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Sagnac's Voodoo

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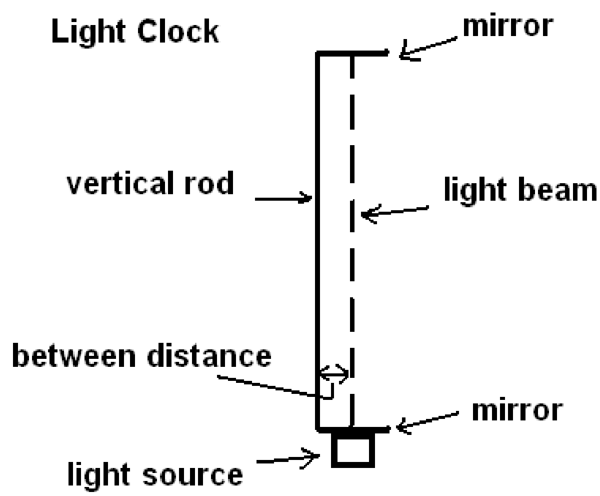
Abstract

Applying the Paritas Hypothesis to the Sagnac experiment to demonstrate that with the turntable turned OFF exclusion measurements are made, and with the turntable turned ON mixed measurements (for relative motion) are made, and that the two types of measurements can not be compared because exclusion measurements represent velocity vectors, but mixed measurements represent non-velocity vectors (the old apples and oranges). Sagnac's voodoo is the Schwalm Switch in action.

Statement 1

A light clock is a vertical rod with a light source and a mirror attached at one end and a mirror attached at the other end. The light clock has a "between distance", which is the distance between the vertical rod and the light that travels from the source up to the mirror at the other end.

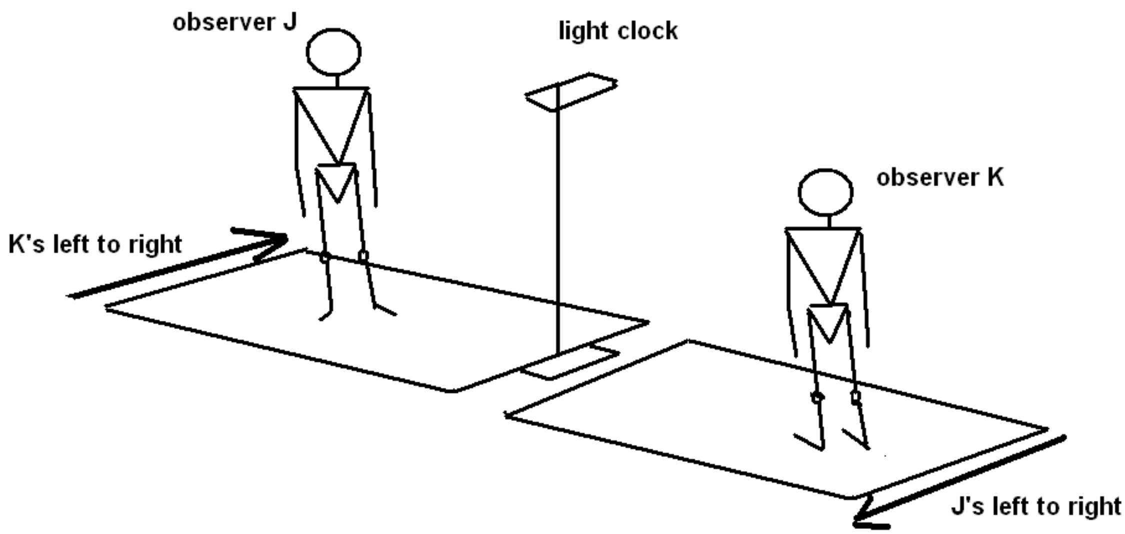
Diagram 1



Statement 2

The light clock is in the inertial reference frame of an observer called J, who is at rest with respect to the light clock. The light clock is not in the reference frame of another inertial observer called K. To observer K, the light clock and observer J appear to travel at constant speed in a straight line from observer K's left to right, and to observer J it is observer K who appears to travel at constant speed in a straight line from observer J's left to right.

