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Title

Finding unknown velocity vector of a moving closed space.

Abstract

It is a long held theory that if one is in a closed space, with no access to external phenomena, moving at a constant velocity, there is no experiment that can be carried out, within that closed space, without reference to phenomena external to that closed space, to find the unknown velocity of the closed space.

In essence this problem involves finding an unknown velocity vector. In this article I will propose an experiment to find that unknown vector without reference to external phenomena.

I will also discuss some of the ramification of the experiment.

Attached are figures 1 to 11 at the end of this paper.

A closed space is an enclosed volume with no windows or access to external phenomena.

Isotropic

On small scales (less than 5km) I have assumed the speed of light in a vacuum is isotropic.

Is there an unknown vector?

Consider the following thought experiment

Say there are 2 closed spaces both identical. The closed spaces have no windows an no way to access information external to the closed space.

We have 3 ppl. 1 in closed space 1, 1 in closed space 2 and a third standing outside the closed spaces.

The two persons in the closed spaces fall asleep.

The third person then accelerates closed space 1 in a northerly direction up to a constant velocity of X kph. Immediately after closed space 2 is caused to have a constant velocity in a southerly direction at Y kph constant velocity.

Person 1 and person 2 are then woken up. According to conventional theories they have no idea they are now moving at a constant velocity.

If person 1 was able to look out of the closed space they could claim they are stationary and the other closed space is moving and visa versa for closed space 2. They could also claim they are both moving. But no one can claim they are both stationary.

At least one closed space must now be subject to a non zero unknown velocity vector as both closed spaces cannot be stationary. Both cannot have an zero unknown velocity vector.

In both closed spaces there is a strobe. The closed spaces is subject to an unknown velocity vector Vu (velocity unknown). If the strobe goes off at point A, at say T0, at some later time, T1 say, it is my assertion the strobe light itself will not be located at point A. As a result of Vu it will be at some other point in space, say (t0 - t1) x Vu.

If it is argued that it is still located at point A that means Vu = 0 which we have already ruled out, as the closed space is subject to a non zero Vu.

If for some reason the closed space is subject to multiple unknown vectors then the multiple unknown vectors will simply resolve into a single unknown vector.

If one was to assert that one of the closed spaces has a Vu = 0. Is making the argument that that closed space is stationary in an absolute sense. As a result of Special Relativity, where motion in an absolute sense is impermissible, one is forced to argue a closed space cannot be subject to a non zero Vu. If that was the case the closed space would be absolutely stationary, or in a state of absolute lack of movement. It would then be a simple matter to measure all other movement relative to that absolutely stationary point.

However if one is forced to argue, as a result of SR, that a closed space is subject to a non zero Vu one is forced to admit the closed space is moving in an absolute sense.

There appears to be no alternative but to admit that absolute movement is , at least , possible.

Introduction and experiment set up

Referring to fig 1.

The figures are at the end of this article.

This shows the general set up of the experiment. There is a closed space that is travelling at some unknown velocity depicted by the vector Vu (vector unknown) in the direction Vu at the magnitude of Vu.

The purpose of the experiment is to find the unknown vector Vu, from an experiment conducted within the closed space, without reference to any phenomena external to the closed space.

Within that space are 2 trains one red one black. Each train has a collimator attached to it. The red train has many identical collimators attached to it. The trains sit on tracks. It just so happens the tracks are parallel to Vu. The red train is moving in the direction Vk at a known constant velocity Vk (relative to the tracks). The black train is not moving relative to the tracks.

There is a strobe light in the ceiling depicted as a green square , lets call this point B. The strobe light is at rest wrt the black train. The collimator of the black train is positioned directly below the light at point B.

The black train has a collimator attached to it of length L. The red train has many collimators attached to it, all also of length L. There is an identical stop watch at the top and at the bottom of every collimator. Apart from the number of collimators, the trains, collimators and stop watches are all identical in every way.

Each collimator has a detector at the top that can detect when a photon enters the collimator. Each collimator has a detector in its base that can detect when a photon arrives at the base of the collimator.

When a photon enters a collimator the top detector is triggered and it fires a light pulse to the top stop watch associated with that collimator, which starts the top stop watch running.

When a photon arrives at the base of a collimator the base detector is triggered and fires a light pulse to the bottom stop watch associated with that collimator, which starts the bottom stop watch running.

As shown in fig 1 the red train is moving at a constant velocity Vk in the direction Vk. There is a point on the track just before the black train. When the front of the red train reaches that point a pulse is sent to the strobe in the ceiling. When the pulse arrives at the strobe it is triggered. The point on the track makes an allowance for the time it takes for the pulse to transit to the strobe, so that the red train and black train collimators will align. The point on the track is positioned in such a way so that the strobe will trigger when the collimator on the black train is exactly adjacent to the front collimator of the red train, and both collimators will be precisely below point B. However, this is not precisely correct.

As the entire experiment is moving at a velocity Vu the strobe will move some distance in the direction Vu, in the time interval whilst the pulse is in transit from the point on the track to the strobe. So the strobe may trigger at some point to the right of point B.

In that same time interval the red train is moving in the direction Vk at Vk. If the red train only had a single collimator the possibility exists the red train collimator would not be directly vertical wrt point B. In order to negate this possibility the red train has many collimators.

Lest call the point where the strobe triggers point A.

As long as one red train collimator is below point A the experiment will work.

Lets just say for the purposes of this discussion, allowing for the above, the strobe goes off when the last collimator on the red train is directly below the strobe, see fig 2.

It just so happens that the speed of the red train Vk is equal to Vu. In the experiment the experimenters would try many values for Vk, I am simply showing the specific experiment where Vk is equal to Vu.

