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Mathematical Refutation of the Formulas of Special Relativity

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1 *Introduction*

Every time I study the Special Theory of Relativity I have many problems understanding it. Therefore, I have analysed 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". If not, the reader will have to show me where I've made mistakes in the following.

I admit to a limited knowledge of mathematics and for this reason, I will use only simple examples. This insures that everybody will be able to follow the arguments. My conclusion is that the basic concepts (that we have learned through education,) have also been twisted by the great genius, Einstein.

To begin, I clarify two rules of mathematics without which, we cannot begin.

2 *Basic rules of mathematics*

A) If we define that 2 + 2 = 4, in any case where this expression occurs, **the result is still and always will be 4.**

B) If I have the following situation that I clarify with an example:

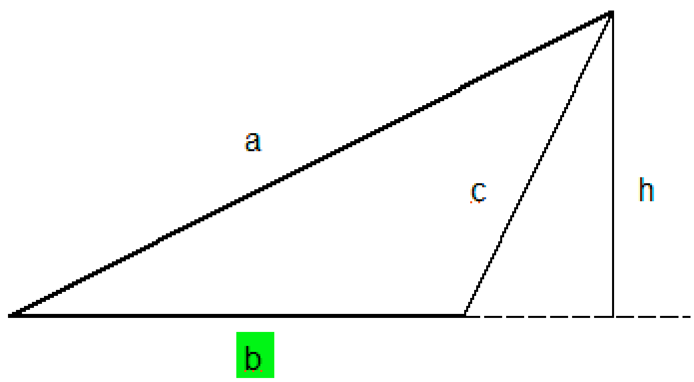
$$A = \frac{b.\,h}{2} \quad \text{(area of the triangle)}$$

$$A = \sqrt{s.(s-a).(s-b).(s-c)} \quad \text{where} \quad s = \frac{a+b+c}{2} \quad \text{(Erone's formula)}$$

It's clear that if I use at the same time (in the same article, book, etc.) the two formulas, the variable *b*, present in each one of the 2 expressions, must be **always be the same**!
Moreover:

$$\frac{b.h}{2} = \sqrt{s.(s-a).(s-b).(s-c)}$$

with $b = \sqrt{a^2 - h^2} - \sqrt{c^2 - h^2}$ (see below), and therefore we can obtain *h= f(a, b, c)* that introduced in the expression $\frac{b.h}{2} = \sqrt{s.(s-a).(s-b).(s-c)}$ allow to verify the equality.

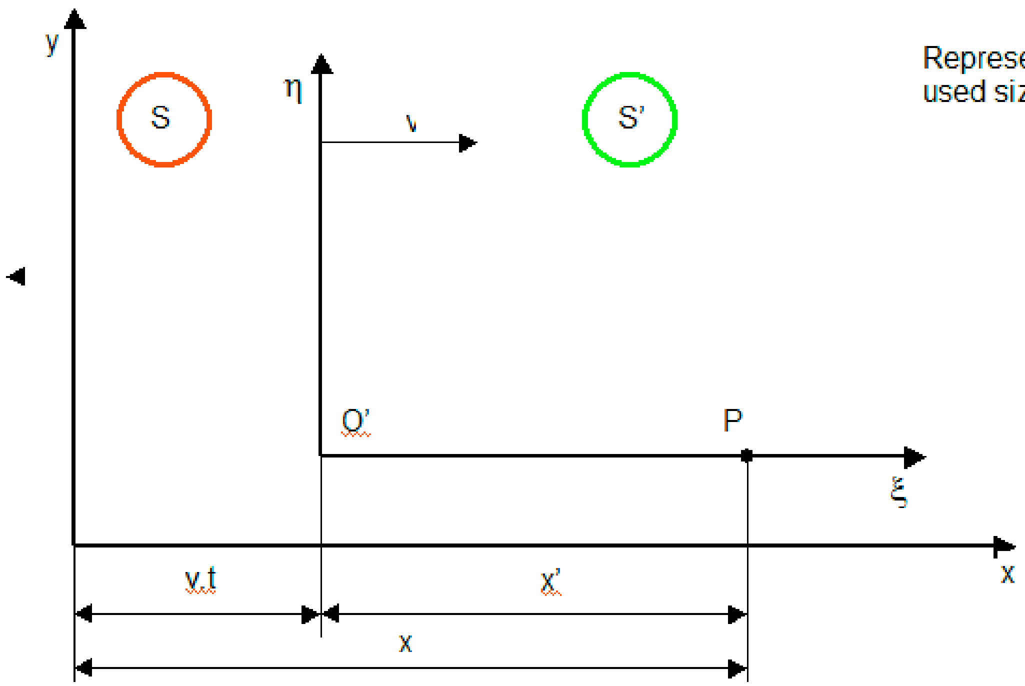


3 *Analysis of Einstein's formulas*

Later, I examine the development of the formulas made by Einstein in his famous work that appeared in Annalen der Physik in 1905 (pages from 898 to 906), reporting the excerpts, with the number of the page and then my observations.
For easy comprehension, I replace the following symbols that were used by Einstein with some that are more usual:

system S instead of system K (stable system)
system S' instead of system k (system in motion)
for the rest, I use the symbols that were be used by Einstein.