Diagram 2



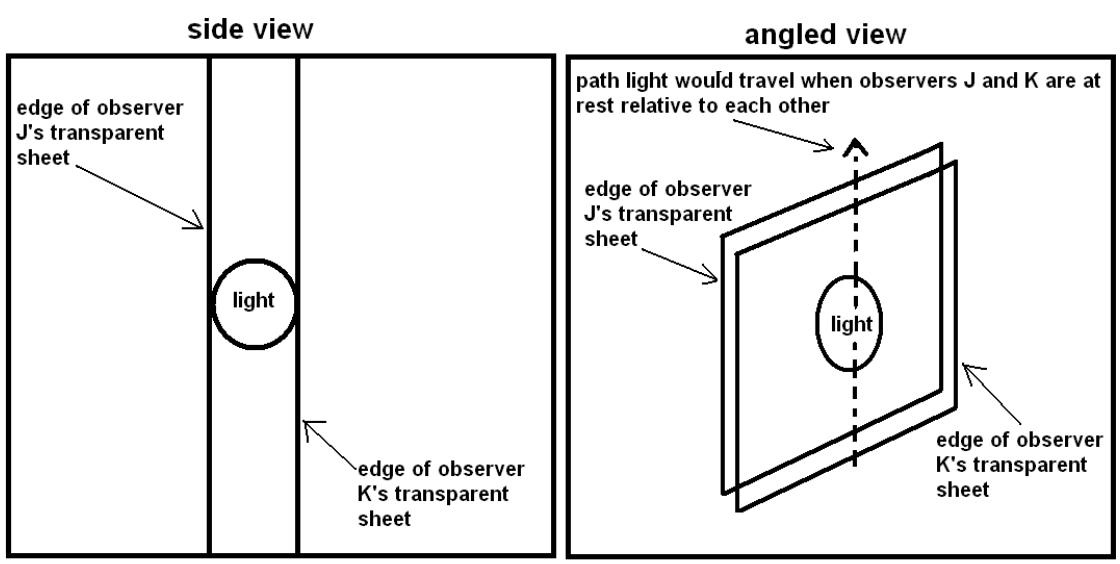
Note 1

Remember, the light clock has a “between distance”.

Statement 3

Observer J has a transparent sheet, and observer K has a transparent sheet. The light of the light clock is sandwiched between the two transparent sheets, and is touching both transparent sheets.

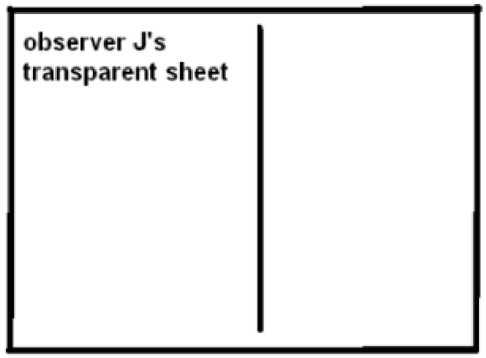
Diagram 3



Statement 4

The light of the light clock leaves a burn mark on the transparent sheets. According to both observers J and K, because the light clock is in observer J’s reference frame, a vertical burn mark appears on observer J’s transparent sheet, and the “between distance” (the distance between the light and the vertical rod of the light clock) does not change.

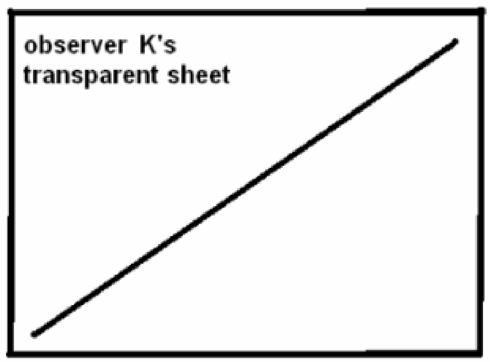
Diagram 4



Statement 5

According to both observer J and K a diagonal burn mark appears on observer K’s transparent sheet.

