the general science journal

The reckless about Einstein's Special Theory of Relativity, chapter 3, 4 and 5 (pages from 897 to 907) of the publication "Zur Elektrodynamik bewegter Körper" appeared in "Annalen der Physik" in 1905.

Le fesserie di Einstein a proposito della Teoria della Relatività Ristretta, capitoli 3, 4 e 5 (pagine da 897 a 907) della pubblicazione "Zur Elektrodynamik bewegter Körper" apparso su "Annalen der Physik" nel 1905.

Die Einsteins Dummheiten über die Spezielle Relativitätstheorie, der Kapitel 3, 4 und 5 (Seiten von 897 bis 907) der Publikation "Zur Elektrodynamik bewegter Körper" erscheint in der "Annalen der Physik" im 1905.

Les conneries d'Einstein à propos de la Théorie de la Relativité Restreinte, chapitre 3, 4 et 5 (pages de 897 à 907) de la publication "Zur Elektrodynamik bewegter Körper" apparue dans les "Annalen der Physik" en 1905.

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1 *Introduction*

Every time I study the SPECIAL THEORY OF RELATIVITY, I have problems understanding it. Therefore, I have been forced to analyze it to the best of my ability. I'm of the opinion that by using only elementary mathematics, we can refute the formulas that were developed by Einstein in his famous work, "Zur Elektrodynamik bewegter Körper.

I admit to a limited knowledge of mathematics, and not at all English.
I reached the conclusion that also basic concept learned at the elementary school is distorted by Einstein.
I convinced myself that if this theory has been around for hundred years without strong opposition it's only because those that are able to do so are not interested in contradicting the winner of a Nobel prize. Now that they are in the paradise of the great scientists, it must be said that rather than run the risk of having opposition, they let physics be massacred, instead it should be an exact science.

So I take therefore the commitment (and also the courage), through my limited abilities, to critically analyze to the work of Einstein, <u>providing evidence of the errors and contradictions.</u> This is limited to chapters 3,4 and 5 (pages from 897 to 907) of the original German text.

If someone intends to verify the following, they <u>must absolutely</u>:

1) follow the rules of classical mathematic, and not invent to justify Einstein's way of thinking.
2) Pretend that in a text, with the same symbol it is always meant the same sizes. For vectorial sizes should be equal both module and the argument (angle).
3) Do not accept anything, in this case a theory, without been convicted of the it's rightness.
4) They must also be objective and take into consideration that even a genius like Einstein can make mistakes ! Also a theory that as already a hundred years can be wrong. Just think about when people believed that was the sun to turn around the heart !

People that go far into this dissertation and have an master title, or greater, in math or physic are already aware that at the end they must take a not so easy choice.
If they don't want to have risk, they are urged to stop here and not proceed into this text; <u>it's dangerous</u> !
If they want to take the risk of continue, at the end they will make the following choice:
<u>correct the errors made by me it the present document</u>;
other way
<u>admit that for the physic, the mathematic procedure used by Einstein for the development of Lorentz transformations and the velocities addition is not acceptable.</u>
Here I do not exclude the possibility of using this formulas in practice, but it must be said clearly that, by now, they are <u>EMPIRICAL</u>, and so not demonstrable with mathematic procedure or scientific reasoning.

Who has not the bravery to opt for one of the two previous choice must <u>burn his degree or diploma that he got; HE HAS NO RIGHT TO KEEP IT !!</u>

2 *Explanation of the symbols used*

My analysis follows the original text that appears in the Annalen der Physik in 1905, German text, to avoid introduction of errors in translated or interpretation. I'll indicate the pages where the formulas may be found in the Einstein's text.
I'll mark the extracts of the Einstein text in blue.

For the following text I'll use:

I'll use the same symbols as Einstein, with the exception of the two following symbols:
for the system K (fixed system), I'll use **S**
and for the system k (in motion) I'll use **S'**

V is the speed of light in the vacuum.

Speed in system S' (apparent speed)
$V_{10} = \left(V_\xi; 0; 0\right)$ ray only in the direction of $\boldsymbol{\Xi}$ axis
$V_{20} = \left(0; V_\eta; 0\right)$ ray only in the direction of $\boldsymbol{H}$ axis (eta of Greek alphabet)
$V_{30} = \left(0; 0; V_\zeta\right)$ ray only in the direction of $\boldsymbol{Z}$ axis (zeta of Greek alphabet)

Speed in system S
$V_{11} = (V_x; 0; 0)$ ray only in the direction of x axis
$V_{12} = (-V_x; 0; 0) = -V_{11}$
$V_{21} = \left(v_x; \sqrt{V^2 - v^2}; 0\right)$
$V_{31} = \left(v_x; 0; \sqrt{V^2 - v^2}\right)$
$V_{41} = \left(V_{41x}; V_{41y}; V_{41z}\right)$ with the condition $V_{41x}^2 + V_{41y}^2 + V_{41z}^2 = V^2$

Taking again the formulas from Einstein's text, I take the liberty, were I believe it's necessary highlighting the vectorial character of the physical sizes, I placing an arrow over the symbol ($\vec{a}$).

The speed with which the system S' moves with the system S, for all the following text, it's always the same and is equal to: $v = (v_x; 0; 0)$

The sizes *x*, *y* e *z* are the distances measured from the origin of the system S to a certain point by an observer fixed in the system S. Respectively ξ, η and ζ are the distances measured from the origin of system S' to a certain point by an observer fixed in system S'.

3 *Analysis of the formulas of Einstein*

The following sections are not strict bound one to the other, but are consideration that show that there are inconsistency between the formulas, or between what is written in the Einstein's job.

A)

Einstein describe the following experiment:

page 897

Seien im "ruhenden" Raume zwei Koordinatensysteme, d. h. zwei Systeme von je drei von einem Punkte ausgehenden, aufeinander senkrechten starren materiellen Linien, Gegeben. Die *X*-Achsen beider Systeme mögen zusammenfallen, ihre *Y*- und *Z*-Achsen bezüglich parallel sein. Jedem Systeme sei ein starrer Massstab und eine Anzahl Uhren beigegeben, und es seien beide Massstäbe sowie alle Uhren beider Systeme einander genau gleich.

Es werde nun dem Anfangspunkte des einen der beiden Systeme (*k*) eine (konstante) Geschwindigkeit *v* in Richtung der wachsenden *x* des anderen, ruhenden Systeme (*K*) erteilt, welche sich auch den Koordinatenachsen, dem betreffenden Massstabe sowie den Uhren mitteilen möge. Jeder Zeit *t* des ruhenden Systeme *K* entspricht dann eine bestimmte Lage der Achsen der bewegten Systems und wir sind aus Symmetriegründen befugt anzunehmen, dass die Bewegung von *k* so beschaffen sein kann, dass die Achsen des bewegten Systems zur Zeit *t* (es ist mit "*t* " immer eine Zeit des ruhenden Systems bezeichnet) den Achsen des ruhenden Systems parallel seien. …

page 898

Setzen wir $x' = x - vt$, so ist klar, dass einem im System *k* ruhenden Punkte ein bestimmtes, von der Zeit unabhängiges Wertsystem *x'*, *y*, *z* zukommt. Wir bestimmen zuerst τ als Funktion von *x'*, *y*, *z* und *t*. …

Vom Anfangspunkt des Systems *k* aus werde ein Lichtstrahl zur Zeit τ_0 längs der *X*-Achse nach *x'* gesandt und von dort zur Zeit τ_1 nach dem Koordinatenursprung reflektiert, wo er zur Zeit τ_2 anlange; so muss dann sein:

Considering this description and since with the linear function $x' = x - vt$ here over I can have for *x'* two times zero with different times, as instead Einstein expects when he puts in the formula

page 898

$$\frac{1}{2}\left[\tau(0,0,0,t) + \tau\left(0,0,0,\left\{t + \frac{x'}{V-v} + \frac{x'}{V+v}\right\}\right)\right] = \tau\left(x',0,0,t + \frac{x'}{V-v}\right) ,$$

I suggest to use the following functions:

