

May 5, 2020

Dear Colleague,

With this letter I would like to acquaint you with a problem connected with the way we instruct our students in the field of relativity theory. Inertial systems are inevitably used to demonstrate various principles. The term "inertial" refers to objects which are in uniform translation and therefore not subject to any external unbalanced force. Newton's First Law of Motion (Law of Inertia) holds that inertial systems cannot change either their speed or their direction until such a force is applied.

The question I want to pose in this letter is whether physical properties other than the velocity of such an object are also constant. In particular, should one expect the rate of an inertial clock to change *spontaneously*, that is, without the influence of some unbalanced external force?

The answer to the above question is directly relevant to Einstein's relativity theory, particularly his claim that two events which are simultaneous ( $\Delta t=0$ ) for one observer based on his inertial clock can occur at different times ( $\Delta t'\neq 0$ ) on the basis of some other inertial clock in a different rest frame. Einstein used the example of two lightning strikes on a train moving with respect to the station platform to demonstrate his position.

Why is the question about inertial clocks relevant to the simultaneity issue? If two inertial clocks are used to measure an elapsed time between two events, the fact that each has a constant rate means that their respective values must be strictly proportional to one another ( $\Delta t'=\Delta t/Q$ ), where  $Q$  is the proportionality constant of the two clock rates. Consequently, if  $\Delta t=0$ , then  $\Delta t'=0$  as well. The remote non-simultaneity phenomenon claimed by Einstein is therefore ruled out.

Our physics students need to be appraised of this situation. I hope you agree.

With kind regards,

Prof. Dr. em. Robert J. Buenker  
Theoretical Chemistry and Chemical Physics  
University of Wuppertal  
Wuppertal, Germany