Diagram 5



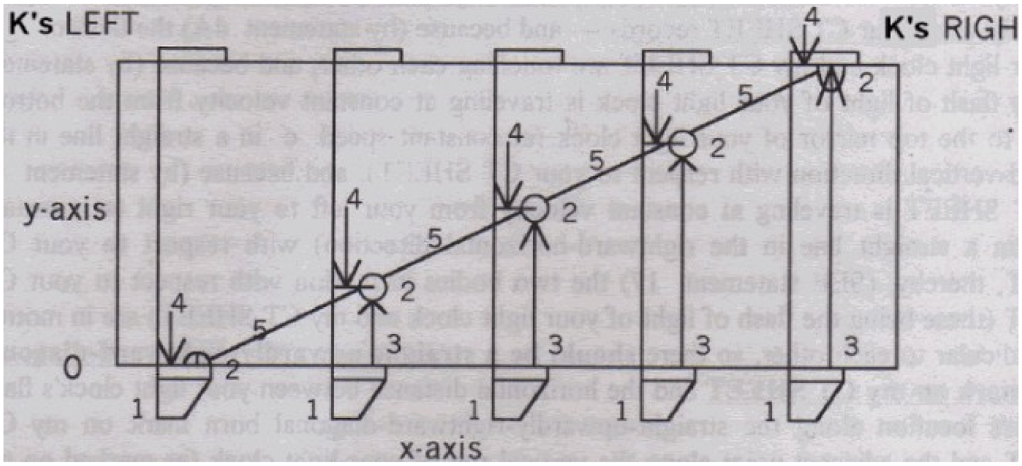
Statement 6

To observer J the diagonal burn mark on observer K’s transparent sheet contains two measurements: one is that of the light traveling from the bottom mirror to the top mirror of the light clock without the “between distance” changing, and two is that of observer K and his transparent sheet traveling at constant speed in a straight line form observer J’s left to right. The diagonal burn mark is a mixed measurement and is a non-velocity vector: it represents the relative motion of the light (in the vertical direction) and observer K (in the horizontal direction) with respect to each other.

Note 2

In Diagram 6 below, O is the origin of K’s coordinate system; 1 is J’s light clock; 2 is the light of J’s light clock; 3 is the vertical burn mark on J’s on J‘s transparent sheet; 4 is the “between distance”; 5 is the diagonal burn mark and path on K’s transparent sheet. Check out that “between distance” from K’s point of view: it does not change.

Diagram 6



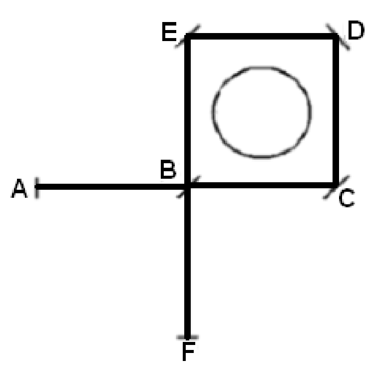
Statement 7 (the Schwalm Switch)

When observer K explains the diagonal burn mark on observer K’s own transparent sheet, at first, observer K thinks the diagonal burn mark contains two measurements: one is that of the light traveling from the bottom mirror to the top mirror of the light clock without a change in the "between distance", and two is that of observer J (with transparent sheet, and light clock) traveling at constant speed in a straight line form observer K’s left to right. But this can NOT be the case because observer J’s transparent sheet is not touching observer K’s transparent sheet. Observer K is faced with a dilemma: either the motion of the source is imparted to the light, which it can not be since the “between distance” did not change, or, contrary to the Inertial Tendency (an inertial observer tends to think of himself as at rest even when there is nothing with respect to which this relative state can be expressed, giving V = 0, and c + V = c + 0 = c) observer K detected his own motion. Since the light is touching observer K’s own transparent sheet, observer K is forced logically into the conclusion that he has in fact detected the relative motion of two bodies with respect to each other, where one of the bodies is the light of the light clock and the other body is himself (and his transparent sheet). The diagonal burn mark on observer K’s transparent sheet is a mixed measurement and a non-velocity vector: it represents the relative motion of the light (in the vertical direction) and observer K (in the horizontal direction) with respect to each other (called relative motion).

Statement 8

We are going to use a Sagnac apparatus, which is a square affixed to a turntable, and affixed to the square is a light source A, and a half silvered mirror B, called a splitter, and three mirrors, C, D, and E set at the corners of the square, called corner mirrors, and a detection screen F. The turntable is affixed to the surface of the Earth.