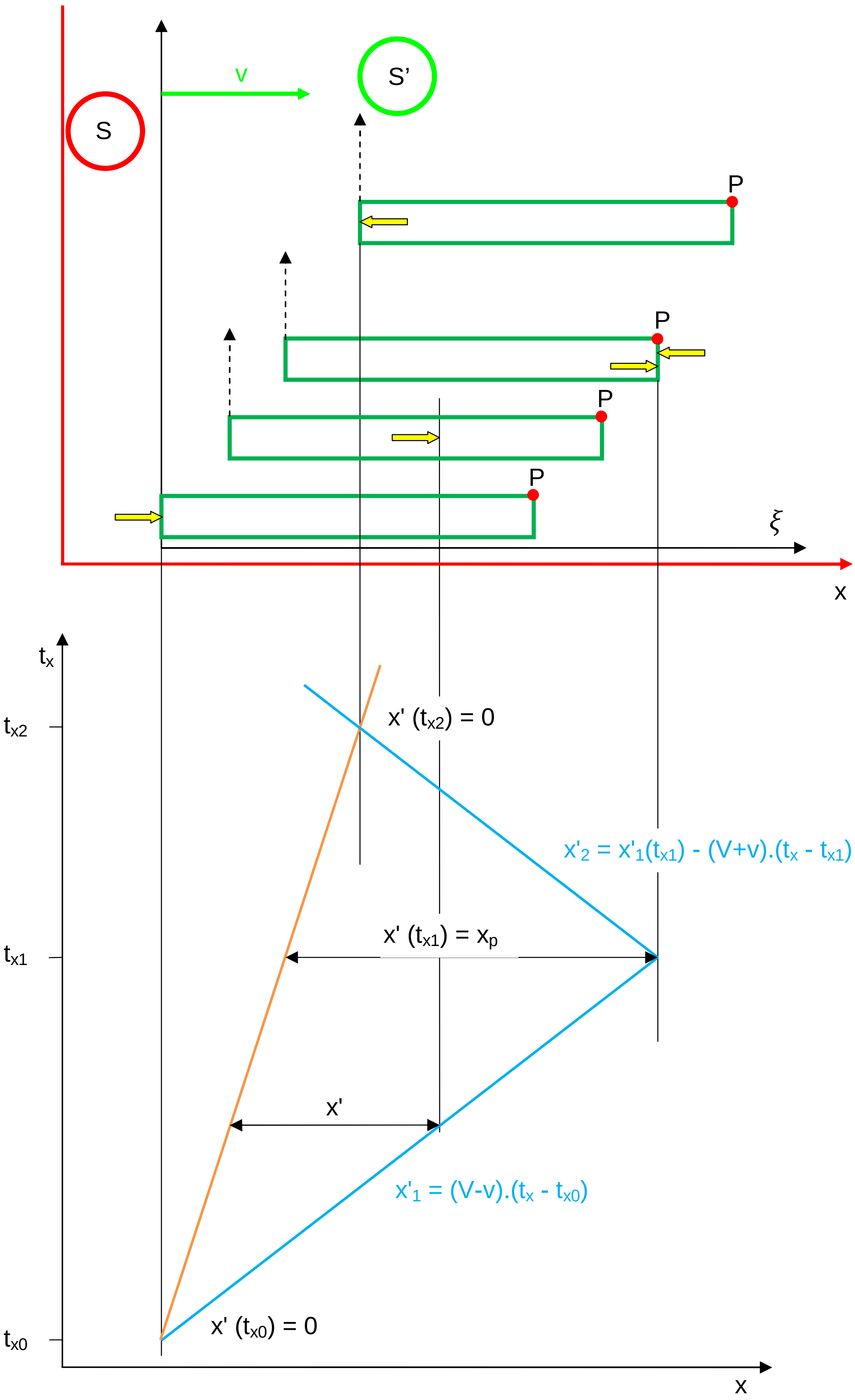
for $t_{x0} \le t_x \le t_{x1}$ $\qquad x'_1 = (V-v).(t_x - t_{x0})$ A1)

and for $t_{x1} \le t_x$ $\qquad x'_2 = x'_{1(t_{x1})} - (V+v).(t_x - t_{x1})$

$$= (V-v).(t_{x1} - t_{x0}) - (V+v).(t_x - t_{x1})$$ A2)

They go moreover distinguished two *x'*, one is the distance between the origin of S' and point "P" that is not varied in time (it's a constant that I define later with x_p), and the other is the size of the variable in function of the time given from the expression $x' = x - vt$.

Only at time t_{x1} this variable *x'* is equal to the distance between the origin of S' and the point "P", that is x_p (measured from an observer still in S).



Representation of *x'* in function of t_x

There is also an incoherence, since Einstein say that the point "P" that is found in the system S', at a distance *x'* regarding the origin of the system, when this distance is seen from the observer still in the system S, it's independent from the time.
But when he introduces the arguments and obtain the following formula:

$$\frac{1}{2}\left[\tau(0,0,0,t)+\tau\left(0,0,0,\left\{t+\frac{x'}{V-v}+\frac{x'}{V+v}\right\}\right)\right]=\tau\left(x',0,0,t+\frac{x'}{V-v}\right)$$

we notice that there aren't three different times and *x'* it's not always equal but for two times is zero and for the thirty is *x'*, therefore IT IS NOT CONSTANT to the varying of the time !

Now we verify the proposed formulas:

for $t_x = t_{x0}$ we got:

$$\underline{x'_1} = (V-v).(t_x - t_{x0}) = (V-v).(t_{x0} - t_{x0}) = \underline{0}$$

for $t_x = t_{x1} = t_{x0} + \frac{x_p}{V-v}$ were

$$t_{x1} - t_{x0} = \frac{x_p}{V-v}$$

$$x_p = (V-v).(t_{x1} - t_{x0})$$

we got:

$$\underline{x'_1} = (V-v).(t_x - t_{x0}) = (V-v).\left(t_{x0} + \frac{x_p}{V-v} - t_{x0}\right) = \underline{x_p}$$

and

$$x'_2 = (V-v).(t_{x1} - t_{x0}) - (V+v).(t_x - t_{x1})$$

$$\underline{x'_2} = x_p - (V+v).(t_{x1} - t_{x1}) = \underline{x_p}$$

and for $t_x = t_{x2} = t_{x0} + \frac{x_p}{V-v} + \frac{x_p}{V+v} = t_{x1} + \frac{x_p}{V+v}$ we got:

$$x'_2 = (V-v).(t_{x1} - t_{x0}) - (V+v).(t_x - t_{x1})$$

$$\underline{x'_2} = x_p - (V+v).\left(t_{x1} + \frac{x_p}{V+v} - t_{x1}\right) = x_p - x_p = \underline{0}$$

Therefore since *x'* should be represented form the formulas that I put into the box above, the step that Einstein say he does at page 900 "Setzen wir für *x'* seinen Wert ein, so erhalten wir:", where it is given to mean that it replaces *x'* with $x - v.t$ <u>it is not feasible !</u>

I verify also the correspondence of the formula $x' = x - vt$ with the value used by Einstein, that is:

for τ_0 ; $t = t_{x0}$ and $x' = 0$

$x' = x - v.t \quad \Rightarrow \quad 0 = x - v.t_{x0}$	A3)

for τ_1 ; $t = t_{x0} + \frac{x\prime}{V-v}$ and $x' = x'$

$x' = x - v.t \quad \Rightarrow x' = x - v.t_{x0} - \frac{v.x\prime}{V-v}$

I insert A3) $x' = 0 - \frac{v.x\prime}{V-v} = -\frac{v.x\prime}{V-v}$

$V - v = -v \quad \Rightarrow \underline{V = 0}$

for τ_2 ; $t = t_{x0} + \frac{x\prime}{V-v} + \frac{x\prime}{V+v}$ and $x' = 0$

$x' = x - v.t \quad \Rightarrow 0 = x - v.t_{x0} - \frac{v.x\prime}{V-v} - \frac{v.x\prime}{V+v}$

I insert A3) $0 = 0 - \frac{v.x\prime}{V-v} - \frac{v.x\prime}{V+v} \quad \Rightarrow \quad \frac{1}{V-v} = -\frac{1}{V+v}$

$V + v = -V + v \quad \Rightarrow \underline{V = -V}$ that is verified only if $\underline{V = 0}$

As we see from the result $V = 0$ it's a nonsense !