I begin with my criticism



A)

page 898

Setzen wir $x' = x - v\,t$, 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

This *x'* is the distance of a point P (that is situated in system S') from the origin of the system S', "measured" by an observer who is situated in system S. Moreover he says that this point (distance O'P) has coordinates that are independent of time.

How could it be that *x'* is independent of time if time appears in its definition, $x' = x - v.t$? So that *x'* is independent of time, a solution could be the substitution of *x* with *(d - v_1.t)*. Therefore $x' = (d + v_1.t) - v.t = d + (v_1 - v).t$ and with $v_1 = v$; *x'* is independent of time, but *x'* is independent too from the other possible variables, because *x' = d* is fixed.

B)

oder, indem man die Argumente der Funktion τ beifügt und das Prinzip der Konstanz der Lichtgeschwindigkeit im ruhenden Systeme anwendet:

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

page 898

Hieraus folgt, wenn man x' unendlich klein wählt:

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

oder

$$\frac{\partial \tau}{\partial x'}+\frac{v}{V^2-v^2}\frac{\partial \tau}{\partial t} = 0.$$

page 899

He uses the argument of the function τ three different times; that is:

for τ_0 he use the time t

for τ_1 he use the time $t+\frac{x'}{V-v}$

for τ_2 he use the time $t+\frac{x'}{V-v}+\frac{x'}{V+v}$

(the variable t, that appears in the expressions above, would better be defined, t_{x0}. In fact, Einstein uses the symbol t to define different times)

Later on, in the continuation of the development of the formulas, he replaces the time t using the expression below.

page 899 and 900

Nun bewegt sich aber der Lichtstrahl relativ zum Anfangspunkt von k im ruhenden System gemessen mit der Geschwindigkeit $V-v$, so daß gilt:

$$\frac{x'}{V-v} = t.$$

I admit that the time t that appears in τ_0, τ_1 and τ_2 is equal to zero. Einstein uses the time, τ_1. That is, when the ray moves toward the increasing x. Later on, the ray described in the experiment goes in the opposite direction, but the time needed to go in this direction, that was used as an argument of the function τ, is no longer used. Is it right to use only one time?

page 899

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

In the formula above, the coefficient of *x'* that turns out from the following passages beginning from the arguments of the function τ , with *t* (better t_{x0}) = 0:

$$\frac{1}{2}\left(\frac{x'}{V-v}+\frac{x'}{V+v}\right)-\frac{x'}{V-v}=\frac{1}{2}\left(\frac{x'}{V-v}+\frac{x'}{V+v}-\frac{2x'}{V-v}\right)=\frac{1}{2}\left(\frac{x'}{V+v}-\frac{x'}{V-v}\right)=\frac{1}{2}\left(\frac{V-v-V-v}{V^2-v^2}.x'\right)=$$
$$\frac{1}{2}.\frac{-2v}{V^2-v^2}.x' = \frac{-v}{V^2-v^2}.x'$$

(The minus sign isn't important. In the development above is only by chance that we obtain the sign minus, to obtain in the right way this sign we must develop the equation, included the integration, considering the other quantities that appear in the initial expression).

At the begin of the reduction, where two speeds appeared, that is $V-v$ and $V+v$ is it now correct to leave one of those out? Why do we only take the speed of the increasing *x*?
We could imagine the experiment executed so that the ray of light is sent in the direction of the decreasing *x* (toward the left) and then reflect the ray forward. Also in this case the time τ would be the same, that is: $\tau=a.\left(t-\frac{v}{V^2-v^2}.x'\right)$, however if we now replace *t* in the formula

page 899

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

I use the time the ray needs to reach the mirror moving towards the left. That is: $t=\frac{x'}{V+v}$.

I obtain the following expression $\xi=a.V\left(\frac{x'}{V+v}-\frac{v}{V^2-v^2}.x'\right)=a.V\left(\frac{V-v-v}{V^2-v^2}x'\right)=a\frac{V^2-2vV}{V^2-v^2}.x'$

Which is different from

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

C)
We have already found the expression $x'=x-v.t$ at the beginning. Now there appears above, for the time calculation, the following expression; $t=\frac{x'}{V-v}$ that can be solved in $x'=V.t-v.t$ therefore $x=V.t$ (right ?) !!

Also using the expressions: $\xi=V.\tau$ of page 900 and

page 902

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

Therefore: $\beta.(x-vt)=V.\beta.\left(t-\frac{v}{V^2}.x\right)$ $x-vt=Vt-\frac{v}{V}.x$ $x.\left(1+\frac{v}{V}\right)=t.(V+v)$

$x.(V+v)=t.V.(V+v)$ and $x = V.t$

as above

D)
I take two extractions of Einstein's work that follow close to one another:

page 899

Für einen zur Zeit $\tau = 0$ in Richtung der wachsenden ξ ausgesandten Lichtstrahl gilt:

$$\xi = V\tau,$$

and
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

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

I see that he uses the two expressions $\xi = V.\tau$ e $\eta = V.\tau$; therefore $\xi = \eta$!!
Moreover he assigns to the direction *y* of system S, the speed $\sqrt{V^2 - v^2}$. But if the ray of light of the experiment (see the text below) runs along the x axis, the speed of this ray will be *V* along the axis *x*, while it will be zero along the other axis *y* and *z*.