In trying many different values for Vk there are three possible permutations Vk < Vu, Vk > Vu and Vk = Vu.

The point at the centre of a strobe photon wave front

A strobe goes off at point A. The photon wave front spreads out in all directions from that point. As the speed of light is invariant the photons in the wave front will, for all time, be equidistant from point A.

The speed of light can be determined by measuring the distance from point A to any photon in the wavefront, and that distance should be the same as the distance to any other photon.

Referring to fig 10. The strobe is shown at point A. This is an image shortly after the strobe has triggered. Lets say the strobe triggered at T0. Lest say this is an image taken at time T1. The photons are depicted as red squares a distance D from the strobe, on the x, y and z axis'.

If D is say 20 m the speed of light can be found by dx/dt or 20/ (T1-T0) which should equate to C (the speed of light). Also the speed of light can be found by dy/dt or dz/dt or 20/ (T1-T0) which should equate to C (the speed of light).

The point A cannot have a displacement in any direction. If an observer as a result of their relative was to observe point A move, then A would become closer to some of the photons, and more distant from others. They would have to conclude the speed of light was variant.

Referring to fig 11. Again this is an image shortly after the strobe has triggered (at say time T1). Lets say the strobe triggered at T0. If in the time T1 to T0, point A was displaced some distance L along the X axis, then it would be closer to some photons in the wave front and more distant from others.

If the speed of light was again calculated at time T1, with Point A now displaced along the x axis by a distance L (point A is now shown at point B), the speed of light would be calculated as before dx/dt or L /(T1 – T0), where L is much less than 20m. The value would not equate to C.

As before, using the photon on the y axis the time would be calculated as before dy/dt which would give a value more than C.

I assert the point at the centre of a strobe photon wave front cannot have a displacement in any direction over time.

If one was able to visualise such a point. If one found oneself moving relative to such a point, so that it appeared the point was moving, then one would have the following options

A the point is moving and I am stationary;

B the point is stationary and I am moving; and

C the point is moving and I am moving.

As outlined above the point cannot move, therefore the only plausible conclusion is that the point is stationary and the observer in the space ship is moving.

Mechanics of collimators and stop watches

Referring to Fig 9. A photon from the strobe enters the aperture at the top of a given collimator, triggering the top detector, sending a light pulse to the top stop watch, thus starting the top stop watch.

The photon traverses the length of the collimator, eventually triggering the base detector, sending a light pulse to the bottom stop watch, which starts the bottom stop watch.

The time difference is calculated by subtracting the top stop watch from the bottom stop watch.

Fig 2

This image is a short time after the strobe is triggered, let's call this time T1.

The red square in the roof is the centre of the photon wave front. This is the original position where the strobe was when it triggered. As mentioned this is point A.

The photons are spreading out from the centre of the wave front are shown as a red semi circle, with point A at the centre of that semi circle.

As the closed space is moving at Vu, in the direction Vu, the actual strobe light itself is some distance to the right of point A. The actual strobe light is shown as the green square in the roof, just to the right of point A. As mentioned above the position of the actual strobe light itself is point B.

If the strobe fired at time T0 then the new position of the actual strobe light, from where it was at time T0, would be delta T multiplied by the velocity of the closed space(magnitude Vu). Or (T0 - T1) multiplied by the magnitude of Vu or Vu x (T1-T0).

The red train is moving to the left (direction of Vk) at a velocity Vk . If the strobe triggered at time T0 and Vk is equal to Vu, the position of the red train at time T1, compared to where it was at T0, would be would be the magnitude of Vu, minus the magnitude of Vk multiplied by delta T or (Vu - Vk) x (T1 – T0). However the magnitude of Vk minus the magnitude of Vu is zero, as Vk is equal to and opposite to Vu.

The interpretation of this is that one of the collimators on the red train will at all times remain directly below point A, the point where the strobe triggered, the centre of the wavefront.

This collimator at rest wrt point A and will interact with a photon moving vertically wrt point A. That photon will be perpendicular to the roof of the room. That photon will have no horizontal component. The red train will like wise have no horizontal component.

All the stop watches are a fixed distance D from their respective collimator.

For an explanation of the term "horizontal component" see fig 7.

Fig 2 to 5

The figures are a series of snapshots in time, early at figure 2 and time incrementally progressing in figures 3 to 5. The trains move further apart. The photon wave front gets larger and larger.

The figures are not to scale.

According to current theory what should observers see ?

An observer at point B would see the red train moving away from them at Vk. An observer on the red train would see point B moving away from them at Vk.

The conventional wisdom would dictate that the observer at point B, at rest wrt point B, should observe that the time difference on the red train stop watches should always be more than the time difference on the black train stop watches.

An observer at B could assert the red train was moving, or point B was moving, or both. An observer on the red train could say point B was moving, or the red train was moving, or both.

But no one could assert that no one was moving, someone must be moving in an absolute sense.

If one was to assert no one was moving then someone must have a Vu = 0 in which case they are absolutely stationary, which is an admission that an object can have absolute movement.

SR forces us to assert that objects have a Vu, because if they don't then absolute movement is possible, as absolutely stationary is a state of absolute movement, or lack thereof.

Alternatively if an object has a Vu, as SR dictates, then that is also a admission that it is possible for an object to have .

It appears absolute movement is in fact, a thing.

Red train summary analysis

Referring to fig 6 the photon moving vertically wrt point A, perpendicular to the roof, would be the first photon to reach a top detector on a collimator on the red train.

A vector equivalent of this photon would be a vector pointing vertically at the floor, perpendicular to the roof, and would have a magnitude of the speed of light, C, towards the floor. That vector would have no horizontal component, and as such the photon would have no horizontal component.

