The theory of relativity in the face of experience.

(Evidence to the contrary offered by Astronomy)

In its "restricted form", the theory of relativity is entirely based how many on two postulates, of strictly experimental content, which therefore must be evaluated and judged in the light of experience alone.

Question:

I °) The principle of relativity proper;

2°) The principle of the constancy of the speed of light.

The first affirms the impossibility of revealing and measuring by means of any "physical fact" the absolute motion of bodies, or more precisely, the motion of matter with respect to the ether.

It was first stated clearly by Einstein, the which he had and has the great merit of having had this profound intuition need for facts, through the numerous negative experiences, made with purpose of discovering and measuring the motion of the Earth, with respect to the ether.

It is a great credit to Einstein to have been able to see that the root of conflict between electromagnetic theory (of Lorentz) and experience, — arisen precisely with regard to the influence of motion on optical and electrical phenomena - consisted of a true antithesis between the principle of relativity (already known in Mechanics) and theory; having known how to see that reconciliation could only be achieved by removing this antithesis, that is, by extending the "principle of relativity" of mechanics to all of physics; making physics "relativistic"; as was the Mechanics.

On this point no doubt can remain; no one can disappear divide School from School, scholar from scholar. Until new experiences (1) come to persuade us of the contrary, our constructions sciences must henceforth bend, adapt to the "law of relativity" *revealed by facts*, and enunciated by Einstein.

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(1) Michelson’s experience was recently repeated at the Monte Observatory Wilson (California) and - it is said - with a positive outcome, although it is much smaller than that pre seen from the theory. But the information known so far does not allow for a conclusive judgment purpose.

Discord can and does arise around the choice of the path that one has to beat to achieve such an end.

Einstein's theory goes one of these ways; that is, it is one of the many schemes, one of the many new theoretical constructions, of "type relativistic" that it is possible to construct. This they must keep in mind all those who like to get a clear opinion of the debates of our science, and who can only have indirect information; this must be known by all those who, through pure speculation, arrive at the "relativistic" conclusion before they bind their thought to the triumphal chariot of the "theory of relativity" outlined by Einstein.

The path taken by Einstein is this: keep the theory intact (i.e., the Lorentz equations) and bend the principle of relativity (which was expressed by Meccanica) in order to reduce it under the empire of theory itself. And to achieve this he had to bend, deform the old and glorious Mechanics - silly if you want to say otherwise by invoking its validity remained intact due to slow motions - had to deny, break down its fundamental postulates, deform even those primitive concepts of "time" and "space" which have given so much since to think and to write.

Now, this upheaval arises, in a direct and necessary way, from this statement by Einstein (his 2nd postulate) that light, emitted by any source, always travels with the same speed, whatever may be the conditions of movement (or more exactly the speeds) of the source itself, and of the observer.

Statement of character and wholly experimental content, and as such, invariably subject to the sanction of experience.

Shortly after Einstein's first memoir appeared, another young and talented theorist, Walter Ritz, managed to outline another "general theory of physical phenomena" also in full harmony with the principle of relativity, beating a path in perfect antithesis with that held by Einstein: that is, trying to keep Mechanics intact classical and to retouch and adapt the electromagnetic theory in such a way to bring it under the dominion of the principle of relativity. He reaches such an end also by means of a postulate on the speed of light, which is perfectly contradictory to that of Einstein, since supposes that the light that reaches us from a source in motion (with respect to us), you travel with a speed equal to the (vectorial) sum of the speed normal *c* of light (emitted by a source at rest) and add speed *v* of the source.

Both schemes undoubtedly have strengths and weaknesses, advantages and disadvantages, brilliant synthetic views and obscure gaps; so that the choice between the two would require a diligent, delicate and not easy.

But even before coming to the examination of these two particular schemes, it is necessary to fulfill a more general and "prejudicial" task: that of testing the "physical truth" of one or the other of the two contradictory postulates, to guide the research in a safe way, to steer it decisively either on the path traveled by Einstein or on that indicated by Ritz. Or, possibly above an intermediate one.

Having taken this first step under the guidance of *experience, the only one that has the right to decide the choice*, the work of theorists will be able to proceed safely in the elaboration of the scheme we need; and you can then either take up and adapt one or the other of the two already built, or devise ex novo one or more others, better responding (1).