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:

The expression for the time τ that has been replaced in $\eta = V.\tau$ has been obtained by considering that the ray of light moves only along the x axis. Can we use it for the ray that runs with a component along the y axis too ?

The argument introduced in the initial formula:

page 898

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

for coordinate *y* was 0 (when we said that the ray moved only along the x direction). Therefore the expression that was obtained for τ can't be used when *y* is different from zero! Moreover, if the ray of light runs along the axis *x* with speed *V*, we can't have components of the speed along the other two axes, otherwise the "absolute" speed of this ray would be greater than *V*. Absolutely unacceptable !! We have three distinct cases (speed *V* along each one of the three axis) ane each case exclude the other two.

I point out that using the conditions:

page 900

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

Is a special case where we admit that the speed of the system S' is identical at the component along the *x* axis of the speed of light *V*, but obviously the two speeds that were only just mentioned, in the greater part of the cases are different !

E)
Einstein says that after he have inserted the expression $x' = x - v t,$

In the formulas:

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

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

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

He finds the following formulas:

page 900

Setzen wir für x' seinen Wert ein, so erhalten wir:

$$\tau = \varphi(v)\beta\left(t - \frac{v}{V^2}x\right),$$
$$\xi = \varphi(v)\beta(x - vt),$$
$$\eta = \varphi(v)y,$$
$$\zeta = \varphi(v)z,$$

wobei

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

Considering that: wobei a eine vorläufig unbekannte Funktion $\varphi(v)$ ist
and $\varphi(v) = 1$ as he has demonstrated in the passages at page 902.

We find there is a mistake in the above formulas, and I put it in evidence for τ :

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

$= a.\frac{1}{1-v^2/V^2}.(t - v/V^2.x) = a.\beta^2.(t - v/V^2.x) = \varphi(v).\beta^2.(t - v/V^2.x)$ where we see that the factor β appears squared, and not in the linear form as was indicated by Einstein.

I repeat the same procedure for ξ as well:

$$\xi = a.V\left(t - \frac{v}{V^2-v^2}.x'\right) = a.V\left(t - \frac{vx}{V^2-v^2} + \frac{v^2t}{V^2-v^2}\right) = a.V\left(\frac{V^2t - v^2t - vx + v^2t}{V^2-v^2}\right) = a.V\left(\frac{V^2t - vx}{V^2-v^2}\right) =$$

$$= a.\frac{1}{1-v^2/V^2}.(Vt - v/V.x) = a.\beta^2.(Vt - v/V.x) = \varphi(v).\beta^2.(Vt - v/V.x)$$

With the following equalities $x' = x - vt$ and $t = \frac{x'}{V-v}$, I obtain $x = V.t$ that replaced in the formula above gives me: $\xi = \varphi(v).\beta^2.(x - v.t)$ and here also the factor β appears squared as above instead of in linear form as Einstein says.

Also for the two other formulas there is the same mistake, that in the final formula there is no factor β.

F)
I take the formulas of page 902

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

$$\xi = V\tau$$

And the formula of page 899:

then I allow having $t = 0$ with $x \neq 0$ as Einstein says at page 903,

Die Gleichung dieser Oberfläche ist in x, y, z ausgedrückt zur Zeit $t = 0$:

And see what happens:

$$\xi = V.\tau$$

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

With $t = 0$ and $x \neq 0$

$$\beta.x = V.\beta\left(\frac{-vx}{V^2}\right) \qquad x = x.\left(\frac{-v}{V}\right) \qquad \Rightarrow \qquad v = -V \quad !!$$

G)

I take certain expressions used by Einstein, grouped below:

$x' = x - v.t$ page 898

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

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

Ad I obtain the following system of linear equations:

$$x - x' - vt = 0$$
$$vx' - (V^2 - v^2)t + (V^2 - v^2)\tau = 0$$
$$x' - (V - v)t = 0$$

Where I have three equations with four unknowns. I solve this system (I omit the passages because they aren't difficult), and I obtain four groups of equations (one for each variable) where there are two unknowns for each.

$x = x'.V/(V - v)$	$x' = x.(V - v)/V$	$t = x/V$	$\tau = x/(V + v)$
$x = t.V$	$x' = t.(V - v)$	$t = x'/(V - v)$	$\tau = x'.V/(V^2 - v^2)$
$x = \tau.(V + v)$	$x' = \tau.(V^2 - v^2)/V$	$t = \tau.(V + v)/V$	$\tau = t.V/(V + v)$

I can remark on these groups of expressions; for instance:

- If one of the quantities x, x', t or $\tau = 0$, then also the other three quantities **must** be equal to zero
- The expressions $x^2 + y^2 + z^2 = V^2 t^2$ page 901

isn't compatible with the expressions found above, for $x = 0$, t must be equal to zero, but it isn't the case in this formula, since y, or z, or both could be different from zero, that implies $t > 0$, incompatible with what was just said !!

- This inconsistency comes from the fact that for deriving the equations at the begin of point **G)**, Einstein has admitted that y and z were equal to zero, therefore it isn't admissible to use the expressions that were obtained in case that y, or z, or both would differ from zero.

