Einstein's Clock

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Abstract

The flexibility of time in the theory of relativity is achieved by unnatural behavior of the clock. Einstein assumes the existence of such a clock, which indicates more time than would have passed according to its speed. In nature there is no such clock. Therefore his assumptions should be reconsidered anew.

In „On the Electrodynamics of Moving Bodies“ [1] Einstein came in the context of his theory of relativity to the following conclusion:

„If at the points A and B of K there are stationary clocks which, viewed in the stationary system, are synchronous; and if the clock at A is moved with the velocity v along the line AB to B, then on its arrival at B the two clocks no longer synchronize, but the clock moved from A to B lags behind the other which has remained at B by $1/2 t v^2/c^2$ (up to magnitudes of fourth and higher order), t being the time occupied in the journey from A to B. It is at once apparent that this result still holds good if the clock moves from A to B in any polygonal line, and also when the points A and B coincide.“

This theorem is better known as the twin paradox. It is quite confirmed experimentally [2]. Einstein did not stop at a preliminary remark and wrote in more detail:

„If we assume that the result proved for a polygonal line is also valid for a continuously curved line, we arrive at this result: If one of two synchronous clocks at A is moved in a closed curve with constant velocity until it returns to A, the journey lasting t seconds, then by the clock which has remained at rest the travelled clock on its arrival at A will be $1/2 t v^2/c^2$ second slow. Thence we conclude that a balance-clock at the equator must go more slowly, by a very small amount, than a precisely similar clock situated at one of the poles under otherwise identical conditions.“

But according to Einstein's relativity principle every observer can consider himself as at rest. That's why, each observer determines that all clocks in motion relative to that observer run slower than that observer’s own clock. If the moving observer returns to point A, he will notice the following: the clock at point A is slower than his own clock. but this clock shows that more time has passed since his departure than his own clock. For moving observers this conjucture makes no sense. If a clock is slower than its own clock, it should also show less time.

We do not call this nuance as paradox, otherwise it is confused with the twin paradox. In fact, this is a testimony to a clock malfunction. The clock no longer fulfills its purpose. The clock shows more time than passed according to its speed. That is, it is not about a simple problem of clock synchronization, as Einstein wanted to portray, but the function of the clocks does not make any physical sense in his theory of relativity.

I have already been told that the moving observer in this case is not inertial, therefore, my consideration is not right. But it should not be forgotten that Einstein formulated his theorem in the context of the special theory of relativity. The acceleration phases were simply ignored by him. He extended the conclusion for a simple route AB to polygonal line AB-BC-CD-...-ZA and imagines a series of clocks, synchronised in A's frame, placed round the route at each inflection point. His conclusion applies to every single line with local clocks, so it applies to the total route, to the first and last clock inclusively, which is actually one and the same clock.

Einstein later tried to prove his „twin" theorem with the general relativity [3]. However, his basic assumption contradicts the experimental finding in CERN [2]. He modeled the acceleration phases wi th the imaginary gravitational field. Obviously, he relied on the principle of equivalence. However, the CERN researchers claim that the acceleration has no effect on the time dilation of the special theory of relativity. This suggests that the acceleration itself can not cause the time dilation. In the gravitational field, on the other hand, the time dilation has been proven several times. So, the exchange of acceleration through the gravitational field is not justified. Moreover, the correctness of the principle of equivalence under these circumstances is also questionable. From this point of view, Einstein's proof with the polygonal line deserves more respect.

Now we can mark all clocks along the polygonal line. The moving observer will then enter in a table which clock which time has indicated (compared with his own time). When the moving observer sees the first clock again, he can check his table. He will notice that this clock shows too much time, although it is just as slow as before.

The flexibility of time in the theory of relativity is achieved by unnatural behavior of the clock. Einstein assumes the existence of such a clock, which indicates more time than would have passed according to its speed. But physically no clock can exist that displays more time than it counts with „ticks". Therefore his assumptions should be reconsidered anew.

[1] ON THE ELECTRODYNAMICS OF MOVING BODIES By A. EINSTEIN June 30, 1905.

[2] Bailey, H.; Borer, K.; Combley F.; Drumm H.; Krienen F.; Lange F.; Picasso E.; Ruden W. von; Farley F. J. M. ; Field J. H.; Flegel W. & Hattersley P. M.: Measurements of relativistic time dilatation for positive and negative muons in a circular orbit. Nature 268, 301 - 305 (28 July 1977).
https://www.researchgate.net/publication/30398795_Measurements_of_relativistic_time_dilatation_for_positive_and_negative_muons_in_a_circular_orbit

[3] A. Einstein: Dialog über Einwände gegen die Relativitätstheorie. In: Die Naturwissenschaften. Heft 48, S. 697–702 (1918).
Translation: Dialog about Objections against the Theory of Relativity.
https://en.wikisource.org/wiki/Translation:Dialog_about_Objections_against_the_Theory_of_Relativity