B)

Also the procedure of replacing into the formula of page 899 $\xi = aV\left(t - \frac{v}{V^2-v^2}x'\right)$ the variable *t* with page 900 $\frac{x'}{V-v} = t$ I got so far ξ in function of the single variable *x'* in order to replace *x'* with $x - v.t$ it doesn't appear to be rational since we can replace directly *x'* into the formula $\xi = aV\left(t - \frac{v}{V^2-v^2}x'\right)$ obtaining: $\xi = a.V.\left(\frac{t-v.x/V^2}{1-v^2/V^2}\right)$ that is a formula perfectly valid, and it can be reconstructed also using the formulas page 899 $\xi = V\tau$ and the one for τ of page 900. I point out that the formula for τ of page 900, as already been subject of changes, but we can notice clearly the term $\left(t - v.x/V^2\right)$.

C)

We already found at page 898 the expression $x' = x - vt$ C1)

And at page 900 their is $\frac{x'}{V-v} = t$ C2)

That can be resolved in: $x' = V.t - v.t$ than replacing x' of C1) with this formula, we got:

$V.t - v.t = x - v.t$ and at the end $x = V.t$ C3)

I'm asking myself why then the formulas at page 902 are not simplified

$\tau = \beta\left(t - \frac{v}{V^2}x\right)$ C5)

$\xi = \beta(x - vt)$ C6)

with τ that is only function of *t* [inserting C3) in C5)]: $\tau = \beta.(1 - v/V).t$

$$\tau = \frac{1}{\sqrt{1-\left(\frac{v}{V}\right)^2}}.(1 - v/V).t = \frac{1 - v/V}{\sqrt{1-\frac{v}{V}}.\sqrt{1+\frac{v}{V}}}.t = \sqrt{\frac{1-{}^{v}/_{V}}{1+{}^{v}/_{V}}}\ .t$$

$$\tau = \sqrt{\frac{V-v}{V+v}}\ .t$$

and ξ that is only function of *x* [inserting C3) in C6)]: $\xi = \beta.(1 - v/V).x$

$$\xi = \frac{1}{\sqrt{1-\left(\frac{v}{V}\right)^2}}.(1 - v/V).x = \frac{1 - v/V}{\sqrt{1-\frac{v}{V}}.\sqrt{1+\frac{v}{V}}}.x = \sqrt{\frac{1-{}^{v}/_{V}}{1+{}^{v}/_{V}}}\ .x$$

$$\xi = \sqrt{\frac{V-v}{V+v}}\ .x$$

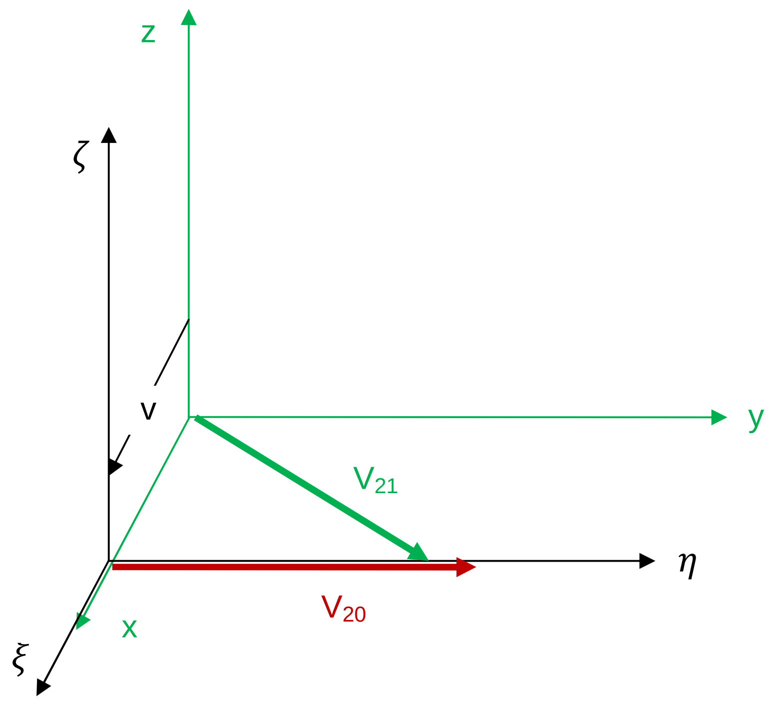
D)

Einstein is always considering particular cases when he use the expression of page 900, $\eta = V\tau$ were the light ray is diffused in the direction of η (*y*), with speed:

$$V_{20} = (0; V_\eta; 0)$$

While the speed of the light that appears, still at page 900, in $\frac{y}{\sqrt{V^2-v^2}} = t$ is:

$V_{21} = \left(v_x; \sqrt{V^2 - v^2}; 0\right)$ and it is diffused in the plan x-y. Also here we got a particular case, in the particular case, since the speed with which the system S' moves can be equal at the component of V_{21} along axis *x*, that in this punctual case is *v*.



page 900

Auf analoge Weise finden wir durch Betrachtung von längs den beiden anderen Achsen bewegte Lichtstrahlen :

$$\eta \; = V\tau = a\, V \left(t - \frac{v}{V^2 - v^2}\, x'\right),$$

wobei

$$\frac{y}{\sqrt{V^2 - v^2}} = t\;; \qquad x' = \; 0\;;$$

Notice that it uses expression for the time that had been obtained considering the propagation of the light ray only in the direction of the *x* axis.

page 898

Vom Anfangspunkt des Systems *k* aus werde ein Lichtstrahl zur Zeit τ_0 längs der *X*-Achse nach *x'* gesandt und von dort zur Zeit τ_1 nach dem Koordinatenursprung reflektiert, wo er zur Zeit τ_2 anlange; so muss dann sein:

and continuing

page 898

$$\frac{1}{2}\left[\tau(0,0,0,t) + \tau\left(0,0,0,\left\{t + \frac{x'}{V-v} + \frac{x'}{V+v}\right\}\right)\right] = \tau\left(x',0,0,t + \frac{x'}{V-v}\right)$$

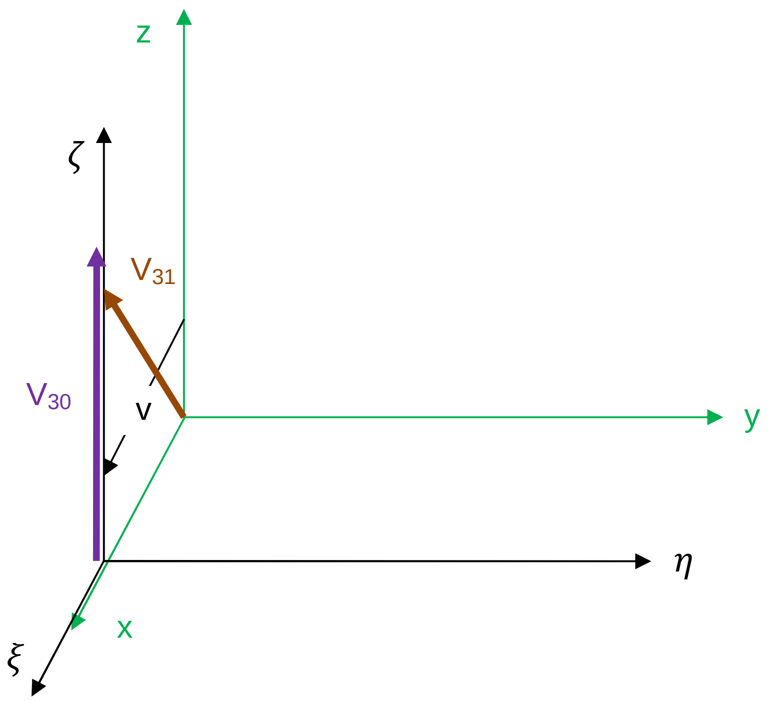
We see that the arguments for the directions *y* and *z*, in the starting formula used to find the equation of time were zero. Therefore the obtained expression for τ can not be used when *y* is different form zero !

E)

Einstein is considering <u>another particular case</u>, (implied at page 900) $\zeta = V.\tau$ were the light ray is diffused in the direction ζ (*z)* with speed:

$V_{30} = \left(0; 0; V_\zeta\right)$ and

$V_{31} = \left(v_x; 0; \sqrt{V^2 - v^2}\right)$ that it is diffused in the plan x-z.



Also here, for analogy, there are the same errors that I put in evidence in section **D)**.