However I find the following expressions too:

$x'=0$ page 900

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

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

And I find the following system of linear equations:

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

I solve this system as above (I omit the passages) and I obtain three groups of equations (one for each variable) where I have two unknowns for each of these equations.

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

This last paragraph is also valid for the ray of light that goes in the same direction as the z axis. I must only replace the variable y with z, and in this case I obtain the following group of equations.

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

Since the developments of the formulas that I have effected above gives two different τ; the τ that appears in the right term of the equation:

page 901

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

which one is the true ?

H)

Taking another time the formula of page 901 : $\xi^2+\eta^2+\zeta^2=V^2\tau^2$

If I replace the variable with the formulas that appears at a page 899 $\xi = V.\tau$ and at page 900 $\eta = V.\tau$, where it is also implied that $\zeta = V.\tau$, I obtain:

$V^2\tau^2 + V^2\tau^2 + V^2\tau^2 = V^2\tau^2 \Rightarrow 3.V^2\tau^2 = V^2\tau^2$!!! This demonstrates at least that the use of the symbols doesn't respect the mathematical rigour that was expected !

I)
After a while, to explain the contraction of the lengths, he introduces:

page 903

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

then putting the time at $t = 0$ and making use of the formula of transformation for x that was found before (page 902), he obtains the formula:

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

Notice that the formula obtained is valid only for $t = 0$. But when the time passes and it is no more equal to zero, the formula is no longer valid! Moreover, the coordinate ξ depends on the time, but the radius R that also has a term in this direction, doesn't change as a function of the time !!

At page 901 I find the formula:

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

Since with the same symbol, I obtain the same quantity (otherwise I would have great chaos !) I conclude that $R^2 = V^2.\tau^2$

J)
To explain time dilation, Einstein proceeds as it follow:

page 904

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

$$x = vt.$$

Putting $x = v.t$ he puts $x' = 0$ since $x' = x - v.t \Rightarrow x = x' + vt$. For point **G)** with x' = 0 therefore $x = 0$, $t = 0$ and $\tau = 0$!!

K)
Theorem of velocity addition.
Ont page 905, Einstein develops his theorem in the following way (notice that he shows only the result)

$\xi = w_\xi . \tau$ with the formulas of transformation that were developed at chapter 3, that is:
$\xi = \beta(x - vt)$ and $\tau = \beta(t - v/V^2 . x)$

therefore:

$$x(1 + w_\xi . v/V^2) = t(w_\xi + v)$$

$x = \dfrac{w_\xi + v}{1 + \dfrac{w_\xi . v}{V^2}} . t$ with $w_\xi = V$ since at page 899 I find $\xi = V.\tau$ and at page 905 $\xi = w_\xi . \tau$

I obtain $x = \dfrac{V + v}{1 + \dfrac{v}{V}} . t = V . \dfrac{V + v}{V + v} . t = V.t$ so $x = V.t$ (see point **C)** too.

In this case Einstein uses the same procedure that he had used on page 899 and 900. In particular, he uses the results that he has obtained with the initial formula $\xi = V.\tau$, but he introduces the new formula $\xi = w_\xi . \tau$ without paying attention that in this case $w_\xi = V$!!

4 *Vectors quantities or modules of the quantities ?*

I try to check the exactness of the transformations from $x^2 + y^2 + z^2 = V^2 t^2$

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

A) With the vectors

$\vec{s} = \vec{V} . t$

where $\vec{s}$ is the distance covered by the light that travels with speed $\vec{V}$ during the time *t*

$$\vec{x} + \vec{y} + \vec{z} = (\vec{V}_x + \vec{V}_y + \vec{V}_z) t$$
$$\hat{x} . x + \hat{y} y + \hat{z} z = (\hat{x} V_x + \hat{y} V_y + \hat{z} V_z) t$$
$$\hat{x}(x - V_x t) + \hat{y}(y - V_y t) + \hat{z}(z - V_z t) = 0 \qquad (4.1)$$
$$x - V_x t = 0 \qquad y - V_y t = 0 \qquad z - V_z t = 0$$
$$\Rightarrow x = V_x t \qquad y = V_y t \qquad z = V_z t \qquad (4.2)$$

Now I try another expression in the form of vectors containing the constants, $\alpha = a + bt/x$ (in effect x/t = *V* is a constant, see chapter 3 point **C)**) that multiplies the scalar *x*, and $\delta = p + qx/t$ that multiplies the scalar *t*, that could be brought back to the expression (4.1) above

$\alpha\vec{x}+\vec{y}+\vec{z}=\left(\vec{V}_x+\vec{V}_y+\vec{V}_z\right).\delta t$

$\hat{x}\alpha x+\hat{y}y+\hat{z}z=\left(\hat{x}V_x+\hat{y}V_y+\hat{z}V_z\right).\delta t$

$\hat{x}(\alpha x-V_x\delta t)+\hat{y}(y-V_y\delta t)+\hat{z}(z-V_z\delta t)=0$

Replacing *x*, *y* and *z* with what was find in (4.2) I obtain:

$\alpha\, V_x t-\delta V_x t=0 \qquad V_y t-\delta V_y t=0 \qquad V_z t-\delta V_z t=0$

$V_y t(1-\delta)=0 \qquad\qquad \Rightarrow \delta=1$

$V_x t(\alpha-\delta)=0$ with $\delta=1$ therefore $V_x t(\alpha-1)=0 \qquad\qquad \Rightarrow \alpha=1$

The resultant values of $\alpha=1$ and $\delta=1$ say to me that using the vectors of the transformation of Einstein that was mentioned at the begin of this chapter 4, is impossible.

