DID EINSTEIN COMPILE PERFECT NONSENSE?

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Anatoli A. Vankov[1] presented in his paper "On Controversies in Special Relativity" (2006) his profound doubts on Einstein's principle that spherical waves are to be described from a moving frame of reference as a spherical wave too. He argued that despite all the popular presentations in course books the shape of a spherical wave cannot be discovered from the moving frame because of the aberration of light: "The truth is that the problem of shape of light front is, indeed, tightly related to the aberration and Doppler effects."

THE LORENTZ TRANSFORMATION APPLIED

In his original „Elektrodynamik"-Paper[2] in 1905 Einstein stated that by applying the Lorentz transformation the shape of a sphere would hold in the moving frame too.

> „Zur Zeit $t = t' = 0$ werde von dem zu dieser Zeit gemeinsamen Koordinatenursprung beider Systeme aus eine Kugelwelle ausgesandt, welche sich im System K mit der Geschwindigkeit c ausbreitet. Ist (x, y, z) ein eben von dieser Welle ergriffener Punkt, so ist also
>
> $$x^2 + y^2 + z^2 = c^2t^2.$$
>
> Diese Gleichung transformieren wir mit Hilfe unserer Transformationsgleichungen und erhalten nach einfacher Rechnung:
>
> $$x'^2 + y'^2 + z'^2 = c^2t'^2.$$
>
> Die betrachtete Welle ist also auch im bewegten System betrachtet eine Kugelwelle von der Ausbreitungsgeschwindigkeit c. Hiermit ist gezeigt, dass unsere beiden Grundprinzipien miteinander vereinbar sind."

The translation of Einstein's 1905 Electrodynamics paper states for the last paragraph[3]:

> „The wave under consideration is therefore no less a spherical wave with velocity of propagation c when viewed in the moving system. This shows that our two fundamental principles are compatible."

The equations of the Lorentz transformation applied herein are given as follows:

$$x' = \gamma(x - vt) \qquad x = \gamma(x' + vt')$$

$$t' = \gamma(t - vx/c^2) \qquad t = \gamma(t' + vx'/c^2)$$

Given a spherical wave by the equation above

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

we have to show that by applying the Lorentz transformations a secondary equation will be produced having the same form. The same algebraic form turns out to give the same geometrical shape.

As the vector $\vec{v}$ takes the direction parallel to x the equations $y = y'$ and $x = x'$ were supplied. The calculation steps are given in detail as follows:

$$\begin{aligned}
ds^2 &= x^2 + y^2 + z^2 - c^2t^2 \\
&= \gamma^2(x' + vt')^2 + y^2 + z^2 - \gamma^2c^2(t' + vx'/c^2)^2 \\
&= \gamma^2 (x'^2 + 2\,x'\,v\,t' + v^2t'^2) - \gamma^2c^2 (t'^2 + 2\,t'\,vx'/c^2 + v^2x'^2/c^4) + y^2 + z^2 \\
&= \gamma^2\,x'^2 + \gamma^2\,2\,x'\,v\,t' + \gamma^2\,v^2t'^2 - \gamma^2\,c^2\,t'^2 - \gamma^2\,2\,t'\,vx' - \gamma^2\,v^2x'^2/c^2 + y^2 + z^2 \\
&= \gamma^2\,x'^2 - \gamma^2\,v^2x'^2/c^2 + \gamma^2\,v^2t'^2 - \gamma^2\,c^2\,t'^2 + y^2 + z^2 \\
&= x'^2\,(\gamma^2 - \gamma^2\,v^2/c^2) + c^2t'^2\,(\gamma^2\,v^2/c^2 - \gamma^2) + y^2 + z^2 \\
&= x'^2\,\gamma^2\,(1 - v^2/c^2) - c^2t'^2\,\gamma^2\,(1 - v^2/c^2) + y^2 + z^2 \\
&= x'^2 - c^2t'^2 + y^2 + z^2 \\
&= x'^2 + y'^2 + z'^2 - c^2t'^2
\end{aligned}$$

Obviously we have the **same form** within the moving frame of reference S'

$$x'^2 + y'^2 + z'^2 = c^2t'^2$$

which seems to indicate that all frames of reference have the **same** spherical **shape** to observe.

How to prove Einstein's spherical equation?

