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Short Communication

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Analysis of Some Passages of Albert Einstein's Theory of Special Relativity Published in the Annalen Der Physik in 1905

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Some Initial Clarifications

Imagine a FIXED spatial and temporal coordinate system defined as *K* whose coordinates for the definition of an "event" are *x*, *y*, *z* and *t* in which another system k moves, therefore in MOTION with the coordinates ξ, η, ζ and τ.

I will clarify the experiment in a very simple way, to be done mentally, as proposed by Einstein.
In a FIXED system placed in a fixed space (im "ruhenden" Raume) imagine another system in MOTION in the direction of the X axis only with constant speed (Es werde nun … eine (konstante) Geschwindigkeit *v* in Richtung der wachsenden *x* des anderen, ruhenden Systems (*K*) erteilt). Therefore, since the direction of the movement is only in the x direction, it is useless to bring up the coordinates of the Y and Z axes.

Einstein then places a fixed point, with respect to the system in motion, which he defines as $x' = x - vt$. From the moving system *k* a ray of light is emitted, at time τ_0 in the direction of the X-axis towards *x*' where it arrives, at this point *x*', at time τ_1 and from here it is reflected towards the origin of the coordinates where it arrives at time τ_2 and so it must be (so muss dann sein):

$$\frac{1}{2}(\tau_0 + \tau_2) = \tau_1$$

How can the great Einstein make this statement? Without giving any explanation?
Furthermore, is it correct to mix the coordinates of the two systems, i.e. x of the *K* system with τ of the *k* system? But let's assume that it is correct.

I make the following very elementary development:

$$\left[\frac{1}{2}(\tau_0 + \tau_2) = \tau_1\right] * 2 \text{ and you get } \tau_0 + \tau_2 = 2 * \tau_1$$

and better $\tau_0 + \tau_2 = \tau_1 + \tau_1$

With the following clarifications:
τ_0 it remains as it is

$\tau_1 = \tau_0 + \tau_A$ with τA which is the time taken by the light ray to travel the path *x*' in the direction of increasing *x*

$\tau_2 = \tau_0 + \tau_A + \tau_B$ with τ_B which is the time taken by the light ray to travel the path *x*' when the light ray returns at the origin of the axes

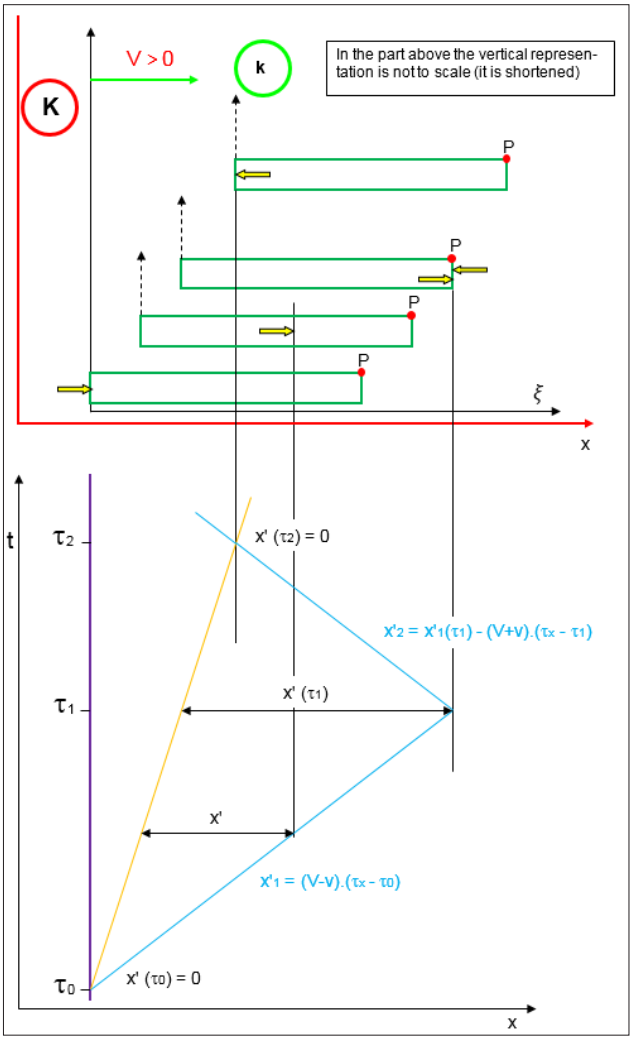
So, introducing these "equations" into Einstein's equation where it says it must be this way, we get:

