Einstein's Train…Derailed!
The Light Clock…Smashed!

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ALFA theory has been tested successfully against many classic motion problems in physics—from Newton's Bucket to Ruyong Wang's FOC. Here we pick up the story by applying ALFA to the train gedanken experiment and then the light clock device of relativity, with the same results as before. A practical implementation of the light clock is suggested to validate claims made herein. The analysis again supports a mobile aether that can be dragged along by ambient matter motion and a laboratory frame anywhere on the ground that can—and must—serve as an absolute frame, if the physics laws of motion are to be covariant. It's strange that the effect of a wind vector on sound speed is well known to be $V_{\text{sound}} \pm V_{\text{wind}}$; yet the same effects—like Doppler shifts and time delays—are seen when $V_{\text{light}} \pm V_{\text{aether}} = c \pm V_{\text{aether}}$ …and ignored or rejected.

1. The Einstein Train

1.1. Relativity Model

We set the scene by referral to a Wiki article [1] on the train model used to explain relativity….

"…a thought experiment consisting of one observer midway inside a speeding train car and another observer standing on a platform as the train moves past. It is similar to thought experiments suggested by…Einstein in 1917 [2].

"A flash of light is given off at the center of the train car just as the two observers pass each other. The observer onboard the train sees the front and back of the train car at fixed distances from the source of light and as such, according to this observer, the light will reach the front and back of the train car at the same time.

"The observer standing on the platform, on the other hand, sees the rear of the train car moving (catching up) toward the point at which the flash was given off, and the front of the train car moving away from it. As the speed of light is finite and the same in all directions for all observers, the light headed for the back of the train will have less distance to cover than the light headed for the front. Thus, the flashes of light will strike the ends of the train car at different times."

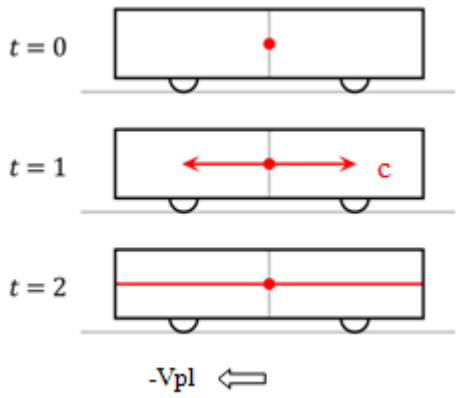

Fig. 1. Train view [3].

Fig. 1 shows the train view of the light beams: $2D$ is the car length measured on the train and on the platform when the train is stopped there; c is the light speed along the red optical paths, by SR axiom 2;

$$-V_{\text{pl}} = +V_{\text{tr}} \tag{1}$$

is the platform (pl) speed seen in the train (tr) frame, by SR axiom 1. There is no dragged aether; aether does not exist.

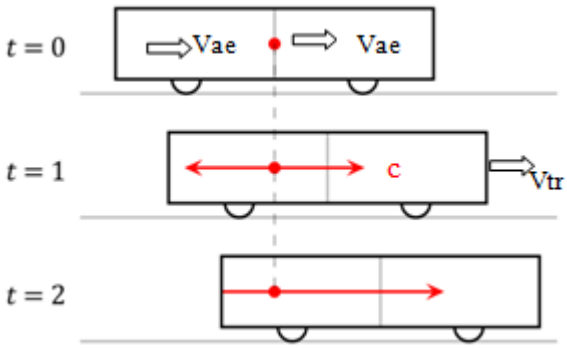

Fig. 2. Platform view [4].

Fig. 2 shows the platform view of the light beams; V_{tr} is the train speed measured in the platform (pl) frame.

Summary of SR analysis: As explained above, the platform observer sees the simultaneous arrival of the two beams, but onboard the light arrives at the back of the train first.

