetrical tensor  $g_{\mu\nu}$  (where  $g_{\mu\mu} = g_{\nu\nu}$ ) no longer describes the ether completely, because the geometrical structure of it is more than Riemannian. New structural elements have to be introduced for a complete description of the ether because it has to determine not only the inertio-gravitational phenomena, but also electromagnetic actions.

Thus, since 1916, Einstein's physics of space, albeit incorporating time within the space dimension, became the physics of a new ether, a physical ether and not just a mathematical formulation. In this physics the three physical notions: 'space', 'ether' and 'field' have found their complete unification through consequent identification.

*Physical space and the ether are only different terms for the same things; fields are physical states of space\*\*.*

Einstein's conception of the ether constitutes a gradual conceptual activation, dynamization and materialization of the physical space. According to the new conception, in its most developed form, the physical space closely connected with time is not a passive and static container of events, nor is it a physically-indifferent or neutral arena of physical phenomena. It is an active dynamic field medium which determines the inertio-gravitational, electromagnetic and other processes, which include the production of elementary particles. The real physical space, as an active field medium of this kind, possesses energy and therefore mass as well and that is why it is itself of a material nature. It constitutes active matter *sui generis* for which the term 'ether' is the most appropriate name.

It must be mentioned, however, that the three synonyms: 'physical space', 'ether' and 'total field' were used by Einstein with different frequency in different periods:

In the period 1916-1925 (see e.g. refs 5,6) the term 'ether' was used very often. He maintained even that 'in a consequent field theory all objects of physics must be embraced in the notion of ether\*.

In the period 1926-1935 (see e.g. refs.

7,8,9) the term 'physical space' played the principal part in Einstein's papers. He wrote: *"Space, brought to light by the corporeal object, made a physical reality by Newton, has in the last few decades swallowed ether and time and seems to swallow also field and corpuses, so that it remains as the sole carrier of reality"*.

In the third period 1936-1955 (see e.g. ref 10) the term 'total field' or 'entire field' was the term preferred by Einstein. After 1955 Einstein began to use the word 'ether' less and less often, although he still wrote in 1958:

*"This word ether has changed its meaning many times in the development of science... Its story, by no means finished, is continued by relativity theory"*.

and although, in 1954, he still indicated that:

*"rigid four-dimensional space of the special theory of relativity is to some extent a four-dimensional analogue of H.A. Lorentz's rigid three-dimensional ether"*.

Yet, underlying all this was his statement dating from 1920, made in the light of his early work on both the Special and General Theories of Relativity that:

*"There is an important argument in favour of the hypothesis of the ether. To deny the existence of the ether means, in the last analysis, denying all physical properties to empty space"*.

According to Einstein's new conception, it was impossible to formulate a complete physical theory without an (at least latent) ether hypothesis, because every complete physical theory must take into consideration the real properties of the physical space i.e. the 'Milieu-Einfuss'\*. One might not use the word 'ether' but one has still to recognise that physical space has real properties which play an active part in physical happenings and, therefore, Einstein maintains:

*"The ether hypothesis was bound always to play a part even if it is mostly a latent one of first in the thinking of physicists"*.

## THE PHYSICAL ETHER

In Einstein's special relativity ether model the physical space accomplishes its active function by 'determining the inertial behaviour of a test body introduced into it'<sup>10</sup> and possesses 'the physical property of transmitting electromagnetic waves'<sup>11</sup>, but 'it no longer stands as a medium built of particles'<sup>11</sup> or 'points'<sup>12</sup> and is no longer regarded as an immobile or stationary

# Einstein And The Ether

**Mike Jess**



## **Einstein And The Ether:**

**Einstein and the Ether** Ludwik Kostro,2000      **The ether of Albert Einstein** Robert Jobard,2022-09-05 If you ask a physicist to explain ether to you he will either be embarrassed or he will say that ether does not exist that it was rejected by Einstein in 1905 But in1921 Einstein published *The ether and the theory of relativity* After his theory of general relativity he became aware of the problem posed by deformable space and gravitational waves He conferred with other physicists and recognized the existence of the Lorentz s ether with no physical characteristics except immobility An immobility that Einstein removed if not a relative immobility in relation with the referential from which it is observed We have found a hypothesis that could explain this mysterious movement the speed of light would be everywhere the same because the ether would be seen as motionless everywhere This hypothesis is very simple and we propose experiments that are also quite simple to verify it