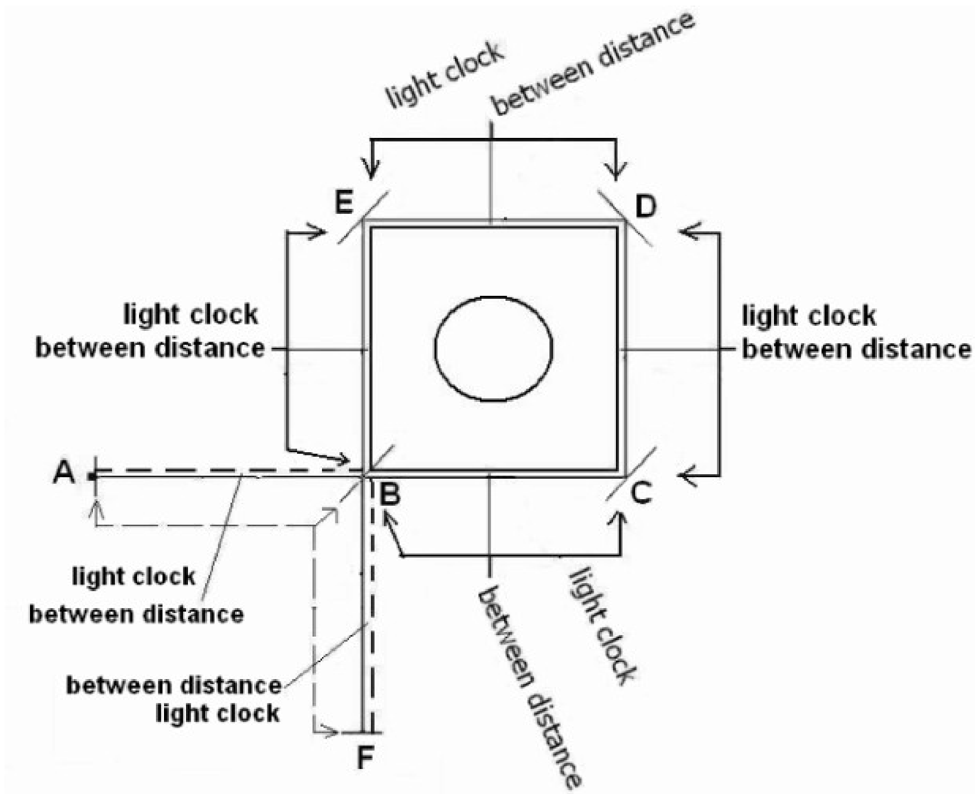
Diagram 7



Statement 9

If we wanted to, we could show how the Sagnac apparatus represents light clocks. On the square platform of the Sagnac apparatus we paint a line inset from the edge. This inset line along each side of the square platform is analogous to the vertical rod of a light clock (see Statement 1 above). This inset line along with the mirrors and splitter are analogous to having a light clock along each side of the Sagnac apparatus. Extending the inset line from B to A, and from B to F, makes AB and BF analogous to light clocks. Since a light clock consisting of a rod with a mirror attached at each end has a “between distance” (see Statement 1 above), it follows that the distance between the inset line and the edge of the square is analogous to the “between distance“.

Diagram 8



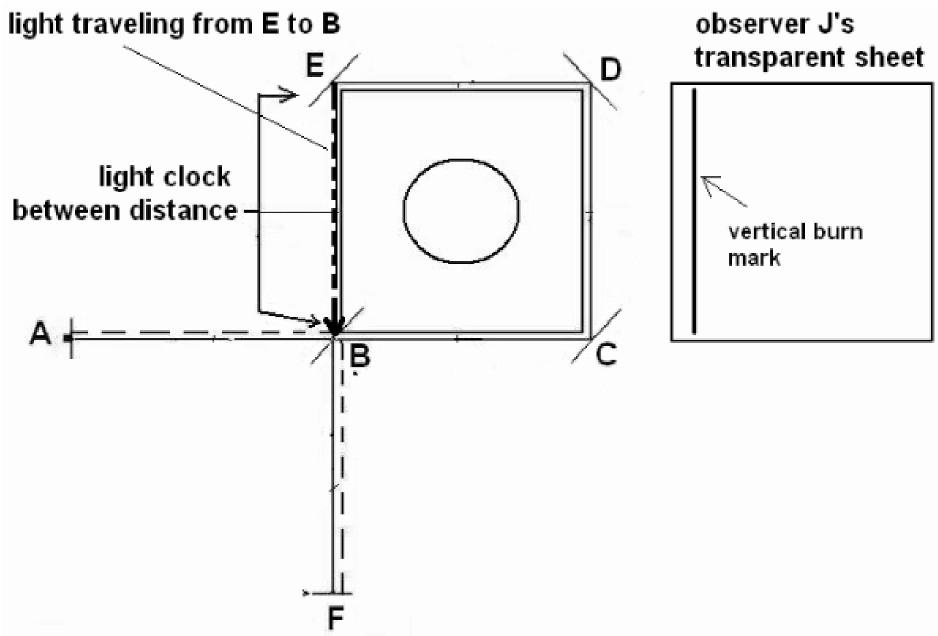
Statement 10

An observer J is affixed to the Sagnac apparatus. Observer J and the apparatus are at rest relative to each other when the turntable is OFF and when the turntable is turned ON. This makes him similar to observer J in the light clock example given above.