1.2. ALFA Model

In Fig. 3,

$$V_{\text{ae}} > 0\,, \tag{2}$$

as supported by 6 anisotropy experiments listed by Cahill. V_{ae} is the dragged aether (ae) speed, which trails behind the leading edge of the car, independent of whether the car is open or sealed. The vertical red dashed line indicates the train (tr) location when the light beams hit the car. In the platform (pl) frame: D_{f} is the distance traveled by the forward light beam; D_{r} is the distance

traveled by the rear light beam when the walls are reached; V_{ae} is the aether dragged by the train:

$$V_{ae} = V_{tr}. \tag{3}$$

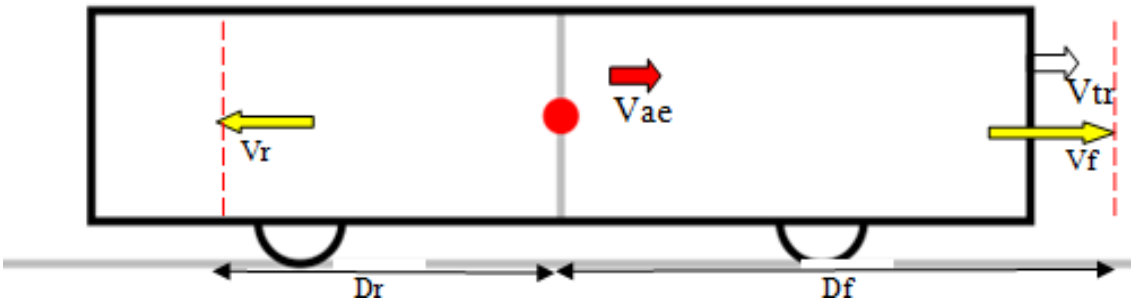

Fig. 3. ALFA Platform view.

ALFA uses a special restricted Galilean transform, with absolute time and the absolute reference frame… the lab frame. This may be termed Galilean Absolutism… The *GalAbs* transform set.

A 1-Dimenional *GalAbs*:

$$X'(T') = X_{obj,ae}(T) + X_{ae,lab}(T), \tag{4}$$

$$T' = T = T_{lab}. \tag{5}$$

It follows that

$$V'(T') = V'(T) = V_{obj,ae}(T) + V_{ae,lab}(T). \tag{6}$$

When applied to light, where the object is light/photon, then the speed of light (SoL) is

$$\text{SoL} = c \pm v, \tag{7}$$

as shown in the ALFA paper. For this application:

$$t_c = t_f = t_r = t. \tag{8}$$

Time is the same in all frames. Absolute time means one time for all. The times for the light beams to hit the walls in the train frame (t_{tr}) and on the platform for the forward (t_f) and rear (t_r) beams are equal for *GalAbs*.

In the train (tr) frame,

$$c = \frac{D}{t} \quad \Rightarrow \quad D = ct. \tag{9}$$

On the platform, for the forward beam:

$$V_f = V_{ph,ae} + V_{ae,ph} = +c + V_{ae}, \tag{10}$$

where "ph" means photon. So

$$D_f = (c + V_{tr})t = \left(\frac{v + V_{tr}}{c}\right)D = \left(1 + \frac{V_{tr}}{c}\right)D, \tag{11}$$

from

$$D = ct \tag{12}$$

in the train (tr) frame.

D_f is always $> D$ when the train is moving. E.g., for

$$c = 2V_{tr}; \quad D_f = 1.5D. \tag{13}$$

On the platform, for the rear beam:

$$V_r = V_{ph,ae} + V_{ae,pl} = -c + V_{ae}. \tag{14}$$

So

$$D_r = (-c + V_{tr})t = \left(\frac{V_{tr}}{c} - 1\right)D. \tag{15}$$

E.g., for

$$c = 2V_{tr}, \quad D_r = -0.5D. \tag{16}$$

In the train frame, light speed

$$V_{ph,tr} = \pm c. \tag{17}$$

The aether co-moves with the train, so

$$V_{ae,tr} = 0. \tag{18}$$

In the platform/lab frame

$$V_{ph,lab} = \pm c + V_{ae} = \pm c + V_{tr}. \tag{19}$$

Relativity predicts that the platform speed measured on the train will be equal and opposite to the train speed seen on the platform (pl):

$$V_{pl,tr} = -V_{tr,pl}. \tag{20}$$

This is false. The platform/lab speed contains the aether speed,

$$V_{ae,lab} = V_{tr}. \tag{21}$$

Another way to look at the lab's absolutism: The laws of physics, the Galilean law of velocity addition, are obeyed in the lab, since

$$V_{total} = V_1 + V_2 = \pm v + V_{ae}. \tag{22}$$

The law of velocity addition is NOT obeyed on the train, since

$$V_{total} = V_1 + V_2 = \pm v, \tag{23}$$

and

$$V_{tr}(= V_{ae}) \tag{24}$$

is measured, when relativity theory predicts

$$V_{tr} = 0, \tag{25}$$

in the train frame.