As mentioned the length of the collimator is L. It is a trivial matter to calculate that the time taken for the photon to traverse the length of the red train collimator would be L/C. As the photon has no horizontal component and as the collimator has no horizontal component.

Whilst the photon is traversing the red train collimator there would be zero horizontal displacement of the collimator or the photon.

Finding : I submit for a collimator of length L, if the long axis of a collimator is lying on a vector that points to the centre of a wave front, if the collimator is at rest wrt that point. The time it takes for that photon to traverse the length of that collimator is the smallest possible time that action can be performed in any experiment.

Finding: I submit the point at the centre of a strobe photon wave front is absolutely not moving.

Black train summary analysis

Referring to fig 7. The black train has a horizontal component which will be the magnitude of Vu. All parts of the black train (stop watches, collimators etc etc) experience a horizontal displacement at all times equal to Vu in the direction Vu.

All the photons interacting with the black train will also have horizontal components. For a photon to interact with any part of the black train, the photon must also have a horizontal component equal to, or greater than the velocity of the black train, which is Vu.

It is trivial to demonstrate that whilst any photon is traversing the black train collimator, the collimator will experience a horizontal displacement.

It is important to not confuse the photon from the strobe and the photons from the stop watches. The photons from the strobe, that interact with the black train, will have a horizontal displacement of Vu. The photons from the lights on the collimator , to the stop watches, will not have a horizontal displacement of Vu.

The photons traversing the collimator will be from the strobe. The photons from the strobe have a horizontal displacement of Vu. As the photons from the strobe traverse the collimator they will undergo a horizontal displacement. The collimator will undergo an equivalent horizontal displacement as the photon from the strobe, which is the magnitude of Vu in the direction Vu.

A photon interacting with the black train will naturally be moving at C. As the black train photon has a horizontal component, the magnitude of the photons vertical component (Vv see fig 7) will always be some value less than C, where C is the speed of light.

Referring to fig 7 the time taken for a photon to traverse the length of the black train collimator will be the collimator length L, divided by the magnitude of the vertical component of the photon (Vv), where the magnitude of the vertical component of the photon will always be some value less than C.

Therefore on the black train, the time taken for a photon to traverse the black train collimator will always greater than the equivalent time for the red train.

Collimator detectors delay red train

Referring to figure 8 and 9. These images are depictions of a collimator and the light at the bottom and top of the collimator.

When a photon enters the aperture of the collimator the detector is triggered and a signal flows to the light on the collimator. There will be a slight delay between the photon entering the aperture and the light sending a light pulse to the corresponding stop watch. The question is, does this delay affect the final result?

The arrangement of the top light is identical to the bottom light. As they are identical the delay will be identical for both the top and bottom. As the delay is identical for both there will be no material effect on the transmission of the signal to the stop watch. The same is true for the black train.

I think it is reasonable to assume ignoring this delay on the red and black trains will have no material effect on the outcome of the experiment.

Red train detailed analysis

Each collimator on the red train has its own top stop watch and bottom stop watch. Each stop watch is a distance D from the collimator. D is equal to L, where L is the length of the collimators.

As Vk is equal to an opposite to Vu the red train will not undergo any horizontal displacement after the roof strobe has triggered. No point on the red train will undergo a horizontal displacement for the entire time of the experiment.

The photons from the strobe arrive at the aperture, this triggers the detector which triggers the light pulse to the top stop watch.

Whilst the photon from the top light on the collimator is in transit to the top stop watch, the collimator, stop watch, train and light will not undergo a horizontal displacement. As the stop watch is the same height as the top light. The time taken for the photon from the top light to reach the top stop watch will be D/C. D is the distance from the collimator to the stop watch. C is the speed of light. D is equal to L.

Whilst a photon is in flight from the top light to the top stop watch, the top stop watch does not undergo a horizontal displacement, so the distance traversed by the photon, from the top light to the top stop watch is D.

Therefore the time it takes for the photon from the top light to transit to the top stop watch will be

Ttop = D/C

C is the speed of light and D equals L

Whilst the photon is in transit from the collimator light to the top stop watch, the photon continues to traverse the length of the collimator. How far down the collimator will that photon go in the time Ttop?

As Vk is equal to an opposite to Vu the photon moving vertically wrt point A, also, will not undergo any horizontal displacement. If the photon moving vertically wrt point A was resolved to its vertical and horizontal components it would have a vertical component of C and a zero horizontal component.

In the time Ttop the photon will move a distance Ttop x C down the collimator. As D = L (the length of the collimator) It is a trivial matter to see that Ttop x C is equal to L (the length of the collimator). In the time the light travels to the stop watch the photon in the collimator traverse the entire length of the collimator.

What time period for the bottom photon to reach the bottom stop watch?

As no point on the red train undergoes a horizontal displacement when the photon arrives at the base of the collimator, the distance from the collimator to the bottom stop watches is D.

Whilst the strobe photon is in flight down the collimator all entities (including the stop watch and collimator) will remain at rest wrt point A, and undergo no horizontal displacement.

Whilst the photon from the bottom light is in flight to the bottom stop watch the collimator, light and stop watch will not undergo any horizontal displacement.

The time it takes for the photon from the bottom light to transit to the bottom stop watch is the same as for the top stop watch.

Tbot = D/C

Timing?

Therefore the top stop watch does not record the time the photon took to traverse the collimator. It is a trivial matter to show the time difference between the top stop watch and the bottom stop watch will be just the time it takes the photon from the bottom light to transit to the bottom stop watch which is D/C or L/C.