**Einstein: On Aether and Relativity** Albert Einstein,2025-03-01 *Aether and the Theory of Relativity* by Albert Einstein A completely new English translation 2025 An address given by Einstein at the University of Leiden the Netherlands in 1920

*Einstein and the Universe* Charles Nordmann,1922      *Substance and Function, and Einstein's Theory of Relativity* Ernst Cassirer,Marie Taylor Collins Swabey,1923 The first part of the present book *Substanzbegriff und funktionsbegriff* was published in 1910 while the second part which we have called the supplement *Zur Einstein schen relativit ts Theorie* appeared in 1921 Bibliography p 457 460      *Einstein's Relativity* Dunlap Jamison McAdam,1922      **Einstein's Theories of**

**Relativity and Gravitation** James Malcolm Bird,1921 Einstein s theory of relativity confounded and excited both professional and amateur scientists with its explanation of the intricacies of how the world and the universe truly work rather than how people wished or believed they worked His view of relativity dismantled Newton s theory of space and time as absolutes adding the concept of curved space time which deals with the velocity of motion Einstein explains his theory of physics in a way that was designed not only for scientists with a knowledge of the complicated math involved but for the general reader as well      *The Evolution of Scientific Thought from Newton to Einstein* A. D'Abro,1927      *Nature* Sir Norman Lockyer,1923      **Unification of Electromagnetism and Gravity** Selwyn E Wright,2014-02 In a *Unification of Electromagnetism and Gravity* author Selwyn Wright describes his New Relativity NR theory in a simple physical way in order to help the lay person to understand At the same time he seeks to update aspects of modern physics in a rigorous manner NR removes confusion in Einstein s relativity simplifies our understanding of the universe and challenges relativity as a more logical and comprehensive theory Motional electromagnetic EM and gravitational theories are shown to have two inherent deficiencies that have prevented them from becoming a unified theory Firstly they do not recognize that the propagation medium ether is the essential thread that runs through these developments Secondly they do not realise that EM waves and gravity are two forms of the same field unsteady electric and steady difference electric fields Wright s new theory re establishes a preferred frame of reference and restores the connection between classical and modern physics It also

forges new links between electrical sources and observers in motion and between electric fields and gravity As explained in the Unification of Electromagnetism and Gravity the medium provides the bridge between the Lorentz transform accelerating frames and gravity providing a basis for the unification theory of the universe **Hunting the Faster than Light**

**Tachyon, and Finding Three Unicorns and a Herd of Elephants** Robert Ehrlich,2022-05-18 In 1905 Albert Einstein declared speeds greater than light to be impossible This book describes the author s decades long search for the hypothetical subatomic particles known as tachyons that violate this principle This book is a scientific detective story The crime is speeding that is the possible breaking of the cosmic speed limit namely the speed of light as stipulated by Einstein This detective story is also a memoir written by a member of a band of tachyon hunters The author s pursuit of tachyons has been met with skepticism from most physicists who note correctly that no such superluminal particles have ever been surely observed and that there have been many false sightings Nevertheless considerable circumstantial evidence for tachyons has already been published and an ongoing experiment could decide the issue in the next few years This book is written for the general reader containing humor and eliminating jargon whenever possible and will also be of interest to scientists The hunt for the tachyon will fascinate all readers who approach the study of physics with curious and open minds *Maimonides Bulletin* ,1925 [The Windsor Magazine](#) ,1930 [The Scientific Monthly](#) James McKeen Cattell,1926 **Journal of the Outdoor Life** ,1926 *Popular Radio and Television* ,1923 **Current History** ,1926 **The Foundations of Einstein's Theory of Gravitation** Erwin Freundlich,1922 **Popular Radio** ,1923 **Foundations of the Universe** Matthew Luckiesh,1925

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