Therefore, the need to search for a "fact" was soon felt physicist capable of providing us with 1 decisive element of proof, in favor of one or the other hypothesis on the speed of light.

Now the only field of facts, from which experimental research could to draw on the desired piece of evidence, it was and is that of the facts astronomical, for reasons on which it is not worth insisting here. Because of this, as early as 1913, De Sitter, a Dutch astronomer, believed he was providing this element of judgement, certain and definitive, based on the observations of the "double stars".

They are pairs of stars, close to each other and linked by mutual attraction, by virtue of which they revolve around each other, according to laws analogous to those discovered by Kepler for the motion of the planets around the sun.

De Sitter's conclusions were flatly contrary to the postulate of Ritz or the "ballistic principle" as it is called by us physicists; and thereafter the motion of the "doubles" has been alleged as the strongest proof in favor of the 2nd postulate of Einstein's theory.

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(1) It goes without saying that these possible schemes will always be "relativistic" if they will satisfy—like those of Einstein and Ritz—the principle of relativity.

An easy analysis has recently led me to recognize that the De Sitter's argument hid an error and, taking up again in examine the consequences to which the Ritz hypothesis can lead us, when be applied to observations of the movement of the "doubles", are succeeded in foreseeing an entire very important field of facts that they find the most exact confirmation in experience; facts, long known to astronomers, but hitherto remained obscure and unexplained.

This unexpected and happy agreement between theoretical prediction and observations, constitutes an element of proof in favor of the "postulate ballistic" that far exceeds the value of any experience ad hoc set up, of any system of observations frantically (and not always serenely) accumulated, to verify forecasts concerning uncertain effects, or untrustworthy because from their very smallness placed on the threshold of inevitable experimental errors.

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Let us therefore admit, from here on, the accuracy of the ballistic hypothesis, i.e., let us admit that *the speed with which light propagates emitted by a moving source* (e.g., a star) *is the one obtained by adding to the normal propagation speed c* (of the light coming from a stationary source) *the speed v with which the source itself moves along line of sight* (1).

So, let's imagine turning our gaze towards a "double", constituted by a big central star O, almost motionless, and by a "companion" S, who goes around it, in the direction of the arrow, long a circular orbit, placed in a plane that contains the "visual" MO. (see Fig. 1[a]).

Let us mark in the figure the points C,D, A,B in which the visual itself and the diameter perpendicular to it cut the circle, i.e., the four o'clock fundamental positions that astronomers call *conjunction* (C), *opposition* (D), *quadrature* (A,B).

(1) When the source moves i direction whatever the speed needed at g arriving at *c* is only the component of *v* in the direction of vision.

When the star passes through A its velocity *v* is directed along the line of sight, but in the opposite direction to the rays departing at that moment from S, which therefore travel with the velocity c-v.

When the star passes through D, its velocity *v* is directed perpendicular to the view, and has no influence on the propagation of the rays, traveling towards the observer, which therefore have the normal velocity *c*.

When the star passes through B, the *v* is directed line of sight and in the direction of propagation, therefore the rays travel with the velocity $c + v$.

Similarly: the rays departing from the successive positions — between B and A — will have to travel with decreasing speeds from $c + v$ to c-v.

To clearly clarify the phenomena that must occur due to this propagation of light with "variable speed", we will make use of a concrete example.

Along a battle front, the commander in chief - placed at a considerable distance - issues orders and information, by means of couriers sent at constant intervals of time, e.g., at every hour. If the couriers all traveled at the same *speed*, the fighting units would receive orders, after more or less long times, depending on their distance from the Command, but at constant intervals of one hour each. If, on the other hand, they run with variable speeds, the orders will reach the following departments at different intervals.

Let us stop for a moment to consider the journey of two consecutive couriers, supposedly e.g., that the first, sent at time 0, travels at a speed of 10 Km. per hour, the second, sent at time 1, travels at a speed of 11 Km. per hour.

It is evident that the advantage of 10 km that the former possesses at the moment of departure of the latter will become increasingly smaller, as the length (or more precisely the duration) of the route increases. In fact, at 2 o'clock, the first courier will have covered 20 km, while the second will have covered 11, so that their distance will have become 9 km. At 3, it will have become 8, and so on. At 11 am the second courier, who will have covered 110 km, will catch up with the first who will also have covered 110, and from that moment on, the second will precede the first by a time that is as greater as the further time is greater. covered room.