T_Diff_Red = Tbot

T_Diff_Red = D/C

From the note below L = D so replacing gives

T_Diff_Red = L/C

Note the time difference is not a function of Vk or Vu.

Summary

In the time the photon from the top light took to move to the top stop watch, at C, the strobe photon in the collimator traversed the entire length of the collimator (L) at velocity C. As the distance from the collimator to the stop watch is L, the length of the collimator is L and both photons are travelling at C. Not a single entity has a horizontal component as Vk is exactly cancelled by Vu.

Reading the red stop watches

The stop watches could be read by someone at rest wrt the red train, or at rest wrt point B.

Because 2 stop watches are used the possibility exists that reading the stop watches could cause an error, as the person reading the stop watches is subject to the vector Vu, if they are at rest wrt the point B. The top stop watches sits vertically above the bottom stop watch.

Despite who reads the stop watches, if both stop watches are compared from a point vertically mid way between each stop watch, no error will occur and the true time will be recorded, which will agree with the above results.

Black train stop watch analysis

Referring to fig 7. After the strobe triggers a photon will travel from the strobe to the aperture on the black train collimator. In order for a photon to traverse from point A to the black train it must have a horizontal component equal to or greater than Vu.

<u>Strobe photon - point A to collimator</u>

As the black train is subject to the unknown vector Vu, in the time a photon transits from where the strobe triggered (point A) to the aperture on the black train collimator, the black train will undergo a horizontal displacement of Vu in the direction Vu.

The photon from the point A will trace a straight line, from point A, to the point where it eventually enters the aperture on the black train collimator. Lest call this line Q. The photon from point A will travel along Q at C (the speed of light. If a vector is drawn along Q , pointing in the direction of the black train, of a length C (the speed of light).That vector can be resolved into its vertical and horizontal components as shown in fig 7.

As can be seen a photon on the line Q undergoes a horizontal and vertical displacement, both of which are less than C.

Collimator and top stop watch horizontal displacement

The black train and the black train stop watch are subject to the unknown vector Vu.

As a photon transits from the top light to the top stop watch, the collimator and stop watch, and all points connected to the black train, will undergo a horizontal displacement in the direction of Vu of magnitude Vu.

The distance between the collimator and the stop watch is D. By the time the top light photon reaches the top stop watch , the top stop watch would have moved a distance in the direction Vu. As a result the top light photon will travel a distance less than D, before it interacts with the top stop watch.

The distance travelled will be

D’ = D – (Ttop x Vu)

The time taken will be D’/C

Top light photon transit to top stop watch

As the top stop watch is the same height as the light on the top of the collimator. The photon travelling from the top light on the collimator, to the top stop watch will not undergo a horizontal or vertical displacement. As photons are not ballistic in nature the vector Vu will have no influence on this photon.

Collimator horizontal displacement

As the train and collimator are subject to the unknown vector Vu. As the strobe photon transits down the collimator, the collimator will undergo a horizontal displacement in the direction Vu and at a magnitude Vu. As already mentioned the strobe photon travelling down the collimator has a horizontal component in the direction of Vu and a magnitude of Vu.

The horizontal component of the photon travelling down the collimator is the same as the horizontal component of the collimator. If that was not the case the photon would collide with the sides of the collimator and not reach the base of the collimator. The collimator would not work.

Bottom light photon transit to bottom stop watch

As the bottom stop watch is the same height as the bottom light, the photon travelling from the bottom light to the bottom stop watch will not undergo a horizontal or vertical displacement.

Further as photons are not ballistic in nature the vector Vu will have no influence on this photon.

Collimator and bottom stop watch horizontal displacement

As the train and the stop watches are subject to the unknown vector Vu. As the photon transits from the bottom light to the bottom stop watch, the collimator and stop watch, and all points connected to the black train, will undergo a horizontal displacement in the direction of Vu, of magnitude Vu.

The analysis for the bottom light and stop watch will be identical to the top light and stop watch. Specifically

The distance travelled will be

$$\text{D}' = \text{D} - (\text{Tbot} \times \text{Vu})$$

The time taken will be D'/C

Time of flight top light to top stop watch

As a result of the displacement of the top stop watch and collimator caused by Vu. The time it takes for the photon to transit from the top light to the top stop watch will be

$$\text{Ttop} = (\text{D} - (\text{Ttop} \times \text{Vu}))/\text{C}$$

Note D = L so

$$\text{Ttop} = (\text{L} - (\text{Ttop} \times \text{Vu}))/\text{C}$$

$\text{Ttop} = (\text{L} - (\text{Ttop} \times \text{Vu}))/\text{C}$ simplifies to

$$\text{Ttop} = \text{L}/(\text{Vu} + \text{C})$$

Time of flight collimator

As a result of the displacement of the collimator caused by Vu. As the photon from the strobe has both a vertical and horizontal component. The strobe photon will move down the collimator at a rate of Vv, (see fig 7). The distance the strobe photon will move down the collimator in time Ttop is

$$\text{Tdist} = \text{Vv} \times \text{Ttop}$$

Or

$$\text{Tdist} = [\text{L}/(\text{C} + \text{Vu})] \times \text{Vv}$$

The distance remaining to be traverse by the strobe photon, in the collimator, after time Ttop will be

$$\text{Dremain} = \text{L} - \text{Tdist}$$

The time to traverse the distance Dremain, at Vv, will be

$$\text{Trem} = \text{Dremain}/\text{Vv}$$

Or

Trem = [L – (Vv x [(L – (Ttop x Vu))/C])]/Vv

In the time Trem the distance D between the collimator and the bottom stop watch will not change as the collimator, bottom light and bottom stop watch all undergo the same horizontal displacement of Vu in that time.