The laws of physics are TRUE in the lab frame. The laws of physics are NOT TRUE in the train frame, so any frames moving relative to Earth are not covariant. There is no time dilation, clock bias, or other tampering with common sense. The distance increases when the light beam moves forward and shrinks when in reverse.

So there is length expansion, and a length shrinkage, but the contraction has no conceptual relationship to the Lorentz contraction.

GalAbs coordinates are used, where

$$V_{\text{obj,lab}} = V_{\text{obj,ae}} + V_{\text{ae,lab}} . \tag{26}$$

One more issue: How do we know that the platform/lab is the absolute frame, other than that the predicted times and distances are experimentally verified?

The key is to accept the three principles:

1. The speed of light in the aether frame always equals *c*, always:

$$c_{\text{obj,ae}} = V_{\text{ph,ae}} = c , \tag{27}$$

2. There is a movable aether that interacts with matter in motion.
3. The lab frame is the universal frame that guarantees physical law covariance.

It is accepted that when sound travels relative to a wind, the speed of sound V_s changes because of the air motion V_a. The correct value for computing the speed of sound is $V_s \pm V_a$. Why is there such resistance to the speed of light being $c \pm V_{ae}$?

1.3. Conclusion:

Einstein's train problem with simultaneity is solved immediately and trivially. The light beam from the car's center reaches the front and rear of the moving car in the same time as when the car was at rest. The light beam moving toward the front of the train is boosted in speed by the aether dragged by the train; the other beam is retarded by the train's aether wash. There's no synchronization between locations separated in space, other than the generic aether correction in GPS range formula.

2. The Light Clock

2.1. SR Model

Refer to an online outline of the relativistic light clock [5]:

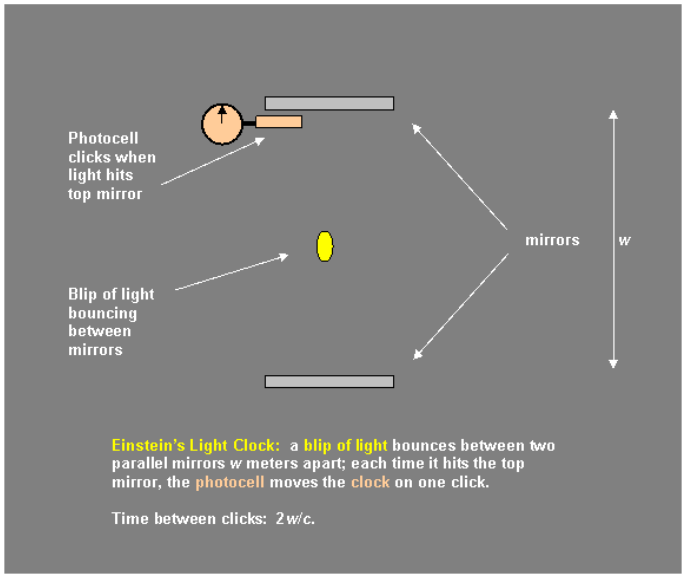

Fig. 4. The light clock frame [6].

In the clock frame of Fig. 4, the time for one trip is

$$t = \frac{w}{c} . \tag{28}$$

For the lab frame at the right of Fig. 5:

$$c^2 t^2 = v^2 t^2 + w^2 , \tag{29}$$

so

$$\left(c^2 - v^2\right) t^2 = w^2 , \tag{30}$$

or

$$\left(1 - \frac{v^2}{c^2}\right) t^2 = \frac{w^2}{c^2} . \tag{31}$$

Solve for *t:*

$$t = \frac{w}{c}\left(1 - \frac{v^2}{c^2}\right)^{-1/2} . \tag{32}$$

As time increases with *v*, this fictitious effect of stretching time is called 'time dilation'. Why fictitious? Read on…

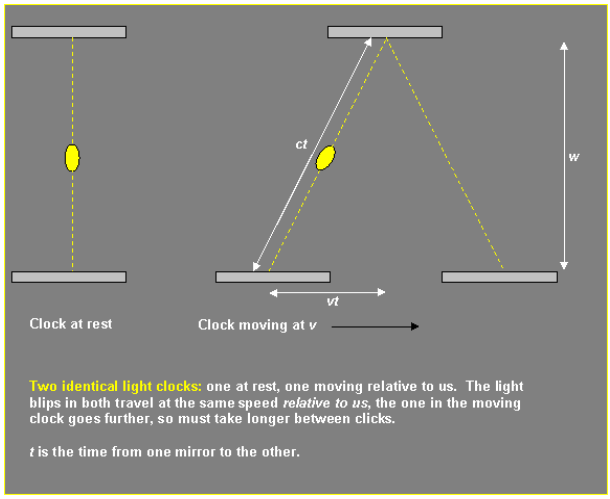

Fig. 5. The light clock lab frame [7], at right.