F)

At page 901 we found :

Zur Zeit $t = \tau = 0$ werde von dem zu dieser Zeit gemeinsamen Koordinatenursprung beider Systeme aus eine Kugelwelle ausgesandt, welche sich im System *K* mit der Geschwindigkeit *V* ausbreitet. Ist (*x*, *y*, *z*) ein eben von dieser Welle ergriffener Punkt, so ist also

$$x^2 + y^2 + z^2 = V^2 t^2$$

Diese Gleichung transformieren wir mit Hilfe unserer Transformationsgleichungen und erhalten nach einfacher Rechnung:

$$\xi^2 + \eta^2 + \zeta^2 = V^2 \tau^2$$

Einstein said that applying in the formula

$$x^2 + y^2 + z^2 = V^2 . t^2$$

The formulas of transformation he developed, after and easy calculation, he obtained

$$\xi^2 + \eta^2 + \zeta^2 = V^2 . \tau^2$$

First it’s not a simple calculation since it is necessary to find the inverse transformations $x = f(\xi, \tau)$ and $t = f(\tau, \xi)$

Starting from the expressions at page 900, as follows:

$$\tau = \frac{\varphi(v)}{\sqrt{1-(v/V_{11})^2}} . \left(t - \frac{v}{V_{11}^2} . x\right)$$

$$\frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \tau = t - \frac{v}{V_{11}^2} . x$$

$$t = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \tau + \frac{v}{V_{11}^2} . x \qquad \text{F1)}$$

and

$$\xi = \frac{\varphi(v)}{\sqrt{1-(v/V_{11})^2}} . (x - v.t)$$

$$\frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \xi = x - v.t$$

$$x = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \xi + v.t \qquad \text{F2)}$$

F2) in F1)

$$t = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \tau + \frac{v}{V_{11}^2} . \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . \xi + \frac{v^2}{V_{11}^2} . t$$

$$[1-(v/V_{11})^2] . t = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} . (\tau + v/V_{11}^2 . \xi)$$

$$t = \frac{1}{\varphi(v)} . \frac{\tau + v/V_{11}^2 . \xi}{\sqrt{1-(v/V_{11})^2}} \qquad \text{F3)}$$

now F1) in F2)

$$x = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} \;.\xi + \; v.\frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} \;.\tau + \frac{v^2}{V_{11}^2}.x$$

$$[1-(v/V_{11})^2].x = \frac{\sqrt{1-(v/V_{11})^2}}{\varphi(v)} \;.(\xi + v.\tau)$$

$$x = \frac{1}{\varphi(v)}.\frac{\xi+v.\tau}{\sqrt{1-(v/V)^2}} \qquad \text{F4)}$$

and $\eta = \varphi(v).y \quad \Rightarrow \quad y = \frac{1}{\varphi(v)}.\eta$ F5)

$\zeta = \varphi(v).z \quad \Rightarrow \quad z = \frac{1}{\varphi(v)}.\zeta$ F6)

Now I continue with the procedure probably used by Einstein, were in:
$x^2 + y^2 + z^2 = V_{41}^2.t^2$ we substitute *t* with F3), *x* with F4), *y* with F5) and *z* with F6)

$$\left(\frac{1}{\varphi(v)}\right)^2.\left(\frac{\xi + v.\tau}{\sqrt{1-v^2/V^2}}\right)^2 + \left(\frac{1}{\varphi(v)}\right)^2.\eta^2 + \left(\frac{1}{\varphi(v)}\right)^2.\zeta^2 = V_{41}^2.\left(\frac{1}{\varphi(v)}\right)^2.\left(\frac{\tau + v/V^2\;.\xi}{\sqrt{1-(v/V)^2}}\right)^2$$

$$\xi^2 + \; v^2.\tau^2 + 2v.\xi.\tau + (1-v^2/V^2).\eta^2 + (1-v^2/V^2).\zeta^2$$
$$= \; V_{41}^2.\tau^2 + V_{41}^2.(v^2/V^4)\,.\xi^2 + 2V_{41}^2.(v/V^2)\,.\xi.\tau$$

$$(1-v^2.V_{41}^2/V^4).\xi^2 + (1-v^2/V^2).\eta^2 + (1-v^2/V^2).\zeta^2 + 2v.(1-V_{41}^2/V^2).\xi.\tau$$
$$= V_{41}^2.(1-v^2/V_{41}^2).\tau^2$$

$$\left[1-\left(\frac{v}{V}\right)^2.\left(\frac{V_{41}}{V}\right)^2\right].\xi^2 + \left[1-\left(\frac{v}{V}\right)^2\right].\eta^2 + \left[1-\left(\frac{v}{V}\right)^2\right].\zeta^2 + 2v.\left[1-\left(\frac{V_{41}}{V}\right)^2\right]\xi.\tau$$
$$= V_{41}^2.\left[1-\left(\frac{v}{V}\right)^2.\left(\frac{V}{V_{41}}\right)^2\right].\tau^2$$

With $V_{41} = V$ It will result in: $\xi^2 + \eta^2 + \zeta^2 = V^2.\tau^2$ as sad by Einstein.

In the procedure indicated here over as possible development of the formulas done by Einstein we must consider that:

in the formula $x^2 + y^2 + z^2 = V^2.t^2$, were are considered the sizes of the system S, the speeds are:
$0 \le velocity_x \le V$
$0 \le velocity_y \le V$

$0 \leq velocity_z \leq V$
with the condition that $velocity_x^2 + velocity_y^2 + velocity_z^2 = V^2$

Instead the formulas at page 902 were obtained with the conditions:

equations for τ and for ξ:
the speed of light, in system S, go in the direction of *x* only $V = (V_x; 0; 0)$
And so also for the formulas for F3) and F4), found here over, the speed is
$V = (V_x; 0; 0)$

Equation for η
The speed of light, in system S, is $V = \left(v_x; \sqrt{V^2 - v^2}; 0\right)$

Equation for ζ
The speed of light, in system S, is $V = \left(v_x; 0; \sqrt{V^2 - v^2}\right)$

And therefore the formulas found at page 902 or the lengths along the three axis cannot be used simultaneously because each formula exclude the simultaneous use of the other two !

A proof of this is that also a Professor of a notorious high school of Switzerland, of which I do not write the name because it has been a private correspondence, and he said: "*The three equations are never reported to the same physical entity* (in that case: same ray), and so are not compatible."
The three equations are the one from pages 899 and 900, that is: $\xi = V\tau$; $\eta = V\tau$ and $\zeta = V.\tau$ that stand at the foundations of the formula that Einstein developed and show at half page 900.

A proof of what we say are also the following:
page 901

$$\xi^2 + \eta^2 + \zeta^2 = V^2\tau^2$$

If we substitute the variable in the expression here over with the formulas that are found, at page 899 $\xi = V\tau$ and at page 900 $\eta = V\tau$, were is also implied $\zeta = V.\tau$, we got:

$V^2.\tau^2 + V^2.\tau^2 + V^2.\tau^2 = V^2.\tau^2 \quad \rightarrow \quad 3 = 1 \quad !$

Also wanting to consider the speeds with their directions, that is:
$\vec{\xi} = \vec{V}_{10}.\tau$ con $\vec{V}_{10} = \left(V_\xi; 0; 0\right)$
$\vec{\eta} = \vec{V}_{20}.\tau$ con $\vec{V}_{20} = \left(0; V_\eta; 0\right)$
$\vec{\zeta} = \vec{V}_{30}.\tau$ con $\vec{V}_{30} = \left(0; 0; V_\zeta\right)$
Of which V_ξ is the speed of light into the vacuum, considered in the event that travels exactly along ξ axis, and so also for other two axis.

And using the squared module, we got:

$$\left|\vec{\xi}+\vec{\eta}+\vec{\zeta}\right|^2 = \left|\vec{V}_{10}.\tau+\vec{V}_{20}.\tau+\vec{V}_{30}.\tau\right|^2 = \left|\left(\vec{V}_{10}+\vec{V}_{20}+\vec{V}_{30}\right).\tau\right|^2$$
$$= \left|\left[\left(V_\xi;0;0\right)+\left(0;V_\eta;0\right)+\left(0;V_\eta;0\right)\right]\right|^2.\tau^2 = (V^2+V^2+V^2).\tau^2$$
$$= 3V^2.\tau^2$$

that would be equaled to the right term of the formula $\xi^2+\eta^2+\zeta^2 = V^2.\tau^2$

obtaining always the wrong result that 3 = 1 !