Time of flight bottom stop watch

In the time that a photon from the bottom light transits to the bottom stop watch, the bottom stop watch will experience a horizontal displacement of in the direction Vu at Vu. The time taken for a photon to move from the bottom light to the bottom stop watch will be

Tbot = (D – (Tbot x Vu))/C

Tbot will be equal to Ttop.

The time difference on the black stop watches will be.

T_diff_black = Tbot + Trem

Plugging in values

Time of flight to stop watch

Tbot = Tbot = L/(C + Vu)

If Vu = 200 000 000

C = 300 000 000

L = 10 m

Tbot = Ttop = 10/500 000 000 s

Vv

From fig 7

If L = 10

Vu = 200 000 000

As Vv = squareroot [(C x C) – (Vu x Vu)] the vertical displacement of the photon in the Black train (Vv) is

Vv = squareroot(300 000 0000 – 200 000 000) = 233 606 000 m/s

Time of flight collimator

The distance the photon will move down the collimator in time Ttop is

Tdist = Vv x Ttop

Or

Tdist = [L/(C + Vu)] x Vv

If L = 10

Vu = 200 000 000

Vv = 233 606 000

The result is

Tdist = (10/500 000 000) x 233 606 000 = 4.67212 m

The distance reaming to be traverse by the photon in the collimator will be if L = 10

Dremain = L – Tdist = 10 - 4.67212 = 5.32788m

When the top stop watch started. the photon on the black train was = 4.67212 m down the black train collimator. The distance to the bottom of the collimator is 10 - 4.67212 m or 5.32788 m

The time it will take for the photon in the collimator to traverse the remaining portion of the collimator 5.32788 m, at the rate Vv, is the distance to travel divided by the vertical velocity of the photon

Trem = Dremain /Vv

Or

Trem = [L – (Vv x [(L – (Ttop x Vu))/C])]/Vv

If L is 10 m

Vu is 200 000 000 m/s

Vv = 233 606 000

Trem = 5.32788 /223 606 000 s

Bottom stop watch

Once the photon reaches the bottom of the collimator a pulse is fired at the bottom stop watch. As the bottom stop watch is equidistant to the top stop watch the time of flight will be the same as the top stop watch.

Summary

From the above

T_diff_black = Tbot + Trem

Tbot = 10/500 000 000s

Trem = 5.32788 /223 606 000 s

so

T_diff_black = 5.32788 /223 606 000 s + 10/500 000 000s

And

T_diff_red was L/C or 10/300 000 000

Final analysis

The question is is T_diff_black > T_diff_red? or is [5.32788 /223 606 000 + 10/400 000 000] more than 10/300 000 000?

Converting to the same denominator

Trem = 5.32788 /223 606 000 = 7.1481266/300 000 000

Tbot = Ttop = 10/400 000 000 = 7.4/300 000 000

adding

T_diff_black = 7.1481266/300 000 000 + 7.5/300 000 000 = c 14.6/300 000 000

14.6/300 000 000 is circa 40% greater than 10/300 000 000 which means the time difference on the black train is substantially more than the time difference on the red train, which proves the theory.

Further observations

Wrong place

If the red train is moving at Vk , and Vk = Vu (at rest wrt point A), but the red train is not vertically below at point A, and is instead at some other point. Then, the photons from the strobe will have to move horizontally to enter the aperture of the collimators on the red train.

However, as Vk = Vu the red train will not at any stage undergo a horizontal displacement, but the photon entering the aperture are. As a result the photon will collide with sides of collimators, and the collimator will not work.

The collimators not working would possibly indicate that the red train is moving at Vu.

Optimisation

The experiment could be optimised by making the stop watches as close as possible to the collimators and making the collimators very long.

Conclusion

The red train is driven at all different constant velocities, in different directions and the experiment is conducted over and over. As the red train approaches the direction of Vu and as the speed of the red train approaches the value Vu, the time difference on the red train stop watches will incrementally decrease, until the time difference reaches a minimum value, after which it will start to increase. The time difference will converge on a minimum value. This is the point where the red train's velocity wrt the train tracks exactly equals Vu and the direction of the red train is exactly opposite to Vu.

If the red train is going faster than Vu then the time difference will start to increase again. By finding the minimum value it is possible to find the magnitude and direction of Vu without reference to external phenomena, simply by measuring Vk and the direction of Vk.

As Vk approaches Vu the net horizontal displacement of the red train decreases gradually to zero. As a consequence the time difference on the red train becomes less and less until the minimum time is found. The same occurs but in reverse as Vk gradually , after finding the minimum, gradually increases as Vk becomes more than Vu.