Thinking therefore of all the couriers who left, e.g. in a whole day (24 hours) and assuming that their speeds are all different, first increasing and then decreasing, we are able to guess what a big tangle of orders and ideas could arise on our battlefront, supposing that the subsequent bulletins carry no indication of the departure time, or any other element which serves to enlighten those who receive them on the "true" order of their succession.

It is precisely these dreadful "overlappings" between the rays which departed from the mobile star, from positions and at different times, were the months with which De Sitter fought Ritz's hypothesis. Such overlappings could not allow us - observes De Sitter - to faithfully follow the motion of the revolving tape, and to discover its laws; contrary to what emerges from the observations on the "doubles", which have allowed us to study their motion and to establish their laws.

This conclusion of De Sitter's is too little thought out and is generally *inaccurate*.

Before arriving at the condemnation of Ritz's hypothesis, it was necessary to try to unravel the "tangle", to establish the factors on which it depends and to become well convinced of the play that each of them can play in the various cases.

Everyone immediately sees that if the differences in speed between the successive couriers were only a few meters over the 10 km altitude (supposed to be the average) we would have nothing more to fear from the small high rations of the arrival intervals; since they would be quite incapable of producing shifts in the succession of orders of our Command; when—of course—the total travel times are not too large.

Well, the differences in speed that we can expect between the light rays emitted by a moving star are always very small fractions of the average speed of propagation of light. According to what is known about the speed of celestial bodies, these differences are between a few hundred thousandths and half a thousandths of the speed of light.

Therefore, for those stars, for which the time taken by the rays to reach us is not too great, that is, for those which are not very distant from us, we will be able to fear no notable perturbation due to overlapping of the rays. If the "doubles" observed are close enough then we can without inconvenience and without obstacles establish the positions subsequently occupied by the "companion" and find the law. of the orbital motion.

Now the fact remains that the astronomical observations relating to the law of motion of the "doubles" fall precisely on stars, for which the condition of distance assumed here is more than largely satisfied; so that one can be certain — in opposition to De Sitter's conclusions — that these observations prove nothing against Ritz's hypothesis!

Things change profoundly when we consider much more distant stars; so far away that the time θ which the rays take to reach us becomes very large in comparison with the time τ of the rotation of the "companion"; or more precisely when the ratio between the time τ of a rotation of the "companion" and the time θ is of the same order of magnitude as the ratio between the speed *v* of the star in its orbit and the speed *c* of light.

The overlapping of light then becomes inevitable, generating curious and interesting effects that make it worthwhile to study.

To get a very clear idea of it, it would be essential to establish, in a precise way, the law of correspondence between the departure times of the light rays from the star, which we will indicate with *t*, and the times of arrival at our eye, which we will indicate with T.

But since we cannot get involved in a discussion of a mathematical nature (however simple and elementary) we must refer to the united diagram which gives the graphic representation of that law, for certain particular notable cases.

The starting times are represented on the straight line OX, so that point O corresponds to the initial instant ($t = 0$) in which the rotating star S passes through position A; point A' corresponds to the time that the star takes to make a complete revolution; to the points C', B' D' which divide OA' into four equal parts, correspond respectively the moments in which the star passes through the positions C (opposition), B (2, quadrature), D (conjunction); at points A", C", B", D" the moments of the new passes (2nd round) for the same positions A, B, C, D: and so on.

In a completely analogous way the points of the straight line OY represent the arrival times T (1).

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(1) In reality, due to the requirements of the drawing, the values of T are all decreased by a fixed number; this does not alter the shape of the drawn curve in any way, on which alone the consequences that will be examined depend.

In the hypothesis (by Einstein) in which the rays starting from any position always traveled with the same speed, the arrival times would increase regularly, as the starting ones increase, and would be represented in our drawing by the points on the straight line Z Z' equally inclined with respect to OX and OY. In the ballistic hypothesis instead, due to the changes in speed, the arrival times undergo real fluctuations and instead of the straight line Z ZA we have, in the drawing, an undulating curve, which deviates more and more from the straight line itself, to the extent that the τ/θ ratio approaches the c/v ratio, and then equals and exceeds it.