Or also
page 901
$\xi^2+\eta^2+\zeta^2 = V^2\tau^2$ and page 899 $\xi = V\tau$ $\Rightarrow \xi^2 = V^2.\tau^2$
so
$V^2.\tau^2+\eta^2+\zeta^2 = V^2.\tau^2 \Rightarrow \eta^2+\zeta^2 = 0 \Rightarrow \underline{\eta = 0;\ \zeta = 0}$

But we found also page 900 $\eta = V\tau$ $\Rightarrow \eta^2 = V^2.\tau^2$
so
$\xi^2+V^2.\tau^2+\zeta^2 = V^2.\tau^2 \Rightarrow \xi^2+\zeta^2 = 0 \Rightarrow \underline{\xi = 0;\ \zeta = 0}$

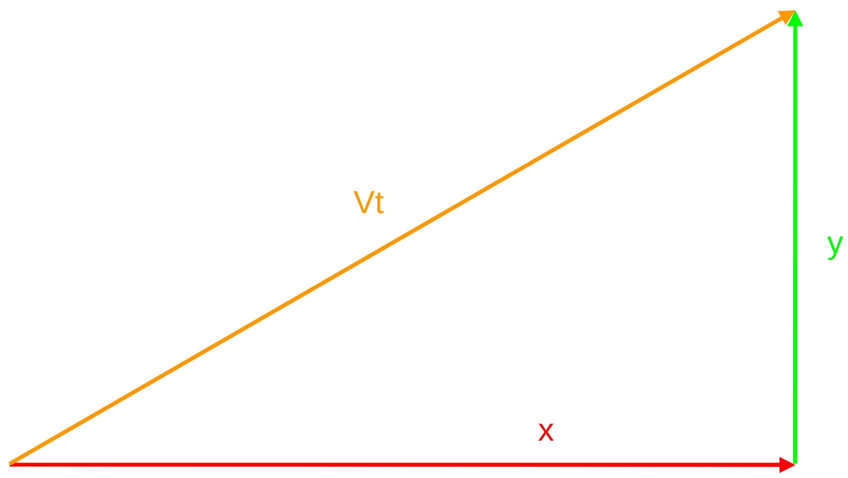
At page 900 is also implied that $\zeta = V.\tau$ $\Rightarrow \zeta^2 = V^2.\tau^2$
so
$\xi^2+\eta^2+V^2.\tau^2 = V^2.\tau^2 \Rightarrow \xi^2+\eta^2 = 0 \Rightarrow \underline{\xi = 0;\ \eta = 0}$

These three result are not compatible !

G)

Seen form system S the light ray, in the plane z = 0, it speed as follow:
$x^2+y^2 = V^2.t^2$
as wee see in the picture underneath the pythagorean theorem is applicable.

(For the following drawing I used these value:
V = 60 m/s; v = 20 m/s; t = 2 s; x = 104 m; y = 60 m; τ = 1,509 s; ξ = 67,801 m;
V. τ = 90,537 m; scale 1 mm ≡ 1 m)



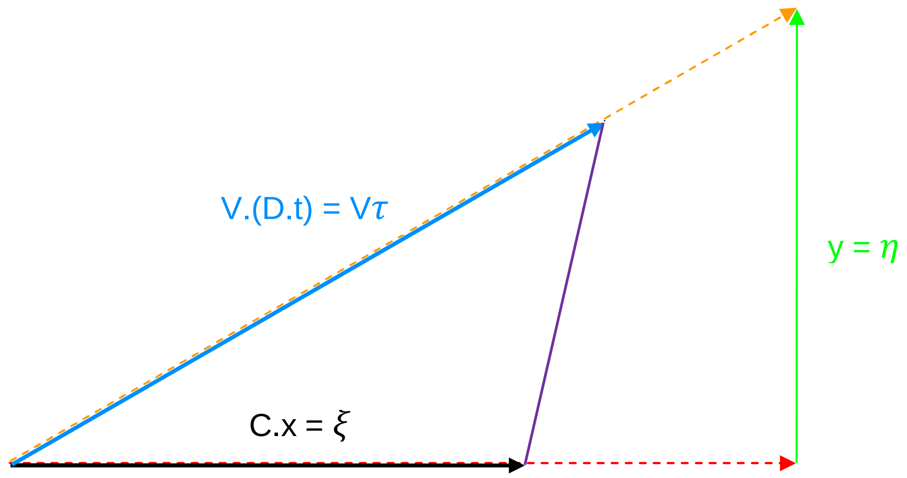
Now if I modify in the following way the sides of the triangle:

$C.x = \xi$ were $C = \frac{1}{X}.\xi = \frac{1}{X}.\frac{x-vt}{\sqrt{1-v^2/V^2}} = \frac{1-v/(x/t)}{\sqrt{1-v^2/V^2}}$ (= 0,6524)

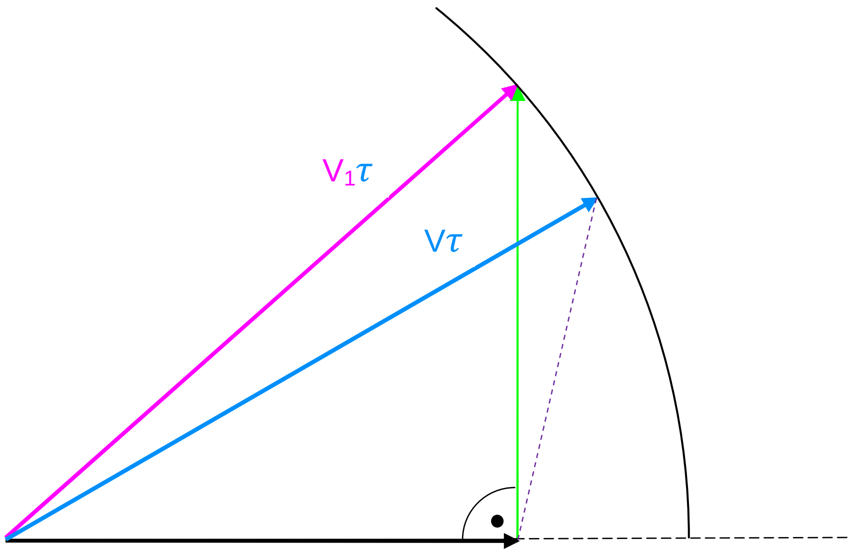
$V.(D.t) = V.\tau$ were $D = \frac{1}{t}.\tau = \frac{1}{t}.\frac{t-(v/V^2).x}{\sqrt{1-v^2/V^2}} = \frac{1-(v/V^2).(x/t)}{\sqrt{1-v^2/V^2}}$ (= 0,7545)

With C and D as scalars

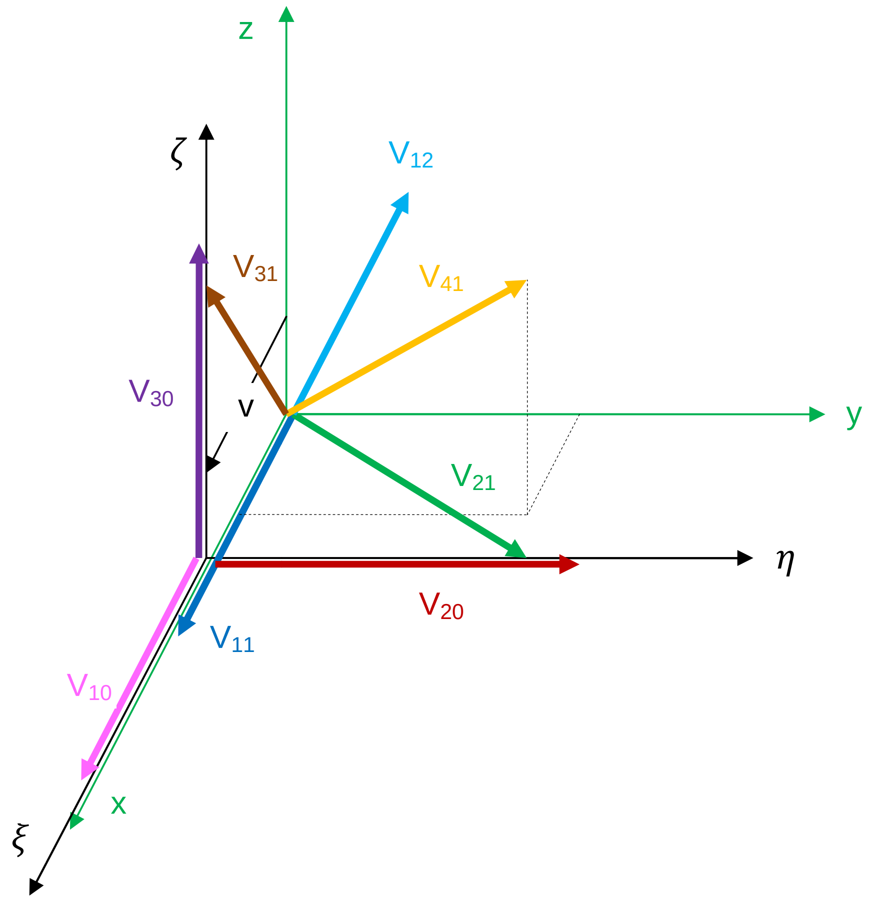
We cannot anymore apply the pythagorean theorem.