$$\tau_0 + \tau_2 = \tau_1 + \tau_1$$

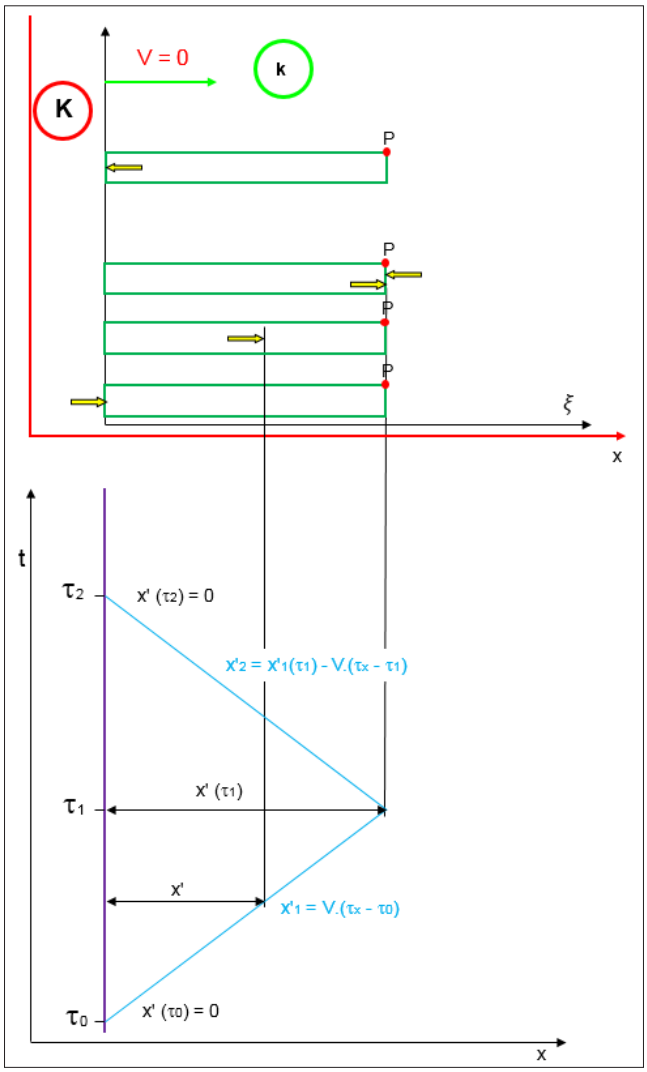
$$\tau_0 + \tau_0 + \tau_A + \tau_B = \tau_0 + \tau_A + \tau_0 + \tau_A$$

And after simplification we get: $\tau_B = \tau_A$

With what has just been demonstrated in a very simple way, Einstein implicitly asserts that the outward time is equal to the return time and this, except for the case where $v = 0$, is not true! But this contradicts the initial condition of the experiment which required that the system *k* be in motion with constant speed. See the sketch below. $v = 0$ would be represented when the orange line is superimposed on the vertical purple line and this can also be seen from the sketch, appropriately corrected.



Representation of x' as a function of τ (zur Zeit τ_0 … nach x' gesandt …)



In conclusion, Einstein develops his theory of Special Relativity starting from a statement "so muss dann sein" which is FALSE! Therefore, this theory must be rejected.