B) With the modules

$\vec{x}+\vec{y}+\vec{z}=\left(\vec{V}_x+\vec{V}_y+\vec{V}_z\right).t$

$\hat{x}.x+\hat{y}y+\hat{z}z=\left(\hat{x}V_x+\hat{y}V_y+\hat{z}V_z\right).t$

Scalar product:

$x^2+y^2+z^2=\left(V_x^2+V_y^2+V_z^2\right)t^2$ that is equal to $x^2+y^2+z^2=V^2t^2$

I proceed like I did in point **A)** of this chapter, I put in the constants α and δ that multiply the values *x* and *t*

$\hat{x}\alpha x+\hat{y}y+\hat{z}z=\left(\hat{x}V_x+\hat{y}V_y+\hat{z}V_z\right).\delta t$

Attention! The equality above is not a demonstration that it is valid !!

Scalar product

$\alpha^2x^2+y^2+z^2=\delta^2V^2t^2$

From that:

$$\delta=\frac{\sqrt{\alpha^2x^2+y^2+z^2}}{Vt}$$

In this case, we can do the transformation of the equations as proposed by Einstein, but pay attention, the argument (angle) of the speed vector is not respected !! See the drawing below where for simplicity I have put *z* = 0, and I have calculate:

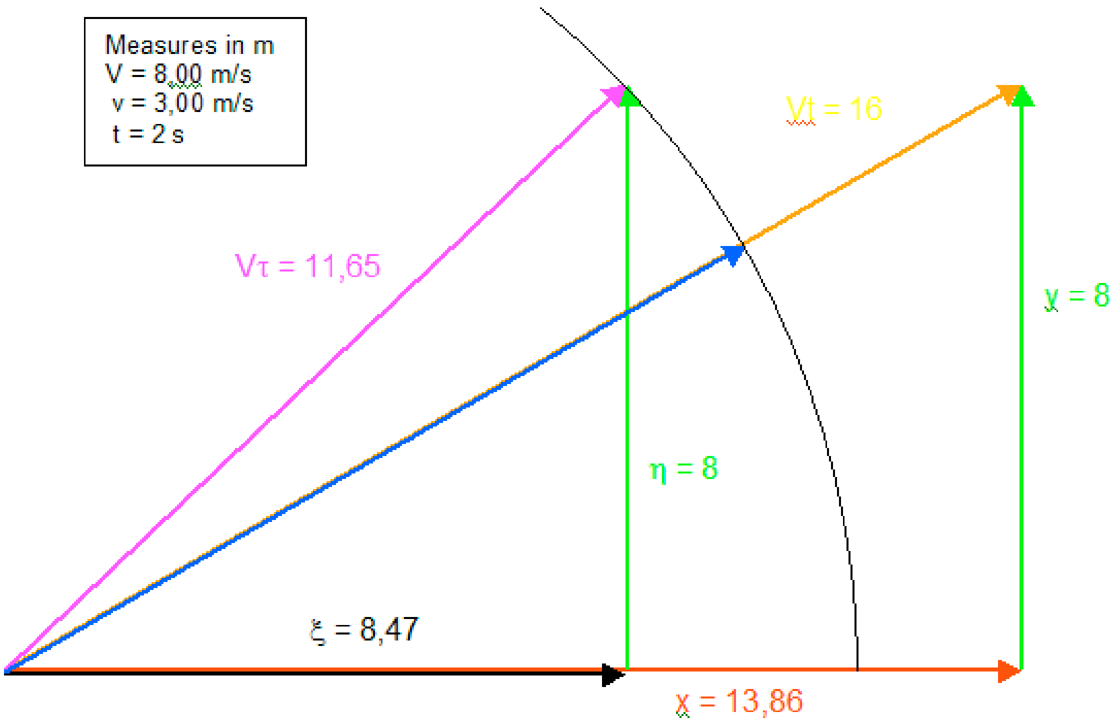
$$\alpha=\frac{\xi}{x}=\frac{x-vt}{x\sqrt{1-v^2/V^2}}=\frac{13{,}86-3.2}{13{,}86\sqrt{1-3^2/8^2}}=0{,}6116$$ (the value was chosen to easily make the draw)

$$\delta=\frac{\tau}{t}=\frac{t-vx/V^2}{t\sqrt{1-v^2/V^2}}=\frac{2-3\left(13{,}86/8^2\right)}{2\sqrt{1-3^2/8^2}}=0{,}7284$$

also $\delta=\dfrac{\sqrt{\alpha^2x^2+y^2+z^2}}{Vt}=\dfrac{\sqrt{0{,}6116^2.13{,}86^2+8^2}}{8.2}=0{,}7284$