Statement 11

If we wanted to, we could use a transparent sheet with observer J in the Sagnac experiment just as we did in the light clock example. We affix observer J’s transparent sheet to the Sagnac apparatus such that the light touches and leaves a burn mark on observer J’s transparent sheet. Since observer J is affixed to the apparatus, and since observer J and the apparatus are at rest relative to each other, the light will leave a vertical burn mark on observer J’s transparent sheet when traveling in the counter-clockwise direction from E to B.

Diagram 9



Statement 12

Just as in the light clock example, the vertical burn mark on observer J's transparent sheet is an exclusion measurement representing the motion of the light (with respect to observer J and his transparent sheet) and represents a velocity vector (for the light).

Statement 13

The above line of reasoning applies to all the segments (AB, BC, CD, DE, EB, and BF) in the counter-clockwise direction according to observer J (affixed to the apparatus).

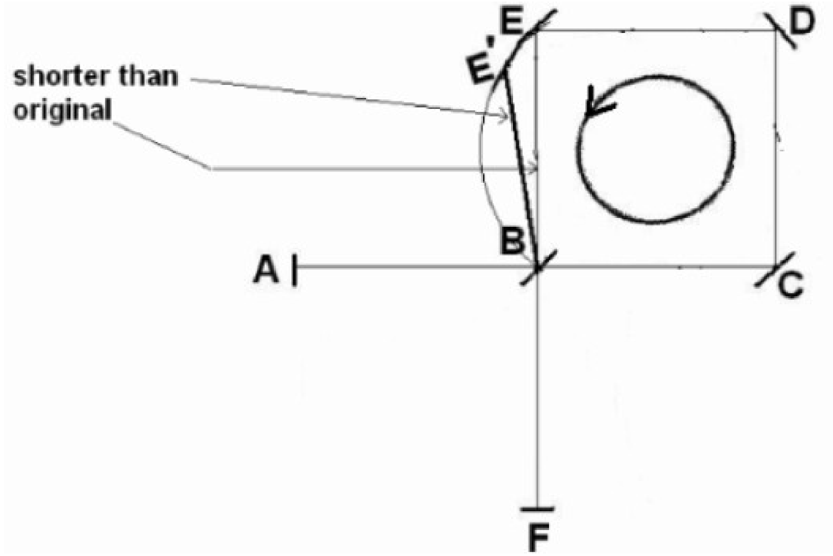
Statement 14

An observer K is affixed to the Earth (such as you and I reading this paper), and observer K and the apparatus are at rest relative to each other when the turntable is turned OFF, but when the turntable is turned ON observer K and the apparatus are in motion relative to each other. This makes him similar to observer K in the light clock example given above.

Statement 15

To observer K, when the turntable is turned ON, it turns counter-clockwise, and the corners of the apparatus sweep out arcs as the square rotates. Using two of the corners, such as B and E, as the square rotates, and the corners sweep out arcs, such that E is moving towards B's original position, a line drawn from B's original position to a point along the arc swept out by E is shorter than the original distance between B and E (observer J does not see any of this because observer J is affixed to the square, so the square and observer J are always at rest relative to each other).