Given the equality from pythagorean theorem this is applied not at the triangle whose sides have been modified as sad a little ago, but at a triangle that has the same size of the modified sides but it is not a similar triangle to the one we started before.



<u>General observations:</u>
Different vector can have the same module, but not for this, they are the same !
In the vectorial calculation it’s not known any “multiplication” that change the direction of the vector.
The only exception is the multiplication with a negative scalar that turns the vector of 180°.



In this picture there are represented the different speed of light used by Einstein. All have module $|V|$ but they are all different sizes.

All the vectors that at the axis origin meet a spherical surface have the same module, but they are all vector different one to the other !

H)

In another point Einstein say:
page 900
Setzen wir für *x′* seinen Wert ein, so erhalten wir:
and he does not say it express, but it implies the substitution of x' with $x - v.t$ in the formulas:

page 899

$$\tau = a\left(t - \frac{v}{V^2 - v^2}x'\right)$$

page 900

$$\xi = a\frac{V^2}{V^2 - v^2}x'$$

$$\eta = a\frac{V}{\sqrt{V^2 - v^2}}y$$

$$\zeta = a\frac{V}{\sqrt{V^2 - v^2}}z$$

and he got the following formulas:

<u>page 900</u>

$$\tau = \varphi(v)\beta\ \left(t - \frac{v}{V^2}\ x\right)$$

$$\xi = \varphi(v)\beta\ (x - vt)$$

$$\eta = \varphi(v)\beta\ y$$
$$\zeta = \varphi(v)\beta\ z$$

wobei

$$\beta = \frac{1}{\sqrt{1 - \left(\frac{v}{V}\right)^2}}$$

In the steps to find the formulas immediately here over there is an mistake, and I put it in evidence for τ :
first considering that, at page 899 Einstein say:
wobei a eine vorläufig unbekannte Funktion $\varphi(v)$ ist
it achieve that I can substitute a with $\varphi(v)$ without problems, as I will do here:

$$\tau = a.\left(t - \frac{v}{V^2 - v^2}.x'\right) = a.\left(t - \frac{v.x}{V^2 - v^2} + \frac{v^2.t}{V^2 - v^2}\right)$$
$$= a.\left(\frac{V^2.t - v^2.t - v.x + v^2.t}{V^2 - v^2}\right) = a.\left(\frac{V^2.t - v.x}{V^2 - v^2}\right)$$
$$= a.\frac{1}{1 - v^2/V^2}.\left(t - \frac{v.x}{V^2}\right) = a.\beta^2.\left(t - \frac{v.x}{V^2}\right) = \varphi(v).\beta^2.\left(t - \frac{v}{V^2}.x\right)$$

Here we can see that the factor β is squared, and not in linear form as indicated by Einstein.

I do the same procedure also for ξ :

$$\xi = a.\frac{V^2}{V^2 - v^2}.x' = a.\frac{1}{1 - v^2/V^2}.(x - v.t) = a.\beta^2.(x - v.t)$$
$$= \varphi(v).\beta^2.(x - v.t)$$

Here also the factor β is squared as before and not in linear form as indicated by Einstein.

There would be a possibility to make “right” what Einstein did, placing $a.\beta = \varphi(v)$ and so $a.\beta^2 = \varphi(v).\beta$ but this would contradict the affirmation that I have mentioned little over.

However different formulas of the Einstein job result correct if we admit that $a.\beta = \varphi(v)$ and taking the equality of page 902 $\varphi(v) = 1$ we got:

$$a.\beta = 1 = a.\frac{1}{\sqrt{1 - v^2/V^2}} \quad \Rightarrow \quad a = \sqrt{1 - v^2/V^2}$$

From no part it comes explication why a should have this value !

For other two formulas the substitution of x' with $x - v.t$ should have no effect because the haven’t the value x' into the formulas. Now I examine one of the two cases:

$$\eta = a.\frac{V}{\sqrt{V^2 - v^2}} y = a.\frac{1}{\sqrt{1 - v^2/V^2}}.y = a.\beta.y = \varphi(v).\beta.y$$

Here also we got a factor β in excess, so we can continue with the reasoning done here over.

Also in the formula for ζ there is the same inconsistency.

---

l)

We take an expression used by Einstein that I group hereunder:

page 898 $\quad x' = x - vt$

page 899 $\quad \tau = a\left(t - \frac{v}{V^2 - v^2} x'\right)$, and pages 899 plus 902 $\quad a = \varphi(v) = 1$

page 900 $\quad \frac{x'}{V - v} = t$

and I get the following system of linear equation:

$$x - x' - v.t = 0$$
$$v.x' - (V_{11}^2 - v^2).t + (V_{11}^2 - v^2).\tau = 0$$
$$x' - (V_{11} - v).t = 0$$

Where I get three equations with four unknown quantities. By resolving this system (without have to rewrite the passages, that aren't difficult at all), and I get a group of equations (one for every variable) where I get, in each equation, two unknown quantities.

$x = x'.V_{11}/(V_{11} - v)$	$x' = x.(V_{11} - v)/V_{11}$	$t = x/V_{11}$	$\tau = x/(V_{11} + v)$
$x = t.V_{11}$	$x' = t.(V_{11} - v)$	$t = x'/(V_{11} - v)$	$\tau = x'.V_{11}/(V_{11}^2 + v^2)$
$x = \tau.(V_{11} + v)$	$x' = \tau.(V_{11}^2 - v^2)/V_{11}$	$t = \tau.(V_{11} + v)/V_{11}$	$\tau = t.V_{11}/(V_{11} + v)$

But we also find the following expression:

page 900 $x' = 0$

page 899 $\tau = a\left(t - \frac{v}{V^2 - v^2}x'\right)$, and pages 899 plus 902 $a = \varphi(v) = 1$

page 900 $\frac{y}{\sqrt{V^2 - v^2}} = t$

And get the following system of linear expressions:

$$x' = 0$$
$$v.x' - (V_{11}^2 - v^2).t + (V_{11}^2 - v^2).\tau = 0$$
$$y - \sqrt{V_{21}^2 - v^2}.t = 0$$

Resolving this system as done before (without writing all the passages) and we get three group of equation (one for each variable) were we got, in each of this equations, always two unknown quantity.

$y = t.\sqrt{V_{21}^2 - v^2}$	$t = y/\sqrt{V_{21}^2 - v^2}$	$\tau = y/\sqrt{V_{21}^2 - v^2}$
$y = \tau.\sqrt{V_{21}^2 - v^2}$	$t = \tau$	$\tau = t$

This last paragraph it's valid also for the ray of light that travel in direction of *z* axis. I only have to replace *y* with *z*, and V_{21} with V_{31}. So we got the following group of equations.

$z = t.\sqrt{V_{31}^2 - v^2}$		
$z = t.\sqrt{V_{31}^2 - v^2}$	$t = z/\sqrt{V_{31}^2 - v^2}$	$\tau = z/\sqrt{V_{31}^2 - v^2}$
$z = \tau.\sqrt{V_{31}^2 - v^2}$	$t = \tau$	$\tau = t$

Since that the two developments that I did before over here give two different τ, the τ that appears as the right member of the equation:

page 901

$$\xi^2 + \eta^2 + \zeta^2 = V^2\tau^2$$

witch of the two will be ?