$\xi=\alpha x=0{,}6116.13{,}86=8.47\,m$

$V.\tau=V\delta t=8.0{,}7284.2=11.65\,m$



B1) Variations with the modules

$\vec{x}+\vec{y}+\vec{z}=(\vec{V}_x+\vec{V}_y+\vec{V}_z).t$

$\hat{x}\alpha x+\hat{y}y+\hat{z}z=(\hat{x}V_x+\hat{y}V_y+\hat{z}V_z).\delta t$

$\hat{x}(\alpha x-V_x\delta.t)+\hat{y}(y-V_y\delta.t)+\hat{z}(z-V_z\delta.t)=0$

Scalar product

$(\alpha x-V_x\delta t)^2+(y-V_y\delta t)^2+(z-V_z\delta t)^2=0$

$\alpha^2x^2+V_x^2\delta^2t^2-2\alpha\delta.xV_xt+y^2+V_y^2\delta^2t^2-2\delta.yV_yt+z^2+V_z^2\delta^2t^2-2\delta.zV_zt=0$

$\alpha^2x^2+(V_x^2+V_y^2+V_z^2)\delta^2t^2+y^2+z^2-2\delta.t(\alpha xV_x+yV_y+zV_z)=0$ con $V_x^2+V_y^2+V_z^2=V^2$

$\delta^2V^2t^2-2\delta t(\alpha xV_x+yV_y+zV_z)+\alpha^2x^2+y^2+z^2=0$

$$\delta_{1,2}=\frac{1}{V^2t^2}\left[t(\alpha xV_x+yV_y+zV_z)\pm\sqrt{t^2(\alpha xV_x+yV_y+zV_z)^2-V^2t^2(\alpha^2x^2+y^2+z^2)}\right]$$

Where $V_xt=x$ $V_yt=y$ $V_zt=z$

$$\delta_{1,2}=\frac{1}{V^2t^2}\left[\alpha x^2+y^2+z^2\pm\sqrt{(\alpha x^2+y^2+z^2)^2-V^2t^2(\alpha^2x^2+y^2+z^2)}\right]$$

To obtain real results' I must have

$(\alpha x^2+y^2+z^2)^2-V^2t^2(\alpha^2x^2+y^2+z^2)\ge 0$

$\alpha^2x^4+y^4+z^4+2\alpha x^2y^2+2\alpha x^2z^2+2y^2z^2-V^2t^2\alpha^2x^2-V^2t^2y^2-V^2t^2z^2\ge 0$

$$\alpha^2 x^2(x^2 - V^2t^2) + 2\alpha x^2(y^2+z^2) + (y^2+z^2)^2 - V^2t^2(y^2+z^2) \ge 0$$
$$\alpha^2 x^2(x^2 - V^2t^2) + 2\alpha x^2(y^2+z^2) + (y^2+z^2)(y^2+z^2 - V^2t^2) \ge 0$$ I multiply for -1
$$\alpha^2 x^2(V^2t^2 - x^2) - 2\alpha x^2(y^2+z^2) + (y^2+z^2)(V^2t^2 - y^2 - z^2) \le 0$$
Since $V^2t^2 - x^2 = y^2 + z^2$ e $V^2t^2 - y^2 - z^2 = x^2$, I obtain
$$\alpha^2 x^2(y^2+z^2) - 2\alpha x^2(y^2+z^2) + (y^2+z^2)x^2 \le 0$$
$\alpha^2 - 2\alpha + 1 \le 0$ $\alpha_{1,2} = \dfrac{1 \pm \sqrt{1-1}}{1} = 1$ and also $\delta = 1$ Just as working with the vectors !!

B2) Another variations with the modules

$$\vec{x} + \vec{y} + \vec{z} = (\vec{V}_x + \vec{V}_y + \vec{V}_z).t$$
$$(\vec{V}_x + \vec{V}_y + \vec{V}_z).t - \vec{x} - \vec{z} = \vec{y}$$
I insert directly the factors α and δ
$$(\vec{V}_x + \vec{V}_y + \vec{V}_z)\delta.t - \alpha\vec{x} - \vec{z} = \vec{y}$$
$$\hat{x}(V_x\delta t - \alpha x) + \hat{y}V_y\delta t + \hat{z}(V_z\delta t - z) = \hat{y}y$$
Scalar product
$$(V_x\beta t - \alpha x)^2 + V_y^2\delta^2t^2 + (V_z\delta t - z)^2 = y^2$$
$$V_x^2\delta^2t^2 + \alpha^2x^2 - 2\alpha\delta V_x tx + V_y^2\delta^2t^2 + V_z^2\delta^2t^2 + z^2 - 2\delta V_z tz - y^2 = 0$$
$$\delta^2t^2(V_x^2 + V_y^2 + V_z^2) - 2\delta t(\alpha V_x x + V_z z) + \alpha^2x^2 + z^2 - y^2 = 0$$
Con $V_x^2 + V_y^2 + V_z^2 = V^2$
$$\delta^2t^2V^2 - 2\delta.t(\alpha V_x x + V_z z) + \alpha^2x^2 + z^2 - y^2 = 0$$
$$\delta_{1,2} = \frac{1}{V^2t^2}\left[t(\alpha V_x x + V_z z) \pm \sqrt{t^2(\alpha V_x x + V_z z)^2 - V^2t^2(\alpha^2x^2 + z^2 - y^2)}\right]$$

$$\delta_{1,2} = \frac{1}{V^2t}\left[\alpha V_x x + V_z z \pm \sqrt{\alpha^2V_x^2x^2 + V_z^2z^2 + 2\alpha V_x x V_z z - \alpha^2V^2x^2 - V^2z^2 + V^2y^2}\right]$$