The drawn curves show this very clearly: they correspond in an orderly manner to the cases in which the first ratio is 0.1 of the second; and then 0.16; 0.3; 0.6; 1 (i.e., equal).

To clearly see the effects of the overlapping let us analyze one of our curves in detail, for example we choose the one for which the ratio τ/θ is 3/10 of the second.

The phenomenon must be considered from the moment in which the rays departing from the star arrive at the epoch of the first quadrature (i.e., at the passage through A) i.e., departing at time $t = 0$.

This moment is represented by the point T_0 of our curve. Drawing from T_0 a straight line parallel to the axis OX we observe that it further cuts the curve at the points R and S. What does this fact mean? It means that the rays departing from the star in the instants t_1 = OR' t_2 = OS', reach us *also at time* T_0, i.e., they arrive together with those departing at time t=o. In other words, the rays emitted from *three* different positions reach us "crossed over": it still means that at the moment T_0 the rays departing from the positions that the star occupies have already arrived in the entire interval that begins from the instant t_1=OR', because (as the curve shows) the rays departing in said interval all have arrival times *smaller* than T_0.

The light emitted by the star in so much of the circle, therefore had to overlap with the light emitted in the previous circle.

In the times that follow T_0 (i.e., greater than T_0) and for a short interval we will still collect light coming from three distinct positions (1) of which the 1st and 2nd positions are approaching up to merge into a single MT point. As T grows

(1) Slowly slide a small ruler across the figure, parallel to the OX axis starting from T_0; and follow all the points where it cuts the curve under examination.

further, our parallel to OX cuts *the curve only once*, i.e., the overlap disappears. And it disappears until T reaches the value OM'_2, since from that moment on the rays emitted in the last part of the circle overlap with those emitted in about half of the second (the parallel again cuts the curve in three points).

But in addition to this phenomenon of overlapping, it is also important to note the following very remarkable fact: in the vicinity of the points M_1, M_2, M_3 the observer must receive a much larger quantity of light than he would have received if the speed of propagation of light were re been constant (or the star is stationary), while in the vicinity of the points O_1, O_2, etc., must receive a somewhat smaller quantity and this due to the play of a second "fluctuation factor" of the luminous intensity, much larger than the overlap already seen. The diagram will serve us very well to clarify the matter.

At the points D_1, D_2... our curve, as everyone sees, is very steep with respect to the axis OX; while at the points M_1, M_2... it is very slightly inclined (indeed small arcs taken in the immediate vicinity of these points are even parallel to OX). This indicates that in correspondence with the first points the light emitted by the star in a certain time interval h reaches the observer in a somewhat longer time interval κ (1), which means that the light emitted in the first time arrives in a somewhat longer duration, that is, it is diluted - allow me the word - in a somewhat longer time so that *for each unit of time we get a much smaller quantity than normal*.

In the other moments the opposite happens: the light emitted in a certain interval h_1 is received in a κ_1 somewhat smaller than h_1, so that *we will have strong concentrations of light*.

In total, and due to the simultaneous arrival of rays emitted from several locations, *and much more due to these periodic* gatherings and thinnings of light, we must expect the star to present us with *periodic changes in luminous intensity, i.e., periodic changes in the apparent magnitude*.

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(1) The intervals h are segments of the OX axis: the intervals k are the corresponding segments of the OY axis. A pair of such segments is obtained by taking any section of the curve and lowering the perpendiculars to the axes from its ends.

All that we have said for the case examined still holds - with the appropriate variations - for the other cases in which the two usual ratios are slightly different, so that we are authorized to conclude *that all double (or more complex) stars for which the distance, speed and period are such as to satisfy the given condition must appear to us as having variable luminosity*, i.e., of variable apparent size, because the classification of stars according to *different sizes* is based only on their most or less big.

This analysis led me not only to *predict the existence of "variable stars"*, but also to completely predict the very different behavioral details that can appear when the value of the two ratios, τ/θ and v/c change.

However, the resistance of "variable stars" (unknown to me when I developed the theory mentioned here) had been known to the astronomers for a long time. Also known were many details I found, but science had not managed to glimpse the most rudimentary explanation.

The theory developed by me gave me, instead, in the most direct, simplest and most natural way, the general key to these facts, it allowed me to trace an explanation which proved to be in perfect harmony with the observations, and as soon as it was born and had the good fortune of a very brilliant confirmation.