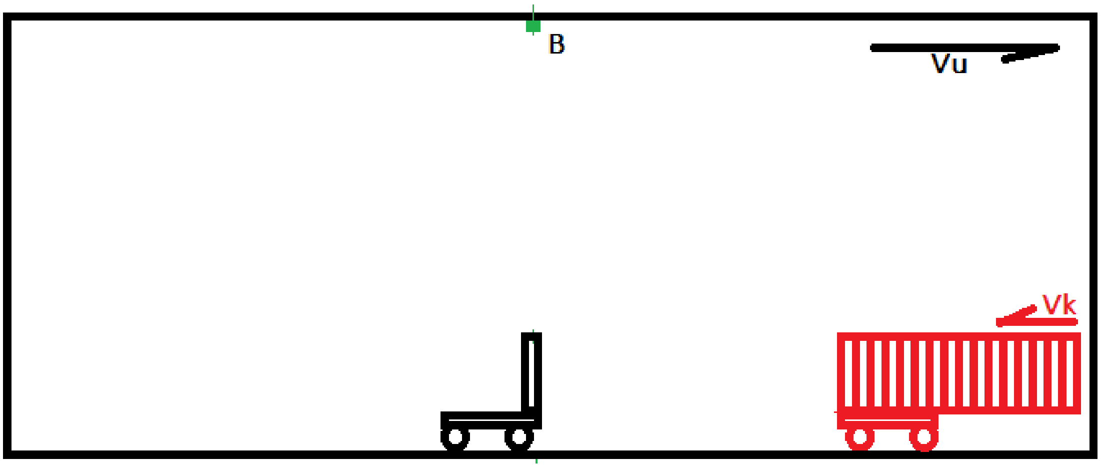

Fig 1

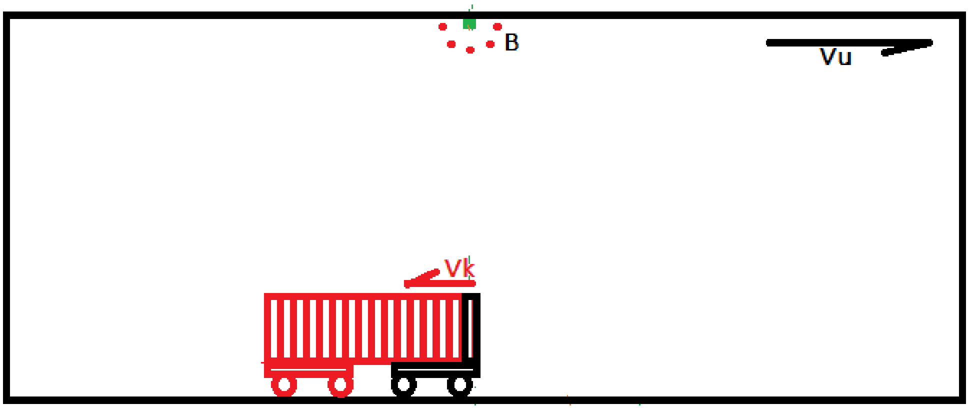

Fig 2

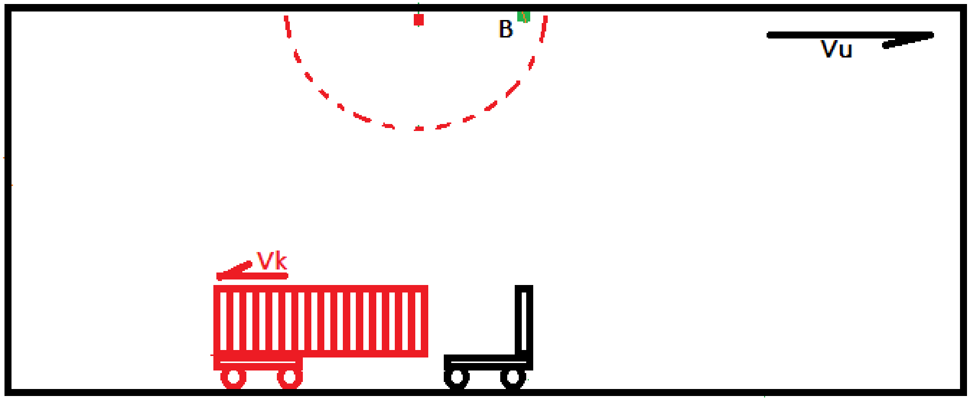

Fig 3

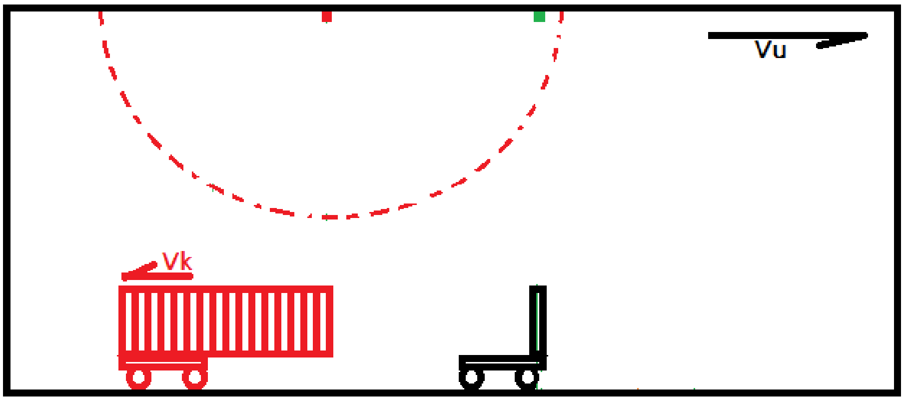

Fig 4

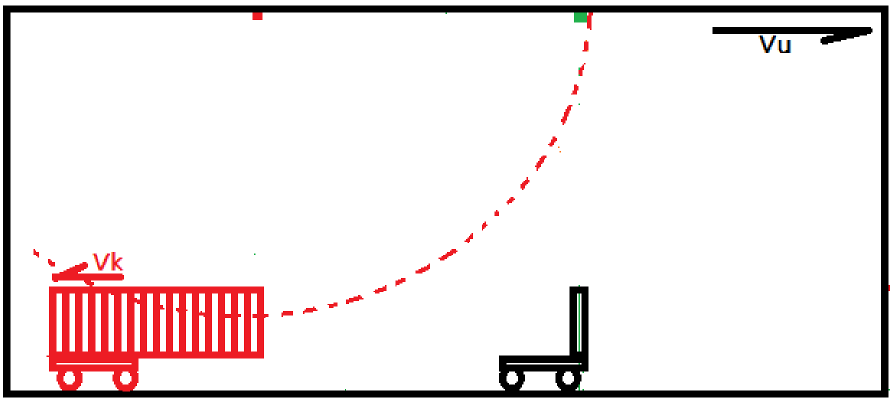

Fig 5

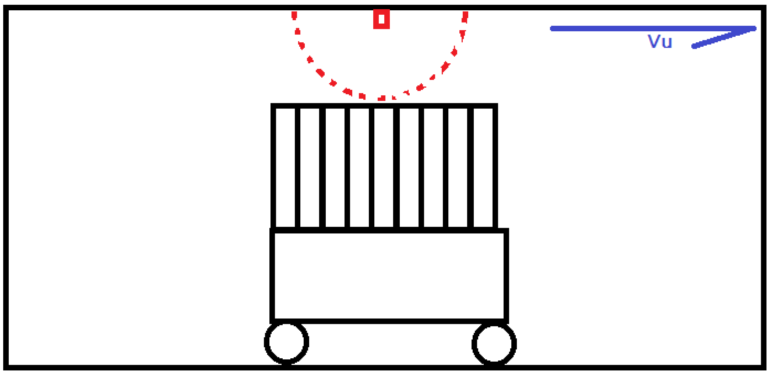
Vu

Fig 6

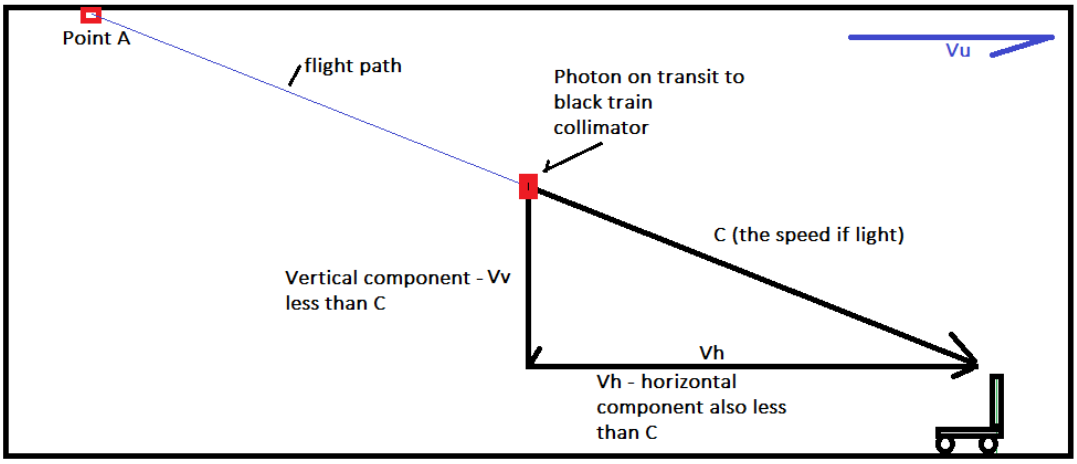