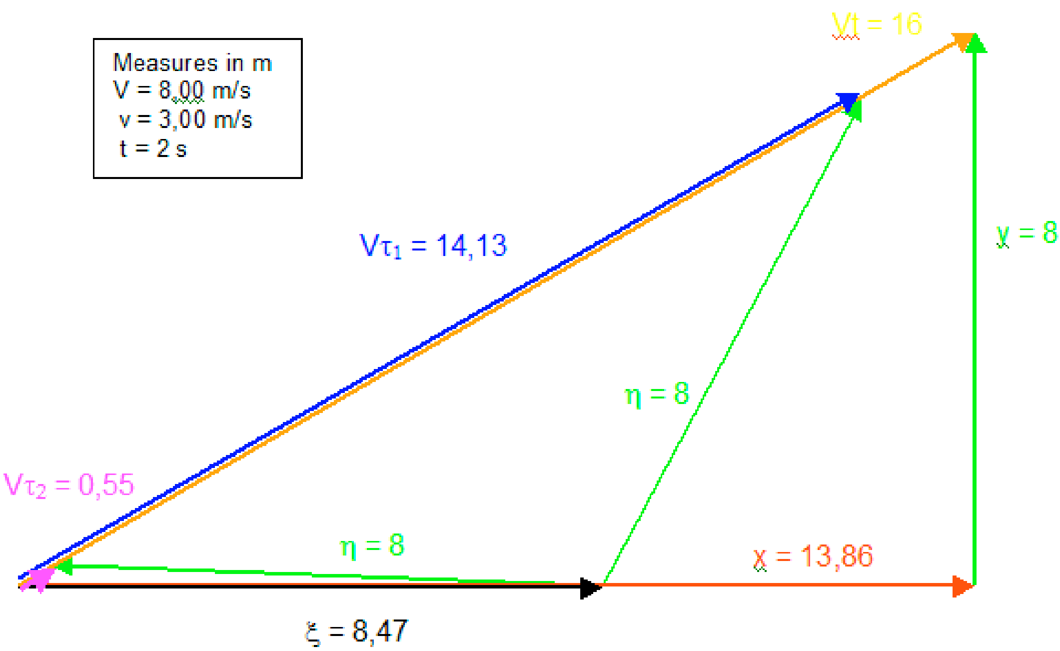
$$\delta_{1,2} = \frac{1}{V^2t}\left[\alpha V_x x + V_z z \pm \sqrt{V^2y^2 + 2\alpha V_x x V_z z - \alpha^2x^2(V^2 - V_x^2) - z^2(V^2 - V_z^2)}\right]$$

See the drawing below where also for simplicity I have put *z* = 0.

α = 0,6116 as above and δ_1 = 0,8828, whereas δ_2 = 0,0346

$$\xi = \alpha x = 0{,}6116.13{,}86 = 8.47\,m$$
$$V.\tau_1 = V\delta_1\,t = 8.0{,}8828.2 = 14{,}13\,m$$
$$V.\tau_2 = V\delta_2\,t = 8.0{,}0346.2 = 0{,}55\,m$$

In this case the argument of the speed doesn't change, but as you can see from the drawing, neither η is that was searched, even if their modules is 8 m, exactly the same measure of *y*.