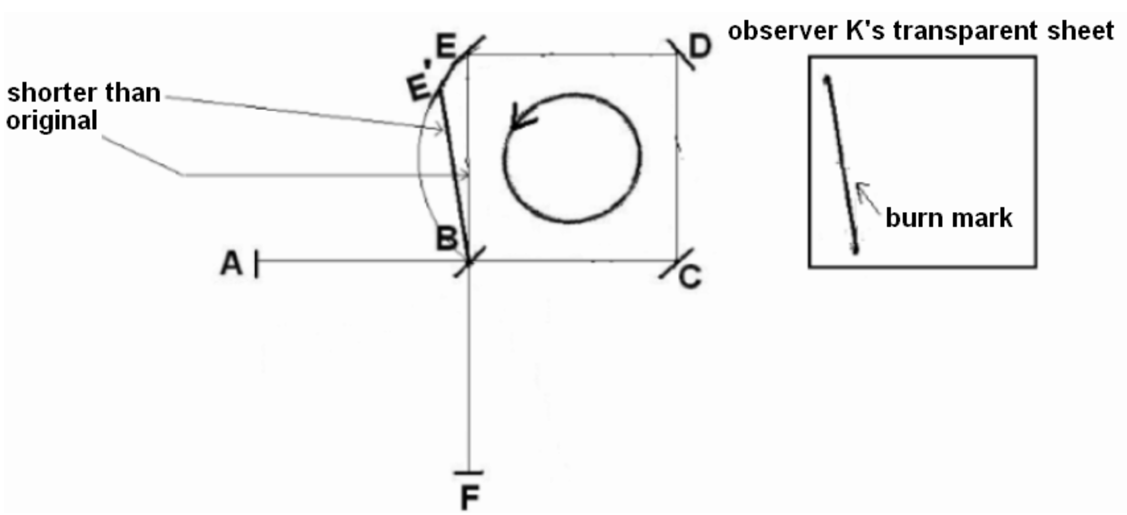
Diagram 10



Statement 16

If we wanted to, we could use a transparent sheet with observer K in the Sagnac experiment just as we did in the light clock example. We position observer K's transparent sheet above the apparatus and affix it to the Earth such that the light touches and leaves a burn mark on observer K's transparent sheet. Since observer K is affixed to the Earth, and since observer K and the apparatus are in motion relative to each other, the light will leave a diagonal burn mark on observer K's transparent sheet when traveling in the clockwise direction from B to E'.

Diagram 11



Statement 17 *the Schwalm Switch)

Just as in the light clock example, observer K is forced logically into the conclusion that the diagonal burn mark on his transparent sheet is a mixed measurement representing the relative motion of two bodies with respect to each other, where one of the bodies is the light and the other body is observer K himself. The diagonal burn mark on observer K's transparent sheet is a mixed measurement and a non-velocity vector: it represents the relative motion of the light (in the clockwise direction) and observer K (in the counter-clockwise direction) with respect to each other (called relative motion).

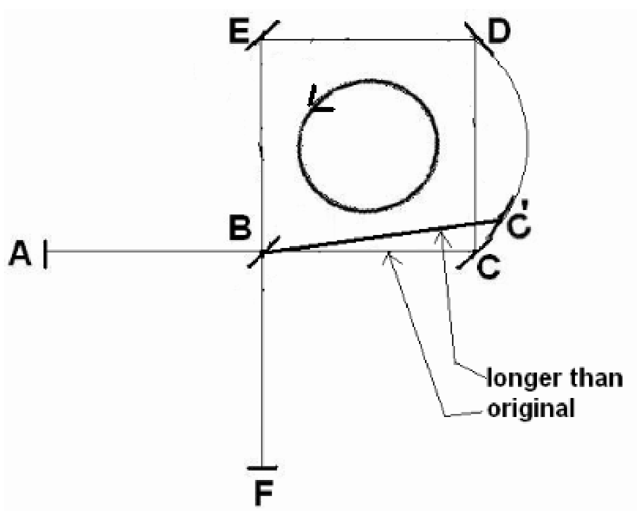
Statement 18

The line of reasoning in statements 14 - 17 applies to all the segments (BE', ED', DC', and CB') in the clockwise direction according to observer K (affixed to the Earth).

Statement 19

When the turntable is turned ON, turning counter-clockwise with the corners sweeping out arcs as the square rotates, using the two corners B and C, such that C is moving away from B's original position according to observer K, a line drawn from B's original position to a point along the arc swept out by C is longer than the original distance between B and C (observer J does not see any of this because observer J is affixed to the square, so the square and observer J are always at rest relative to each other).