Point A
flight path
Photon on transit to black train collimator
Vu
C (the speed if light)
Vertical component - Vv less than C
Vh
Vh - horizontal component also less than C

Fig 7

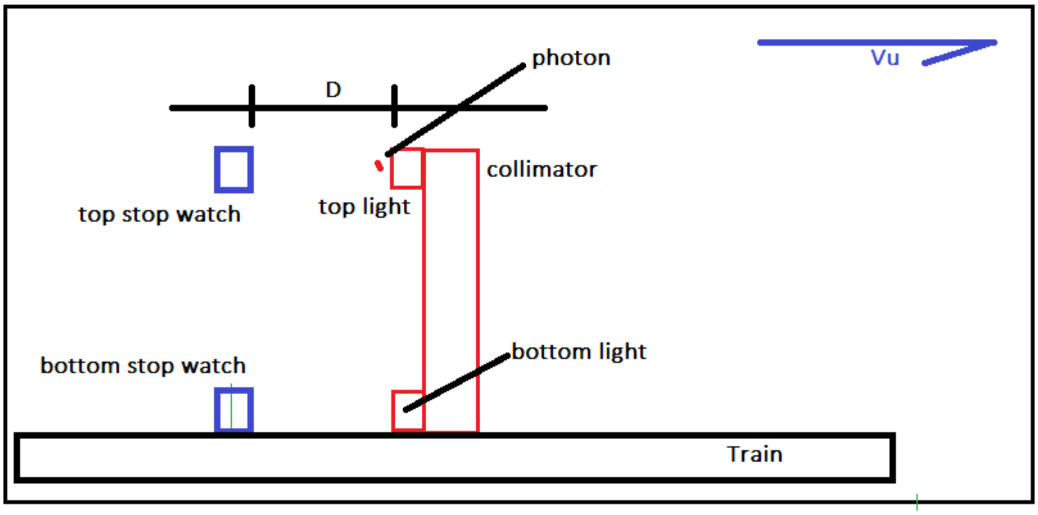
photon
Vu
D
top stop watch
top light
collimator
bottom stop watch
bottom light
Train

