Abstract for oral presentation Second Hermann Minkowski Meeting on the Foundations of Spacetime Physics 2019

How Minkowski already 1908 could have discovered superluminal LT and six dimensional spacetime and how it could have and can give new understanding to the relation of relativity to quantum theory and to Weyl' s proposal about consciousness.

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Abstract
The history and rationale for the discovery of superluminal Lorentz transformations in two, four and six dimensional, three space and three time, spacetime was summarised [1]. I also showed how Einstein 1905 [2] and Minkowski 1907/1909 [3] missed this possibility. A further analysis [4] show two types of error, which at least show the need of caution when thinking about the possibility of systems with $|v| > c$ not just as ordinary systems going faster and faster:
A: Using argument from symmetry or even relativity postulate which are only valid for $|v| < c$. That is using a faulty argument (Einstein [2], Born [5], Pauli [6], Landau and Lifshitz[7] and Rindler's later works [8])
B**:** Not fully use of the mathematical possibilities, of negative $\phi(x,y,z,t)$ in

$$dx'^2 + dy'^2 + dz'^2 - c^2dt'^2 = \phi(x,y,z,t)(dx^2 + dy^2 + dz^2 - c^2dt^2)$$

(Cunningham [9]) , of two different formulas for "rotations" in non-Euclidean Minkowski space, (Minkowski [3, dec 1907], Cunningham [9], Synge [10], Landau and Lifshitz[7]) , or the seemingly obvious alternative in the graphic method (Minkowski [3, 1908], Born [5]) thus perhaps more of a lapse. In these five works the delayed discovery could have been done but it seems clear that Minkowskis 2D graphic method came closest, very close. I think it is very plausible that he with his graphic method could have discovered Generalised LT for $|v| > c$ (GLT) in 2D if not his untimely death 1909.
As shown [1] in 4D spacetime the GLT include imagainaty numbers in order be able to use the – sign in $ds'^2 = \pm ds^2$. But is easy to see how to solve this in accordance with the law of inertia for quadratic forms [11, p.122] (Sylvester's law of inertia) by introducing two extra negative "dimensions", thus "timelike dimensions", which make it possible to use – sign in $ds'^2 = \pm ds^2$

$$x^2 + y^2 + z^2 - c^2(t_1^2 + t_2^2 + t_3^2) = \pm(x'^2 + y'^2 + z'^2 - c^2(t_1'^2 + t_2'^2 + t_3'^2)$$

yet only real valued transformations for both LT and GLT. As the excellent mathematician Minkowski was and having written his first paper on quadratic forms, which he won a price for, it is conceivable that he could have seen how the problem with imaginary numbers in 4D superluminal LT could be solved with 6D, three space three time already 1908, as it was done much later by others [12]. Of course the question then is if $|v| > c$ and 6D spacetime is just mathematics or if it is a way to new physics. To exclude $|v| > c$ we must have physical arguments, which is not clear to exist. Instead I think, we should, and believe Minkowski himself would have done so, follow Minkowski's mission " … to move from the currently adopted mechanics through purely mathematical reasoning to modified ideas about space and time. " [3, p.111].
I think six dimensional spacetime and superluminality is related to, and also possibly indicate a solution to three connected and fundamental problems in physics.

1. Dimensionality of spacetime. 3D presentism or 4D block universe ? Or 6D synthesis?
2. Problem to unite relativity and quantum theory.
3. Weyl's proposal about consciousness and relativity

Ad.1 The problem about dimensionality of the world is still under debate [13]. Petkov, following Minkowski, has strong arguments for that the experimentally verified kinematic effects in relativity are possible only in a 4D block universe [14 p.125] or actually are possible only in a world of *at least four-dimensions* [14 p.11] . It seems to me that the 6D spacetime construed as a 5D block universe + 1 D flow time might be a possible synthesis that can save both the merits of 4D block universe and the fundamental experience of change.
Ad. 2 It seems to me that at a fundamental level there is a contradiction between relativity, which as

a 4D Block universe seems deterministic whereas quantum theory is non-deterministic[1]. It also seems to me that 5D +1D spacetime as argued above has both the merits of an objective *5D block universe* but which is not deterministic as what exists as a block are *different possibilities* and it is not determined which possibility which become a real physical world. [15]

Ad. 3 Petkov's comments on Weyls proposal "that the flow time is mind-dependent – outlined by Weyl should have been examined more rigorously." and "… this idea appears to be self contradictory since Weyl assumed that consciousness (leaving aside the question of what consciousness itself is) *moves* in Minkowski spacetime where no motion is possible" [14 p.150] and **"**no one has found a way, which does not involve our consciousness, to reconcile the spacetime world view and the fact that whatever we perceive happens only at the present moment". [16, p. 110-111]

So there is an interesting, albeit seemingly contradictory, possible connection between the nature of spacetime and consciousness, and thus a need to question what consciousness is.

Very short: **the hard problem**, *the subjective experience* of e.g. the c[1] of a piano or the red of an apple, have ***not even today been explained by the brain.***

But I think there is a solution using spacetime as Manzotti's The Spread Mind or mind-object-identity [17] also combined with that the mental experiences can be identical to possible events in 6D spacetime construed as a 5D block universe +1D flow time [1, 4,18]

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[1] Petkov has an interesting, but still speculative, way to solve this paradox in 4D- atomistic model (H. Anastassov), which suggest that a particle can be structureless in space but structured in time. [14 chap 6 especially. p.166]