The Einstein's starting equation was:

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

As the left hand side and right hand side must have the same value, we get:

$$x^2 + y^2 + z^2 - c^2t^2 = 0.$$

The so-called **Minkowski metric** is presenting the *same equation* as follows:

$$x^2 + y^2 + z^2 - c^2t^2 = ds^2$$

Hence, what Einstein showed to be equal was:

$$x^2 + y^2 + z^2 - c^2t^2 = ds^2 = x'^2 + y'^2 + z'^2 - c^2t'^2$$

Summarizing the lines above we see that for all transformations of the Lorentz kind the *transformed values* itself are restricted to

$$ds^2 = 0$$

and the proof of **any invariant** is limited to

$$0 = 0.$$

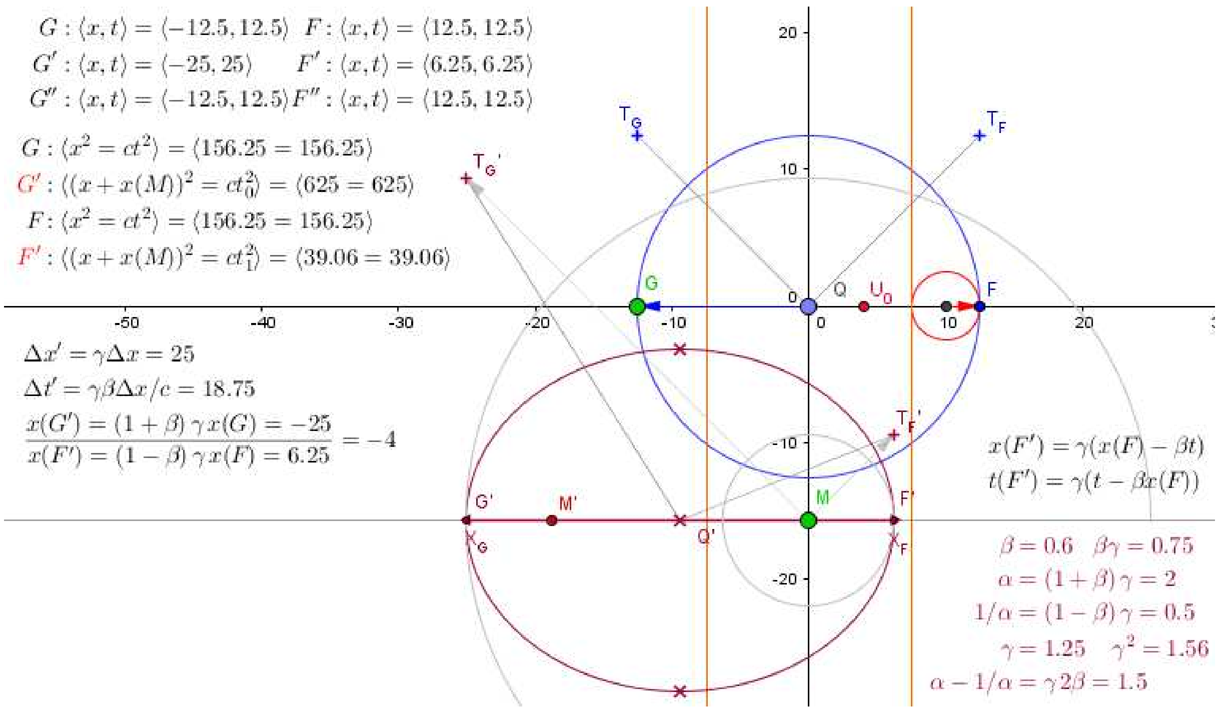
Einstein did prove that there is a sphere-like formula for every point to describe. What he omitted was to define some unique radius for all points of the same shape. To understand the fundamental nonsense of Einstein's 'proof' it's important to outline that only points that share the same x-value will be mapped to the same shape. As Einstein introduced the t-coordinates as not only arbitrary but rather as some real time values the conventional reception of his ideas, i.e. to assume that his kind of thinking would go logically straight, did cause the major part of this error. There are given **no constraints** for pairs of symbols like $x'^2 \sim x^2$, $z'^2 < z^2$ or $ct_F = ct_G$, therefore the variables of K' are not tightly bound against K. According to Einstein's idea to show the compatibility of his principles every point is mapped to its very own shape and one spherical shape ends up in as many different shapes as points exist along the x-axis.

> *Einstein did not prove that all points of some sphere A are mapped to the same sphere A'.*

The notion of *time in motion* that takes different values out of the same time at rest is quite unknown. Do different time values indicate different times to take place or do all points of the coordinate system in motion K' share the same time but have different constant delays? The interpretation of an indefinite number of different times –like Wolfgang Pauli gave it– produces an indefinite number of different shapes out of one shape at rest. To show that basic principles hold just by demonstrating that there may be drawn a sphere through any point - this is completely impossible. In order to prove that *all* points of A are mapped to A' one has to assure that the formulae of *all* points of some sphere share the same radius:

$$\bigwedge_{a \epsilon A} x_a^2 + y_a^2 + z_a^2 = ct_A^2$$

The constraints above directly forbid different times within the same shape. When fulfilling these constraints all attempts to introduce some relativity of simultaneity in order to cope with manifold shapes are to be rejected immediately. To allow non-simultaneity as some valid kind of simultaneity would perturb the right hand side of the equation above and enable us to proclaim nonsense by highly sophisticated means.