2.2. ALFA Model

The clock rest frame is as in SR…the analog of a boat crossing a lake. The lab frame analysis differs sharply from the relativistic view: boat crossing a river.

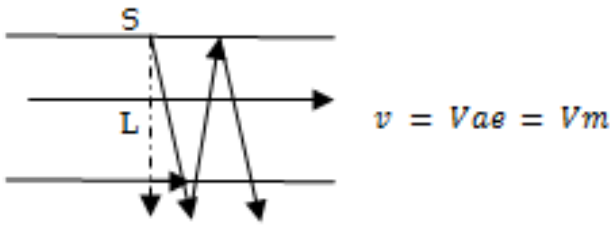

Fig. 6. Light clock lab frame.

The light source S is fixed in the lab in Fig. 6. L is the spacing between mirrors. $v\left(=V_m\right)$ is the speed of the mirrors past the laser source, equal to the aether drag breeze V_{ae}. Because of V_{ae}, the light beam is forced to drift a distance d when reaching the opposite mirror, in time *t* (Fig. 7).

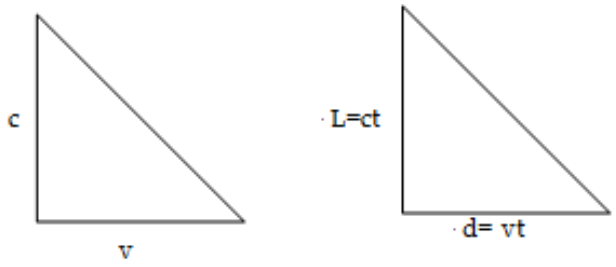

Fig. 7. Light path simplified.

The light beam travels along the diagonal hypotenuse at

$$\left(1+\frac{v^2}{c^2}\right)c > c\,! \tag{33}$$

R.I.P., SR!

The drift angle is

$$c\tan\frac{v}{c}\,. \tag{34}$$

$$d=vt \quad \text{and} \quad t=\frac{L}{c}, \tag{35}$$

so

$$d=\frac{v}{c}L\,. \tag{36}$$

We will suggest a test protocol for this prediction of ALFA. But first…

2.3. Proof of the Absolute Frame

1. *Clock frame*: the beam is always vertical; there is no drift motion sideways. So
$$v=0 \tag{37}$$
always.
2. *Lab frame*: If the mirrors move relative to earth, then there is a
$$V_{\text{ae}}=0\,! \tag{38}$$
which is measured, as Wang's Fiber Optic Conveyor did.
3. SR says that if V_{ae} is measured in the lab, then $-V_{\text{ae}}$ will be measured in the clock frame. This contradicts #1 above; the laws of physics are invalid in the clock frame (and in any frame moving relative to Earth.) Only the lab frame yields the laws of Newton and Hertz.

3. ALFA Light Clock Test

Getting the mirrors to move at a speed v that will allow measurement of d is a practical problem. We can replace

$$V_{\text{ae}}=V_{\text{m}} \tag{39}$$

with the speed of a rotor, V_{r}, whose linear rim velocity will create the aether breeze, as it did in the Sagnac test. The mirrors will stay at rest, and we will also test the aether entrainment claim as a bonus, by using ambient mass motion to drag the aether!

The rotor's plane is parallel to the mirror plane. The rotor is placed above the mirror gap, so that the linear rim velocity will be focused in the mirror channel, duplicating V_{ae} in Fig. 8.

$$V_{\text{r}}=2\pi rf\,, \tag{40}$$

the rotor's rim velocity, now replaces $V_{\text{ae}}\,(=v)$. The rotor's radius is r, the frequency f. The drift distance d now becomes

$$d=2\pi rf\frac{L}{c} \tag{41}$$

But what is the maximum rim velocity technically possible? Probably the ultrahigh centrifuge used in U_{235} separation, which reaches 1500 rps at 10 cm radius maximum, corresponding to ~900m/s, or almost 1 km/s.

Fig. 8. Rotor and motor: Typical aether generator.

