Yet another wrong claim by Ralph Malcolm Rabbidge

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1 Introduction

Ralph Malcolm Rabbidge, who is posting in the usenet-group sci.physics.relativity under the pseudonym Henry Wilson, has in this post: **Ralph Malcolm Rabbidge's post** made the following claim:

> *« It is often claimed that LET and SR produce the same results. Consider these two situations. Firstly, let two clocks be moving with the same absolute speed v in the 'aether'. Let a light signal be sent from the mid point between them and the clocks synched so that they register the same arrival times for the signals. Clearly, their synchronization will be very different from the SR version since in that theory both signals move the same distance at c, whereas in the aether, they move at c over UNEQUAL distances. »*

The claim made by Ralph Malcolm Rabbidge is that the predictions of Lorentz Ether Theory (LET) and The Special Theory of Relativity (SR) for how the clocks will be synchronized are different. I will show that the claim is wrong.

LET is defined in Lorentz's 1904 paper: ELECTROMAGNETIC PHENOMENA IN A SYSTEM MOVING WITH ANY VELOCITY LESS THAN THAT OF LIGHT

Lorentz's paper

Finding the Lorentz transform in Lorentz's paper

2 The scenario

We will define the scenario a bit more precisely.

> Two clocks, C_1 and C_2 are stationary relative to each other. The distance between them is constant. A light source emits a short pulse when it is midway between the clocks. When the clocks are hit by the light pulse, they are set to zero.

Note that the scenario is defined with no reference to frames of reference. It can however be observed in any inertial frame of reference.

3 The scenario observed in a frame where the clocks are moving

Ralph Malcolm Rabbidge says: *«let two clocks be moving with the same absolute speed v in the 'aether'»*

As the well informed reader will know: the speed of the aether in Lorentz's Ether Theory (LET) is unobservable, and will have no consequences whatsoever for what is measured. But we can obviously assume the clocks to move at an arbitrary speed v in an inertial frame which in the LET interpretation is stationary in the aether. Let's call this frame K with coordinates $[t, x]$, and let the distance between the clocks be L as measured in K.

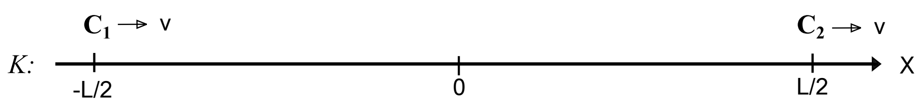

Figure 1: *The frame of reference K*

Let the light pulse be emitted from the midpoint $x = 0$ at the time $t = 0$, when the position of C_1 is $x = -\frac{L}{2}$ and the position of C_2 is $x = \frac{L}{2}$.

Let t_1 and x_1 be the coordinates in K of the event "the light pulse hits C_1", while t_2 and x_2 are the coordinates of the event "the light pulse hits C_2". Let's call these events E_1 and E_2 respectively.

The calculation is trivial, and these coordinates will be:

$$E_1: \quad t_1 = \frac{L}{2(c+v)} \qquad x_1 = -ct_1 = -\frac{cL}{2(c+v)} \tag{1}$$

$$E_2: \quad t_2 = \frac{L}{2(c-v)} \qquad x_2 = ct_2 = \frac{cL}{2(c-v)} \tag{2}$$

Since the clocks C_1 and C_2 are set to zero at the times $\frac{L}{2(c+v)}$ and $\frac{L}{2(c-v)}$ respectively, it is clear that they are not synchronous in K, C_1 is showing zero a time $\frac{Lv}{c^2-v^2}$ before C_2 is showing zero.

4 The scenario observed in the rest frame of the clocks

We will now observe the same scenario as above in a frame of reference where the clocks are stationary. Let's call this frame of reference K' with coordinates $[t', x']$. Let K and K' be aligned such that their origins coincide at the time $t = t' = 0$.

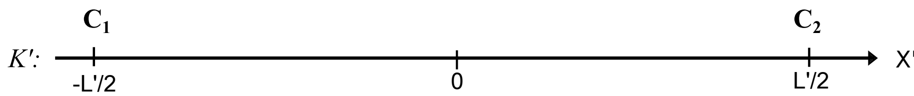

Figure 2: *The frame of reference* K'

The events with the coordinates $\left[0, -\frac{L}{2}\right]$ and $\left[0, \frac{L}{2}\right]$ in K will according to the Lorentz transform have the coordinates $\left[0, -\frac{L}{2\sqrt{1-\frac{v^2}{c^2}}}\right]$ and $\left[0, \frac{L}{2\sqrt{1-\frac{v^2}{c^2}}}\right]$ in K'.

This means that the clocks will be stationary at the positions $-\frac{L'}{2}$ and $\frac{L'}{2}$ in K', where $L' = \frac{L}{\sqrt{1-\frac{v^2}{c^2}}}$.

We can see that L is the Lorentz contracted distance between the clocks in the frame where the clocks are moving at the speed v, while L' is the proper distance between the clocks as measured in their common rest frame.

We will apply the Lorentz transform to find the coordinates of the events E_1 "the light pulse hits C_1" and E_2 "the light pulse hits C_2".

$$E_1: \quad t'_1 = \frac{t_1 - \frac{vx_1}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{L}{2c\sqrt{1-\frac{v^2}{c^2}}} = \frac{L'}{2c} \qquad x'_1 = \frac{x_1 - vt_1}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{-L}{2\sqrt{1-\frac{v^2}{c^2}}} = -\frac{L'}{2} \tag{3}$$

$$E_2: \quad t'_2 = \frac{t_2 - \frac{vx_2}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{L}{2c\sqrt{1-\frac{v^2}{c^2}}} = \frac{L'}{2c} \qquad x'_2 = \frac{x_2 - vt_2}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{L}{2\sqrt{1-\frac{v^2}{c^2}}} = \frac{L'}{2} \tag{4}$$

Since L' is the proper distance between the clocks, we can see that it would be trivially simple to calculate these coordinates in K', which shows that the Lorentz transform correctly transforms the coordinates from K (LET's 'aether frame') to K'; it doesn't matter if you call it applying LET or SR, the result is the same.

Since $t'_1 = t'_2$ the clocks are set to zero simultaneously in K'; the clocks are synchronous in K'.

5 Conclusion

We have shown that according to LET as well as SR: the clocks will not be synchronous in the frame of reference where they are moving with the speed v (LET's 'aether frame'), but they will be synchronous in the rest frame of the clocks.

Ralph Malcolm Rabbidge's claim is thus proven wrong.

SR and LET will always predict the same for any experiment involving propagation of EM-radiation.