This example shows the application of the Einstein criterion for circular shapes. The shapes occur as 2D-projection of spherical waves originating at point Q and expanding with $c = 1$. The Points F and G are transformed to $F'$and G' using the Lorentz transformation. Equations of the form $x^2 + y^2 = c^2t^2$ are fulfilled by any of the four points, but the points F' and G' are dedicated to different circles. As all points show $y = 0$ the constraint $x^2 = c^2t^2$ would be sufficient to prove. Taking into account that t is a variable and t' is obliged to be a variable there remains nothing to be checked. The equations $x^2 = c^2t^2$ can take different x-values **if** and only if the values of *time* are allowed to differ. There is no reason that the moving system may encounter point F and point G at different times. The picture above shows a simulation at rest with two different circles (light gray) for the given time value $t = 10$.

> *As the radius of the circles is a linear function of time t' for* any *small circle through F there will be present* a *larger circle through G, simultaneously within the moving system.*

The gradients along $\langle M, T_F' \rangle$ and $\langle M, T_G' \rangle$ indicate the time needed ($dy = dt$) to expand the circles that start in M. The idea to deploy different times would cause the theory to create *as many* circles *as different* points are given by the original shape. This would end up in stupidity as the self-imposed principle of covariance cannot hold: Producing an infinite number of shapes out of one shape will give an indefinite set of tasks of transformations. Finally, if the shapes are intended to occur at different times and there is not given a final time to stop further occurrences no retransformation may ever be completed. This is a consequence of the switch from implicit timing in the frame a rest to explicit timing convention.

The Einstein idea to slice the time by creating non-simultaneous events in the moving system drags severe bugs. The system at rest is thought to be static because there is no time index for the objects, no time index at the points. All objects within the system at rest share the same time.

As any point of the system in motion may have some different time to indicate its specific time dependency the system carries as many static subsystems as different times occur. The system in motion has all the features needed to record each object at its very own point of time. Moreover, the static system may be described synchronously whereas the dynamic system is given by asynchronous description, each object taking its time index explicitly. It seems quite impossible that there exists a valid transformation from the moving system to some static system because the information of so many static systems cannot be stored into one system without loss of precision or uniqueness.

CONCLUSION

Einstein seemed to believe that the **shape of a spherical wave is given** in the moving System S' if the observer of S' is **able to describe it** by some spherical equation. Einstein mixed up two elements successfully. He never used the **common intension** of "*it*" as holistic structure referenced by "*to describe it*" but he thought that giving some point the same formula, i.e. time slicing the shape into points that may be viewed as part of some sphere, would match the *intension* of "*it*".

Being able to describe something using a specific form *is nothing* to proof anything. If an algebraic form is equivalent to some geometrical shape the presentation of it *may be* concerned as some evidence which geometrical constructions have in general. But practical applications need a lot more of constraints to be checked in order to get some evidence.

> *Einstein's objective was to give rise to some evidence by the equivalence of the formula, in order to fulfil his general covariance principle.*

If we are able to **paint a ball** of diameter $2r$ within a coordinate system using the equating principle $x^2 + y^2 = r^2$ and if we have painted a ball then we would have done it **if** and only if $r > 0$. But if we **teach to paint** a ball by applying a rule like $ds^2 = x^2 + y^2 - r^2$ the most important constraint may be refrained. If the Lorentz transformation cannot be used to establish some equivalence of diameters of balls for what is it useful then?

If we take into account that any observer can see shapes only **by apparent simultaneous events** (i.e. simultaneously incoming photons) the situation described by Einstein is drastically flawed with errors. Did Einstein actually kidding someone as he wrote his Elektrodynamik-paper?

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[1] http://arxiv.org/pdf/physics/0606130.pdf, Anatoli Andrei Vankov:"On Controversies in Special Relativity", 06/14/2006

[2] http://echo.mpiwg-berlin.mpg.de/ECHOdocuViewSB?url=http://content.mpiwg-berlin.mpg.de/mpiwg/online/permanent/einstein/annalen/Einst_Zurel_de_1905/index.meta&mode=texttool

[3] http://www.fourmilab.ch/etexts/einstein/specrel/www/