We will try a conservative test value 1/10 that size as a reasonable design parameter,

$$V_{\text{ae}}=V_{\text{r}}=0.1\,\text{km/s}\,, \tag{42}$$

and a mirror spacing of 3 cm (= 0.03 m).

$$d=\frac{V_{\text{r}}L}{c}=\frac{(0.1\,\text{km/s})(0.03\,\text{m})}{(3\times10^5\,\text{km/s})}\sim10^{-8}\,\text{m} \tag{43}$$

$$t=\frac{L}{c}=\frac{0.03\,\text{m}}{3\times10^8\,\text{m/s}}=10^{-10}\,\text{sec}=0.1\,\text{ns}\,. \tag{44}$$

Let

$$D=nd \tag{45}$$

be the detectable distance desired, and n be the number of legs (one-way trips) in D.

$$D=2\pi rf\frac{nL}{c}=\frac{V_{\text{r}}}{c}nL \tag{46}$$

and

$$T=nt \tag{47}$$

is the time to reach D.

A photodetector is placed a distance D downstream from S, determined by a laser-gauge; an electronic timer measures T. Let D be 10 cm. Then

$$n=\frac{cD}{V_{\text{r}}L}=\frac{(3\times10^8\,\text{m/s})(0.1\,\text{m})}{(100\,\text{m/s})(0.03\,\text{m})}\sim10^7\ \text{legs} \tag{48}$$

The predicted time to reach D is

$$T = nt = 107 \times 10^{-10} \text{ sec} = 10^{-3} \text{ sec} \quad (49)$$

a millisecond.

This seems doable….

List of Test Equipment

- laser source; 2 mirrors; laser-gauge; precision timer; rotor and motor/sanding disc plus electric drill; photo-detector.
- No interferometer is needed….
- Any dissident experimenters out there with spare time, an empty garage, and extra cash?

4. Measuring Earth's 'Motions'

First, note that

$$v = V_{\text{ae}} \quad (50)$$

is directly measurable as D/T as defined above. Choose a distance D from the source and measure T. Then

$$V_{\text{ae}} = \frac{D}{T}. \quad (51)$$

- *MS claim 1*: The Earth rotates.
- *ALFA claim 1*: It doesn't.

Orient the light clock N–S. If there is no drift, then both claims are supported. Orient the light clock E–W. If the aether wind is 0.47cos(latitude) km/s West, then both claims are supported. But we showed that the light clock must use the lab as the absolute frame.

- *MS claim 2*: The Earth orbits the Sun.
- *ALFA claim 2*: It doesn't.

Orient the light clock in the direction of the Earth's orbit: If the light clock measures $V = 30\,km/s$, then ALFA is refuted. If the light clock measures $V = 0\,km/s$, then MS/Galileo/ Copernicus is refuted.

- *MS claim 3*: The Earth is moving through the aether toward Leo.
- *ALFA claim 3*: An aether stream from Leo is moving toward Earth.

Orient the light clock in the direction of Leo in the Virgo cluster. If the light clock measures $V = 378$ km/s, blue shifted, then nothing is proven. The relative motion of Earth and Leo will produce the CMB dipole velocity.

5. Conclusion

The ALFA refutation of the relativistic train and light clock thought experiments doesn't mean that anyone will now listen to logic and empirical proof, to change their own private world with its idealistic paradigm of a Carrollian Wonderland, where time has to expand, rulers shrink, and

$$c + c = c. \quad (52)$$

Welcome to MS science—Mysterious and Speculative physics.

Blinded by the light, they chose to remain in darkness.

References

[1] http://en.wikipedia.org/wiki/Relativity_of_simultaneity.

[2] A. Einstein, **Relativity: The Special and General Theory** (Springer, 1917); A. Einstein, **Relativity: The Special and General Theory,** pp. 30–33, Chapter IX (READ BOOKS, 2009, ISBN 1-4446-3762-2) Einstein's thought experiment used two light rays starting at both ends of the platform.

[3] http://upload.wikimedia.org/wikipedia/commons/c/ce/_Train-car_Relativity1.svg.

[4] http://upload.wikimedia.org/wikipedia/commons/7/72/_Train-car_Relativity2.svg.

[5] http://galileo.phys.virginia.edu/classes/109.mf1i.fall03/lectures09.pdf.

[6] http://galileoandeinstein.physics.virginia.edu/lectures/srelwhat_files/image016.gif.

[7] http://galileoandeinstein.physics.virginia.edu/lectures/srelwhat_files/image017.gif.