5 *Measure of the speed*

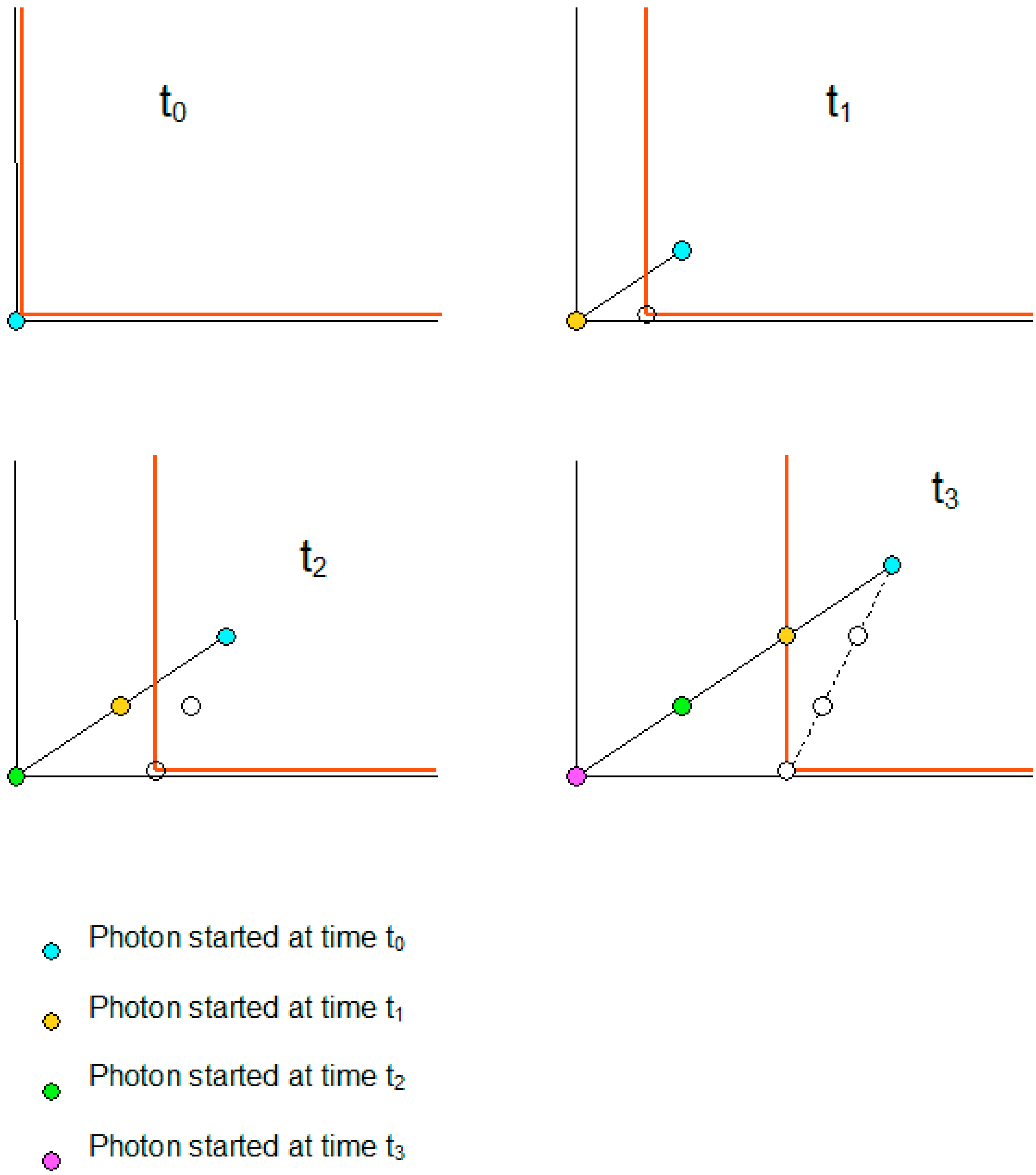
The measure of the speed of a body in motion cause some problems if we cannot define the position of the body with respect to a fixed reference (in this case what's the meaning of the word "fixed"? There is something that is fixed?), as it happens with a ray of light whose source is in motion.

In case we can have a "fixed reference", we calculate the speed with:

$v = \frac{\Delta L}{\Delta t}$ or better $v = \frac{dL}{dt}$

But in case of a ray of light the measure, or better the calculation of the speed isn't so easy:

To calculate the speed of the light from a system in motion I can't use a not-fixed reference and therefore the centre of the coordinates of the system in motion can't be used. In fact in the moment t_3 only the coloured photons are really present. The white photons in the same instant aren't present, but they were present in the previous instants. One valid system to calculate the speed of the light is therefore to divide the distance between two photons, that were consecutively emitted, for the time formed from the period *T* with they are emitted by the source. Obviously we still need to admit that the source is fixed (what means "fixed" ?). If I admit, as we usual do, that the light covers the dotted part of the figure t_3 I suppose that the speed of the light is infinite since it is in the same time at the origin of the system in motion and also where there is the light-blue photon. If the light at the moment t_3 is in the point of the light-blue photon it means that when it is in the origin of the system in motion this system couldn't be in the point that is showed by the figure t_3 but it must be more behind and therefore the distance covered by the light is longer than the dotted segment that we can see in the figure t_3.



6 *Conclusion*

In consideration of what I have shown in my treatment above, it is clear that the procedure used by Einstein to develop the famous Lorentz formulas, as well as the formulas about the lengths contraction, time dilation and those for the velocity addition, <u>disagree with the elementary laws of mathematics.</u>

And so **this formulas must be rejected.**

I repeat what I said in the introduction: If in my "demonstration" I have committed some mistakes, the reader have to show me where those mistakes are, and I will be pleased if he tell me that at my e-mail address franco53@bluewin.ch.

If the obvious inconsistencies that we find in the Einstein's work were developed by a student in a secondary school, this student would have an low mark.
If I consider that the "construction" of the formulas that I have mentioned before cannot be made using rigid mathematic rules, then no test is possible.

It would be possible that the formulas (of Lorentz, of lengths contraction, of time dilation and those for the addition of velocities), **BUT IT MUST BE SAID IN A CLEAR WAY THAT THOSE FORMULAS ARE EMPIRICAL**, that is, they cannot be demonstrated with mathematics. They may be useful to explain some phenomenon where the speed of light attends.

The worldwide scientific community, especially the most important, have to:

- Declare the illegitimacy of the development of the Einstein's formulas

- Find irrefutable laws (and not empirical law) to explain those phenomenon that seems to confirm the Lorentz's and Einstein's formulas.

Franco Crivelli