
A table of contents for *Bibliotheca Sacra* can be found here:

https://biblicalstudies.org.uk/articles_bib-sacra_01.php

THE EINSTEIN THEORY[1]

L. FRANKLIN GRUBER, D.D., LL.D.
ST. PAUL, MINN.

WHEN the war clouds were lifted from Central Europe the scientific world outside of Germany was startled by the daring researches which a lone German scholar of Jewish descent had brought to completion during those days of darkness. That Newtonian gravitation should be declared to be only a first approximation to the truth, that even light should be said to be deflected in passing through a so-called gravitational field and that this deflection should be twice as much as could be accounted for by Newton's laws if light really came under the power of gravitation, came to English men of science like a shock. A test of so bold a theory must therefore be made. Two astronomical expeditions, in charge of some of England's foremost astronomers, were accordingly sent out to make observations during the total eclipse of the sun, May 29, 1919, to see whether rays of light from a star are deflected in passing near the sun, and if so whether the amount of deflection corresponds to that predicted by Dr. Einstein. And to their astonishment their observations confirmed Einstein's prediction: theory was found to be matched by scientific fact. Light was found to be deflected by the sun, and the amount of deflection averaged approximately 1.7 seconds of arc for rays passing the limb of the sun, or twice the amount that might be due to Newtonian gravitation.

But this is only one of the applications of the theory itself. To discuss that adequately would manifestly not

[1] Dr. Einstein's somewhat popular presentation is found in the following work: Relativity: The Special and General Theory. By Albert Einstein, Ph.D. Translated by Robert W. Lawson, M. Sc. New York: Henry Holt and Company, 1920. 168 pages.

be possible within the limits of this brief article. All we expect to do is to call attention to the theory and to the works in which the more intelligible elements of the same are set forth. A few of the more interesting points may, however, be given.

Dr. Einstein first calls attention to the fact that all motion is relative, and that we can know of uniform motion of one body only with reference to another body, either at rest or also in motion. This is illustrated on looking out of a uniformly moving train and in the case of the motions of the earth, in both of which cases we are apt to regard ourselves as at rest. Hence it is found *that general laws of nature should hold for a body in uniform motion the same as for a body at rest.* This is the fundamental principle of the *Special Theory* of Relativity.

One of the most startling points—and this has been confirmed by experiment—is this, that the velocity of light is unaffected by the velocity of its source, always retaining its standard of 186,000 miles a second. But this fact is so in conflict with the law of the addition of velocities in mechanics that an explanation had to be sought. In an endeavor to make satisfactory reconciliation it was found that a body in very rapid motion should undergo a shortening of all its elements in the direction of motion as measured by an observer relatively at rest, and that the interval between recurring ticks of a clock on such a body would be lengthened, the lengthening of the intervals between the ticks being mathematically exactly equal to the shortening of the body. Now from this and other considerations time is shown to be really so related to our so-called three-dimensional space as in a sense to be equivalent to a fourth dimension. Thus a body with great relative velocity would apparently be passing into the fourth dimension, that transition presumably becoming complete at the velocity of light. Thus light must play the part of limiting velocity in nature, even gravitation acting with that velocity.

Now, of course, no one can visualize a fourth dimension, because our experience affords us no four-dimensional concepts. But as a line has but one dimension and yet if curved is curved into a second dimension, and as a surface has but two dimensions and yet if curved curves into what to a two-dimensional being would be a transcendent third dimension, so three dimensional space in the presence of matter supposedly curves into a to us transcendent fourth dimension.

Moreover, Dr. Einstein has shown *that the essential principles of relativity hold not only for bodies in uniform motion, but for bodies in any state of motion whatever.* This is the foundation of the *General Theory of Relativity.* Hence he arrives at the fact that a so-called gravitational field can be produced by a proper choice of motion or of reference-body, as in the case of a rapidly rising elevator, while the gravitational field of the earth may be said to be eliminated in the experience of a falling person. Therefore, even gravitation would come under the general principle of relativity, and would apparently be only a matter of relation or be due to inertia. Thus as centrifugal force, as is well known, is due only to inertia, so would its counter-force called gravitation also apparently be. And in the theory of four-dimensional space, this theory would find its confirmation, a body following what is called its geodesic, "world-line," in four-dimensional space.

According to the above and associated principles, the propositions of Euclidean geometry would not be exactly valid in a gravitational field, as indeed might be shown in the case of a rapidly rotating body, as well as of a body otherwise moving with great velocity.

That Einstein's theory of gravitation might be dignified with the term *law* appears from the fact of the deflection of light in accordance with it, already spoken of, and not less so from the fact that it explains the hitherto baffling factor in the rotation of Mercury's orbit, not to speak of other startling deductions.

Furthermore, Dr. Einstein's theory unmistakably points to a finite, although unbounded, universe, finite in so-called space as well as in matter, as the extent of space is supposed to be wholly dependent upon the amount and distribution of matter. And thus this theory, if established, would confirm the conclusion of the writer that a physically constituted universe cannot be infinite and must therefore be relative and interdependent in every part from electron to star. (See the writer's *Creation ex Nihilo.*) And, of course, such a physical universe must needs be dependent upon an entity superior to it, an independent or absolute spiritual personality. The theory of *physical relativity* in the *parts* thus necessarily implies, and indeed is of a piece with, that of a *spiritual dependence* of the *whole.* Hence a finite and temporal, and therefore *created,* universe issues also from this latest scientific-philosophic world-view.

It may be said in closing this brief statement, as is more and more being acknowledged, that this theory, of which only a few elements have above been given, is in some respects undoubtedly the most revolutionary and far-reaching scientific theory since the days of the publication of Copernican astronomy.