Fig 8

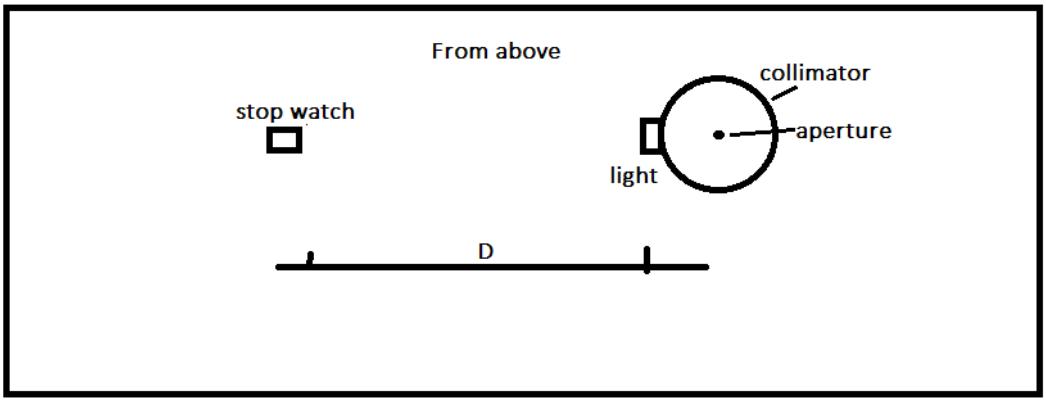
From above
collimator
stop watch
aperture
light
D

Fig 9

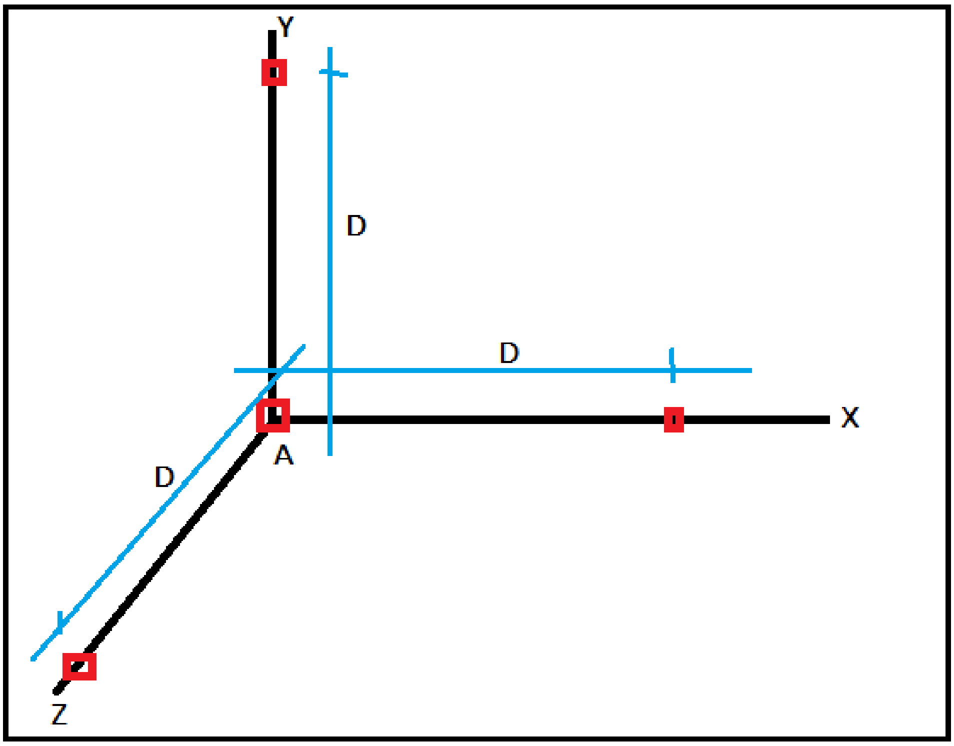

Fig 10

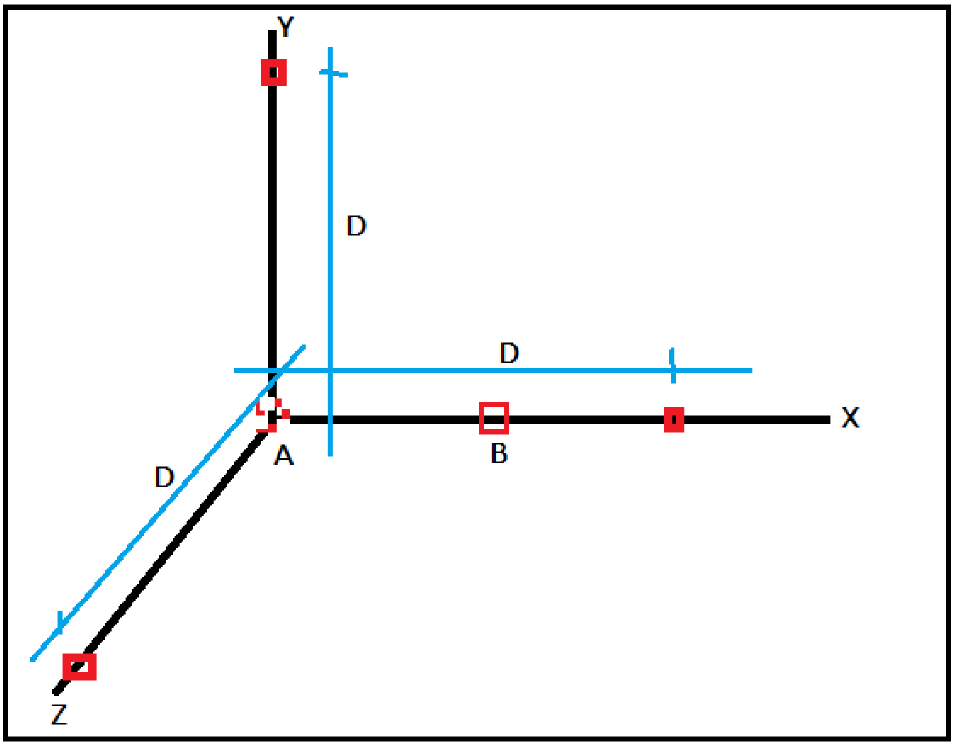

Fig 11

The end