(Eventually try the same demonstration of this section but with $a = \sqrt{1 - v^2/V^2}$, see section **H)**)

J)

At a certain point, page 903, to explain the contraction of length he consider a solid sphere with system S' and with the centre in the origin of S'. The equation of the area of this sphere, that relatively to the system S it moves with speed *v,* that is:

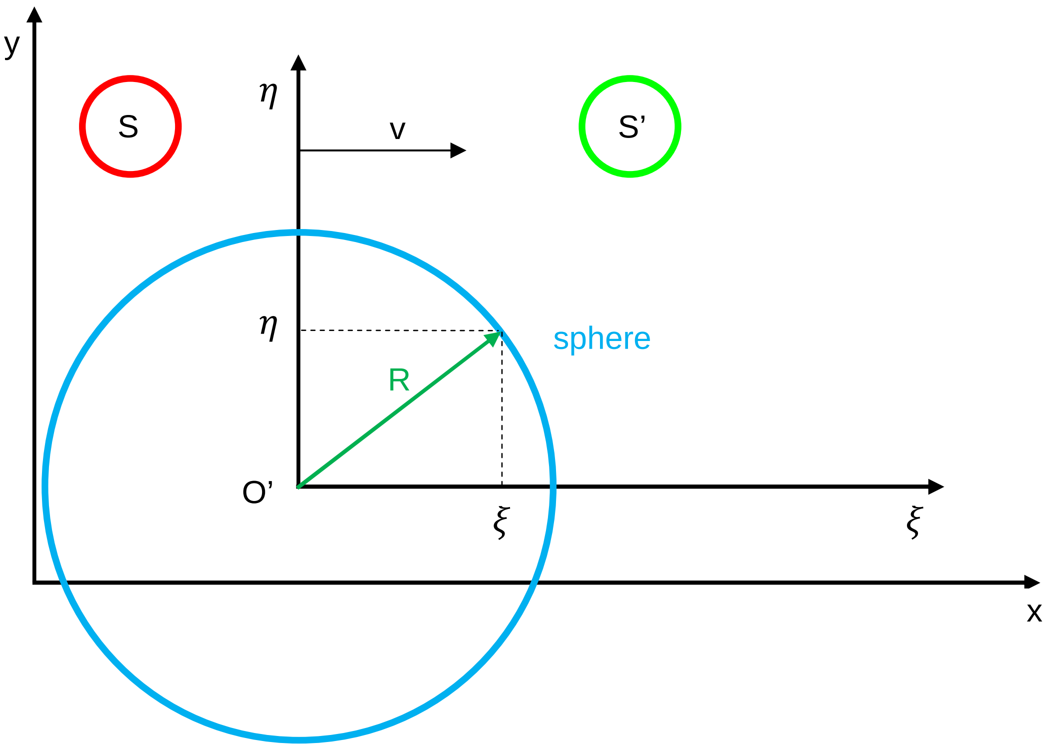
page 903

$$\xi^2 + \eta^2 + \zeta^2 = R^2$$

Instead the equation of this spherical surface in *x*, *y*, *z* at time *t* = 0, up to Einstein is:

page 903

$$\frac{x^2}{\left(\sqrt{1-\left(\frac{v}{V}\right)^2}\right)^2} + y^2 + z^2 = R^2$$



Were we must suppose that he made use of the following expression:

$$\xi = \frac{1}{\sqrt{1-\left(\frac{v}{V}\right)^2}} (x - v.t) \qquad \text{J1)}$$

$\eta = y \qquad \zeta = z$

In first place in this paragraph he is using the formulas that he developed for the light ray, applying them to a solid body, without giving any explication respect to the feasibility of this operation, that is not at all predictable !

Also the choice of *t* = 0 to obtain the general formula it's è incomprehensible. What happen for *t* = 1, 2, 3 s, … or any other time ? For times that are not *t* = 0 the formula found by Einstein it is not available !

Moreover in order to derive the formula J1) he used the following equalities:

page 898 $x' = x - vt$ and page 89 $\frac{x'}{V-v} = t$

now he insert also the condition that $t = 0$ and we obtain the following system of equations:

$x - x' - v.t = 0$ J2)

$x' - (V - v).t = 0$ J3)

$t = 0$ J4)

J4) in J3) $x' = 0$ J5)

J4) and J5) in J2) $x = 0$

Therefore for

$\xi = \frac{1}{\sqrt{1-\left(\frac{v}{V}\right)^2}} (x - v.t)$ with $x = 0$ and $t = 0$ we got $\xi = 0$ and at the end

$y^2 + z^2 = R^2$ that is different form the result obtained by Einstein

To support ulterior that the procedure used by Einstein is not acceptable, I remind you what already sad in section **F)** about the fact that the formulas obtained at page 902 for the lengths along the three axis <u>they cannot be used simultaneously because one exclude the use of the other two !</u>

K)

To explain the time dilation Einstein introduces the following:

page 904

$\tau = \frac{1}{\sqrt{1-\left(\frac{v}{V}\right)^2}} \left(t - \frac{v}{V^2} x\right)$ und $x = vt$

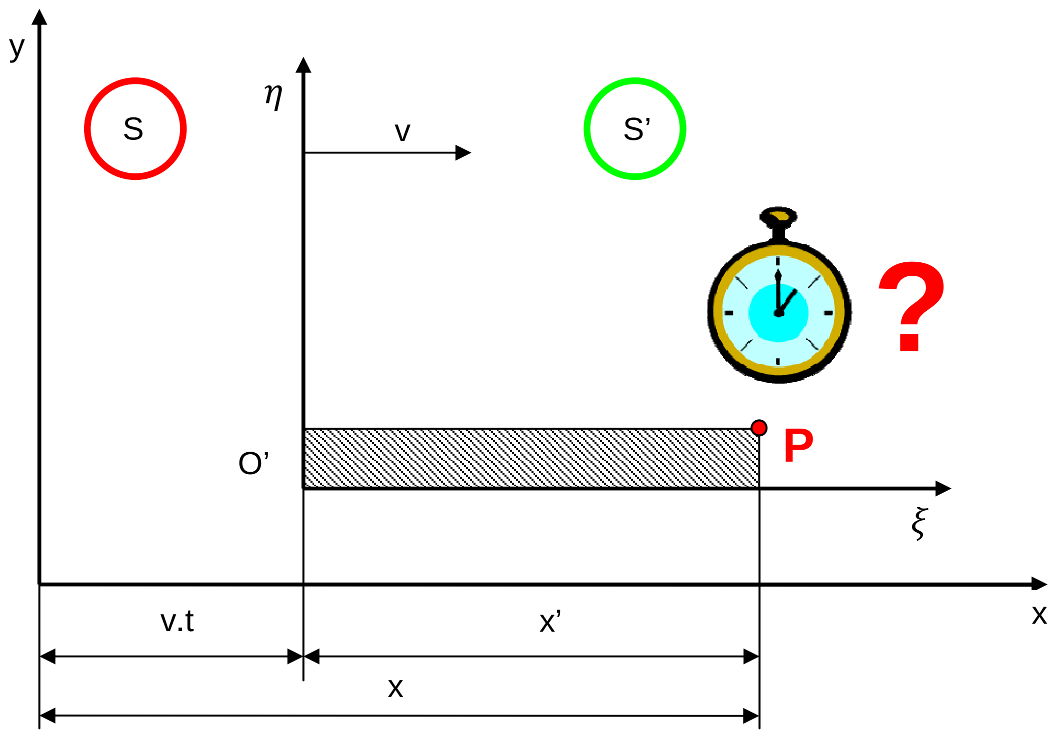
Inserting $x = v.t$ into the formula

page 902

$\xi = \beta\ (x - vt)$

we found that $\xi = 0$

It look logic that that we has a formula of transformation of the time that it's valid in every point of ξ, and not only for the origin of the S' axis. Otherwise, look at the picture here under, we didn't get any mathematical tool to evaluate, in the system S', the time measured from the watch that was found in the point "P" of S.