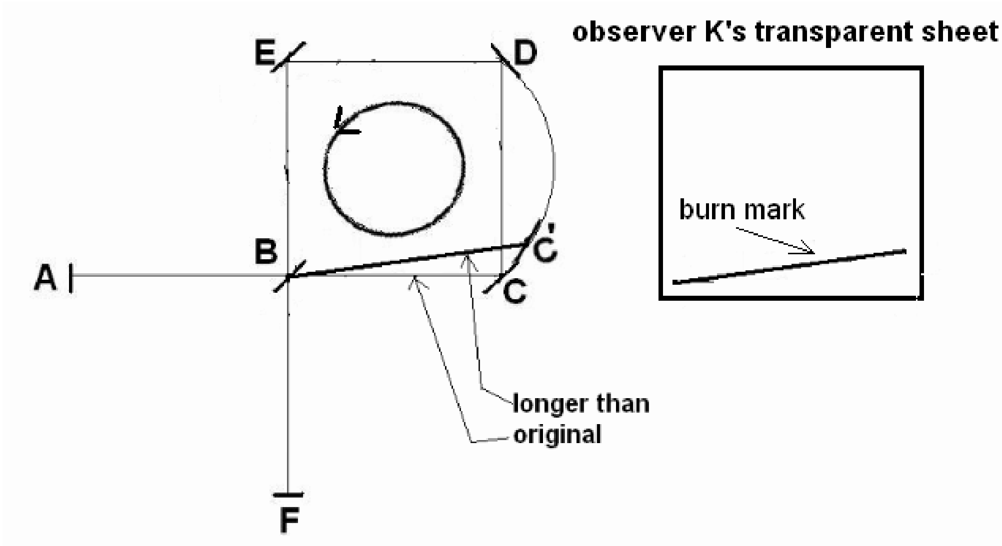
Diagram 12



Statement 20

The light traveling in the counter-clockwise direction from B to C' leaves a burn make on observer K's transparent sheet.

Diagram 13



Statement 21 (the Schwalm Switch)

Just as in the light clock example, observer K is forced logically into the conclusion that the diagonal burn mark on his transparent sheet is a mixed measurement representing the <u>relative motion</u> of two bodies with respect to each other, where one of the bodies is the light and the other body is observer K himself. The diagonal burn mark on observer K's transparent sheet is a mixed measurement and a non-velocity vector: it represents the <u>relative motion</u> of the light (in the counter-clockwise direction) and observer K (in the counter-clockwise direction) with respect to each other (called <u>relative motion</u>).

Statement 22

The line of reasoning in statements 19 - 21 applies to all the segments (AB', BC', CD', DE', EB', and BF') in the counter-clockwise direction according to observer K (affixed to the Earth).

Statement 23

Any line of reasoning that uses the light having a shorter distance to travel along the segments of the clockwise direction (BE', ED', DC', and CB') and/or uses the light having a longer distance to travel along the segments of the counter-clockwise direction (AB', BC', CD', DE', EB', and BF'), involves observer K's point of view for which the Schwalm Switch happens, and the measurements made are mixed measurements that are non-velocity vectors and represent the <u>relative motion</u> of two bodies with respect to each other.

Statement 24

For observer K's point of view, since relative motion is being recorded, it is wrong to say the light arrives at the detector F because what really happens is the light and detector F arrive at each other.

Statement 25

With the turntable turned OFF we can say the light starts off in the counter-clockwise direction, then at the splitter B is split into two separate lights, which we will call light 1 and light 2. Light 1 then travels in the clockwise direction until it arrives back at B, then light 1 travels in the counter-clockwise direction to the detector F. So light 1 travels counter-clockwise, then clockwise, then counter-clockwise, which we can call the combo direction. Light 2 travels from the splitter B in the counter-clockwise direction until it arrives back at B, then travels in the counter-clockwise direction to the detector F. So light 2 travels in the counter-clockwise direction.

Statement 26

For light 1, even though the detector F is recording a fringe patter (or phase pattern, or an interference pattern, or whatever we are calling it), the measurement represents a mixed measurement and a non-velocity vector of the relative motion of two bodies with respect to each other (these being light 1 and observer K). For light 2, even though the detector F is recording a fringe patter (or phase pattern, or an interference pattern, or whatever we are calling it), the measurement represents a mixed measurement and a non-velocity vector of the relative motion of two bodies with respect to each other (these being light 2 and observer K).

Note 3

You have to measure the same thing using the same type of system of measure (which is contained in the Taylor Rule of the Paritas Hypothesis) or your comparing apples and oranges.

Statement 27

We can NOT compare measurements made when the turntable was turned OFF, which were exclusion measurements representing velocity vectors, to measurements made when the turntable was turned ON, which were mixed measurements of relative motion representing non-velocity vectors, because the measurements are different types of measurements (apples and oranges).

Statement 28

The Sagnac experiment in no way demonstrates that the motion of the light source is imparted to the emitted light, because once the turntable is turned On the apparatus can no longer make the required type of measurement (exclusion measurement), and instead makes a relative motion measurement, a mixed measurement, representing a non-velocity vector.