I cannot linger here to explain the observed phenomena and compare them with my theoretical predictions; anyone who wants can read my original Memoir or the popularisation essay that I have already published.

I must content myself with stating that this agreement between new predictions and old observations is wide, multiple and perfect. That this agreement, which came quite spontaneously, and therefore free from any contamination of dangerous suggestions, constitutes the best proof in favor of Ritz's postulate, proof of its fecundity, proof of its physical "*truth*" (in the sense in which we are permitted in science to use this word).

"Truth" which shines even clearer and more beautiful when compared, has the simplicity and "*docility*" with which the ballistic hypothesis rests on the scientific ground of yesterday, and the upheaval that Einstein's hypothesis causes there; between the very imposing concrete throws that the first one gave us in a single stroke, and the extreme infertility of the other, who *still seeks* after twenty years a foothold, in the confirmation of his petty predictions.

Without hesitation and without fear, I entrust to the severe and enlightened, but *serene*, criticism of the educated world these astronomical proofs of mine in favor of the ballistic postulate and the new theory of "variable stars", which it *spontaneously* suggested to me .

The judgment that will come sooner or later will bring light and simplicity back to the scientific horizon; it will again point out - I am sure - the old and glorious route to our thinking, that route which has been so fruitful and on which it will still have a long way to go, before new and "*well-established facts*" will be able to force us to abandon it forever.