L)

Theorem for the velocity addition.
At page 905, Einstein develops his theorem <u>most probably in the following way</u> (notice that he shows only the result)

He set $\xi = w_\xi \tau$ and than he inserts the formulas of transformation developed at chapter 3, of his work, that is:

$\xi = \beta.(x - v.t)$ and $\tau = \beta.\left(t - \frac{v}{V_{11}^2}.x\right)$

so:

$$\beta.(x - v.t) = w_\xi.\beta.\left(t - \frac{v}{V_{11}^2}.x\right)$$

$$\left(1 + w_\xi.\frac{v}{V_{11}^2}\right).x = (w_\xi + v).t$$

$$x = \frac{w_\xi + v}{1 + \frac{w_\xi.v}{V_{11}^2}}.t \qquad \text{L1)}$$

Since that at page 899 I found $\xi = V\tau$ and at page 905 $\xi = w_\xi \, \tau$

It's undeniable that $w_\xi = V_{11}$

And replacing, we have:

$x = \frac{V_{11}+v}{1+\frac{v}{V_{11}}}.t = V_{11}.\frac{V_{11}+v}{V_{11}+v}.t$ and therefore $x = V_{11}.t$ (notice also the point **C)**)

Einstein uses the result that he got with the starting formula $\xi = V_{11}.\tau$, (see pages 899 and 900), but he introduces the formula $\xi = w_\xi \, \tau$ without caring that in this case $w_\xi = V_{11}$!

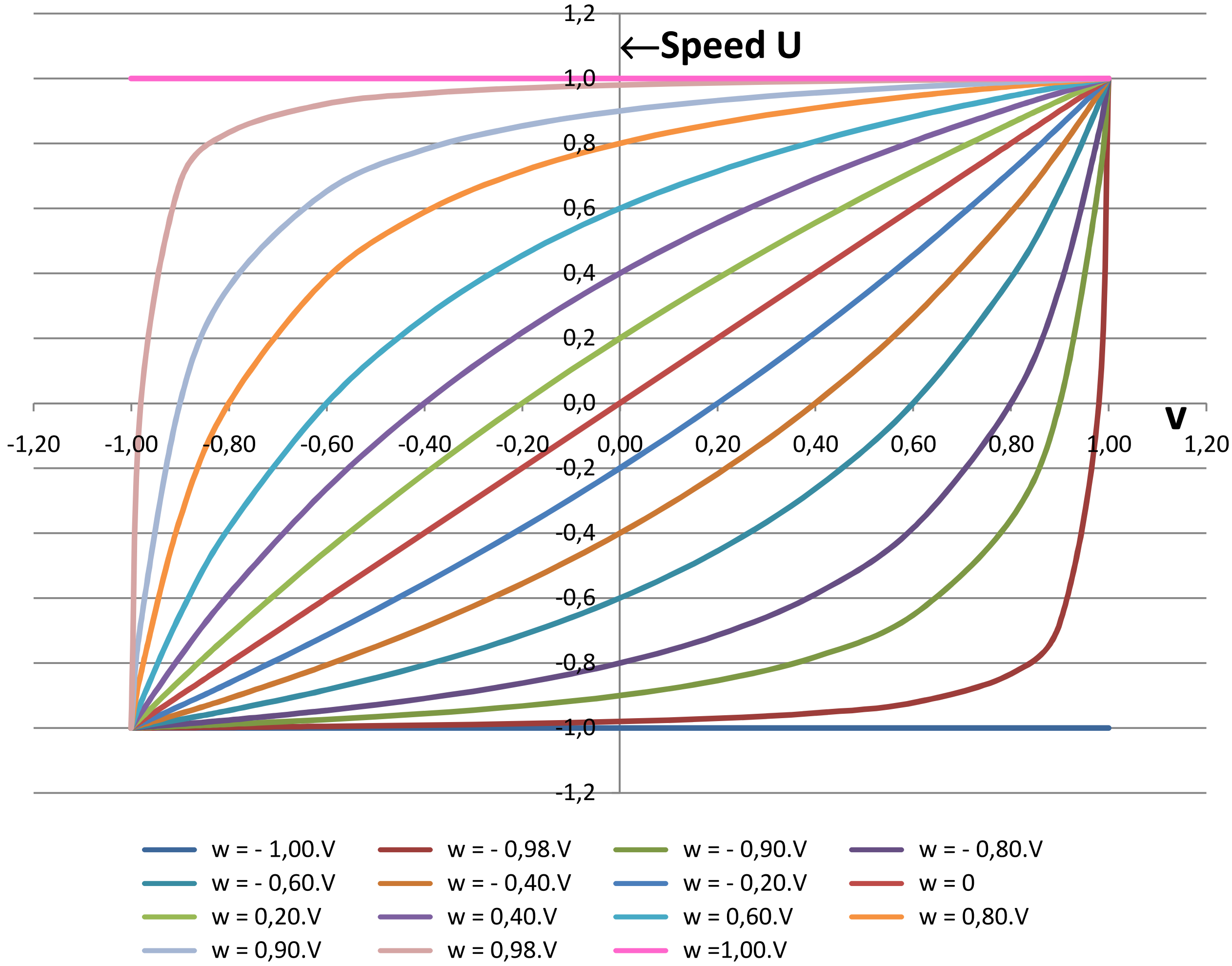
From the formula L1) Einstein later on he obtains this:
page 906

$$U = \frac{v+w}{1+\frac{vw}{V^2}}$$

Since he care only of the special case where w_ξ it's parallel to *v*, we obtain:
$w_\xi = w$ e $w_\eta = 0$
Therefore with the symbols use by me I got: $U = \frac{v+w}{1+\frac{v.w}{V_{11}^2}}$
And I put in evidence what follow:
the sizes *v* and *w* are "symmetric" so what is valid for one is also valid for the other, and that was said also from Einstein (page 906).

And the following paradox: placing $v = V_{11}$ and $w = -0{,}9.V_{11}$, so the two speeds are one the opposite of the other and almost of the same value, we have $U = V_{11}$ (with $v = V_{11}$ and $w = -V_{11}$ the result is indeterminate).
While with $v = 0{,}9.V_{11}$ and $w = 0{,}9.V_{11}$, that is that the two speeds goes in the same direction each one with 90% of the speed of light, the speed *U* it's only 180/181V_{11}, therefore lower to the speed of light in vacuum !

The speed in the graph that follow are ratio to *V*



I continue with the velocity addition in the direction of the *y* axis. Here to can be supposed that Einstein used the following procedure:

page 905 $\eta = w_\eta\ \tau$ with the transformation formulas developed in chapter 3, that is:

$\eta = y$ and $\tau = \beta.\left(t - \frac{v}{V_{11}^2}.x\right)$

Therefore

$$y = w_\eta.\beta.\left(t - \frac{v}{V_{11}^2}.x\right) = w_\eta.\frac{t - v.x/V_{11}^2}{\sqrt{1-(v/V_{11})^2}}$$

At this point he replace *x* with the formula L1) found over there

$$y = \frac{w_\eta}{\sqrt{1-(v/V_{11})^2}}.\left(t - \frac{v}{V_{11}^2}.\frac{w_\xi + v}{1 + \frac{w_\xi.v}{V_{11}^2}}.t\right)$$

$$= \frac{w_\eta}{\sqrt{1-(v/V_{11})^2}}.\left(\frac{t + \frac{w_\xi.v.t}{V_{11}^2} - \frac{w_\xi.v.t}{V_{11}^2} - \frac{v^2.t}{V_{11}^2}}{1 + \frac{w_\xi.v}{V_{11}^2}}\right)$$

$$= \frac{w_\eta}{\sqrt{1-(v/V_{11})^2}} . \left[\frac{1-(v/V_{11})^2}{1+\frac{w_\xi . v}{V_{11}^2}} \right] . t = \frac{\sqrt{1-(v/V_{11})^2}}{1+w_\xi . v/V_{11}^2} . w_\eta . t$$

I put in evidence that when at page 900 Einstein has found the formula
$\eta = \varphi(v). y$ for τ he used:

$$\eta = V\tau = aV\left(t - \frac{v}{V^2 - v^2} x'\right)$$

Therefore $\tau = \frac{\eta}{V}$

And resuming the formulas: $\eta = w_\eta . \tau \Rightarrow \eta = w_\eta . \frac{\eta}{V} \Rightarrow w_\eta = V$

Or also in a more easy way, at page 900 we found $\eta = V\tau$ and at page 905 $\eta = w_\eta \tau$ and therefore: $w_\eta = V$

4 Conclusion

In case you gone so far to reach this point, after having past the previous considerations, I remember you to take in mind the consideration given in my introduction.
I leave you full freedom to take you conclusion based on this analysis.

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