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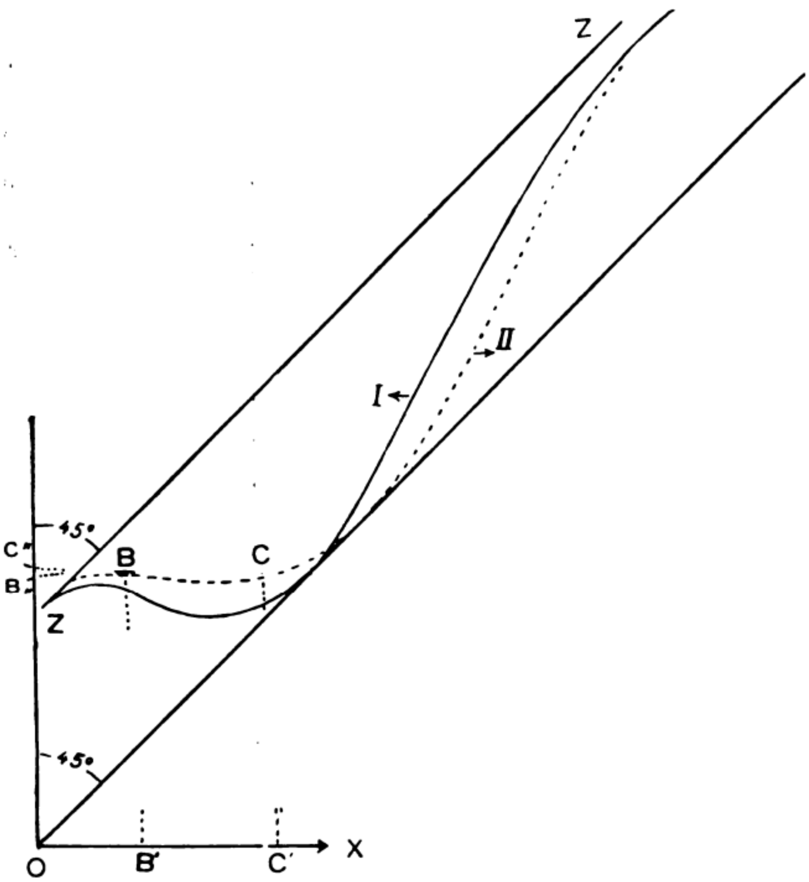
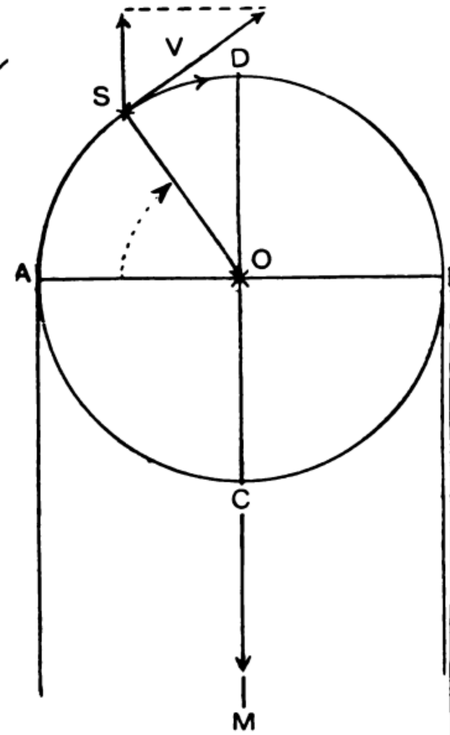
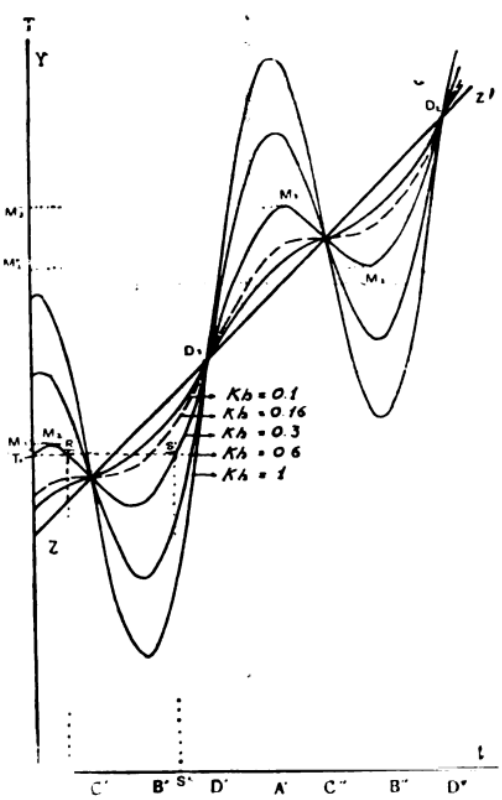
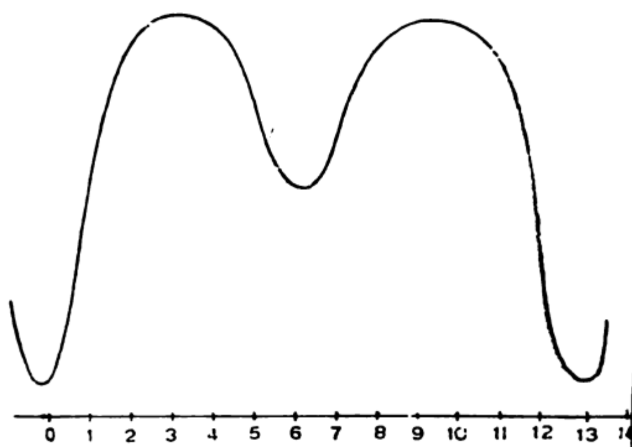
Italian to English translation using Google Translate and Yandex Translate by Thomas E. Miles. Other Ritz & La Rosa related files located by Robert Fritzius at web site: http://shadetreephysics.com/ with other relating at Gen. Sci. Journal: https://gsjournal.net/

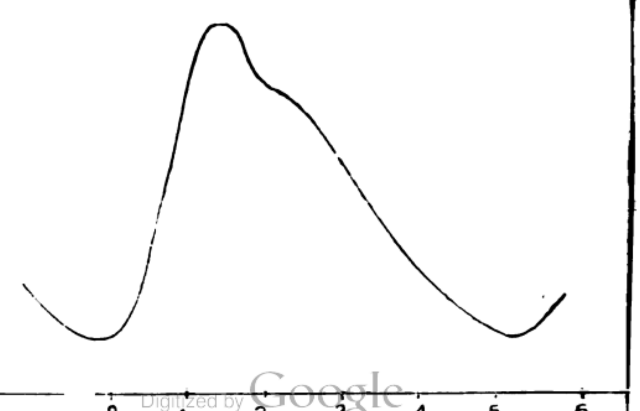
EDITOR COMMENT: The **fig. 1ª** was inserted with figures on this page 64 at the front figure-section of the published text.











La Rosa. La teoria della relatività di fronte all'esperienza