Double Observation

The current belief is that there is no such thing as an absolute velocity or an absolute position. Another way of saying it is that velocity can only be measured in terms of comparison with other object. After consider some aspects of Special Relativity, there appears to be a method of measuring absolute speed. I call it double observation.

1. Sally put Tom on a trolley in front of her. She can move him to the right or left.

2. On the trolley with Tom is a second trolley. Mounted on that second trolley is a bar one meter long. With Tom in front of Sally and they are motionless with respect to each other, they both measure the bar and agree on its length.

3. Presume the bar is very thin, maybe on the order of one or a few atoms thick.

4. In front of the bar is a wall. The bar is very close to the wall but not touching. Again, maybe a few atoms distance from the wall. This is a theoretical discussion so please disregard interactions between the bar and the wall. So let us make the distance between them on the order of one photon.

5. Sally has a very fast strobe light. When it flashes the exposed wall changes color. The bar casts a shadow and the wall behind the wall does not change color. On her command she can flash the strobe and create a shadow image of the bar.

6. The strobe is under Sally's control and always flashes in her space time reference. The wall is stationary with respect to Sally and is always within her space time reference.

7. The strobe is far enough away from the wall, and it is constructed, focused and aimed directly at the wall, such that within the confines of the one meter bar, the light passes both ends of the bar at the same instance. That is with respect to Sally and her space time reference of course.

8. With Tom and the bar stationary with respect to Sally, Sally flashes the light making a shadow of bar on the wall. Call this shadow A.

9. Tom and Sally both examine shadow A and find it to be exactly one meter long.

10. While Tom is stationary WRT (with respect to) Sally, Tom sends the bar off to his right and brings it past him right to left at ½ the speed of light or 149,896,229 meters per second. Sally causes the strobe to flash at just the right time to generate another shadow on the wall. Call this shadow B.

11. The light and shadow are generated in Sally's space time reference. At this particular time, Tom shares that reference with Sally

12. The length of the shadow is calculated by: Square root of ($1 - V^2 / C^2$)

13. Where the 1 in the equation is the one meter length of the bar. At a speed of ½ C, they expect the shadow to be 0.866 meters long.

14. The both measure the length of shadow B and find it to be exactly 0.866 meters long.

15. Now Sally adds a new twist. She tells Tom to repeat the experiment again, moving the bar at 50% the speed of light.

16. Unknown to Tom, She sends him and his trolley and bar off to her right. She brings him past her at 50% of the speed of light such that the bar passes in front of Tom at the same time Tom passes in front of Sally.

17. Sally triggers the strobe, in her time reference, such that it will again cast another shadow on the wall.

18. Sally, the strobe, and the wall are all in the same space time reference and are stationary with respect to each other.

19. Sally sees the bar traveling at a different speed than Tom. The bar's speed is added to Tom's speed relativisticly as:

20. $w = (u + v) / (1 + uv / c^2)$

21. Sally sees the bar moving at 239, 833, 966.4 meters per second. She calculates the length of the shadow and expects to find a distance of 0.6 meters. The shadow is that length.

22. Now she brings Tom back to the shadow in front of her, returning him to her space time reference. He now measures the length of the shadow expecting to find 0.866 meters.

23. Now that he is back in Sally's time space reference, he finds that the shadow C is only 0.6 meters.

24. Tom can now infer that he was not stationary. Indeed, the only way the shadow could have been 0.6 meters long is if the bar was moving at 239833966.4 meters per second. He runs the calculations and can determine that he was moving at ½ C while he conducted his test with the bar running past him at an apparent speed of ½ C.

25. He now knows he was moving with respect to Sally.

26. Sally tells him to repeat the experiment but to move the bar from left to right. Sally again sends Tom to her right. Sally sees Tom move from her right to her left while Tom moves the bar from his left to his right.

27. From Tom's perspective the bar is moving at about ½ light speed. From Sally's perspective the bar is stationary at the moment Tom passes her. This is the D shadow.

28. Tom expects the shadow to have a length of 0.866 meters. But Sally sees the shadow as being 1 meter long.

29. Sally brings Tom back to her space time reference and he sees that the shadow is longer than he expected.

30. The bar was not moving as fast as he thought. He can determine that he and the bar were moving in opposite directions.

31. When he moved the bar from his right to his left, the shadow was shorter than he expected. When he moved the trolley and bar from his left to right the shadow was longer than he expected.

32. The unexpected length of the shadow provides Tom the ability to calculate his direction and velocity with respect to Sally.

33. In this theoretical test, Sally becomes an absolute velocity reference for Tom.

34. Tom is able to measure the test results and determine that he was moving when shadow B was created.

35. Tom is able to determine that he was moving at ½ C when shadow C was created.

36. But he cannot determine the direction.

37. When he compares shadow D, he can determine the direction.

38. From comparing the lengths of the various shadows, he is able to determine his direction of motion along the axis of the trolley.

39. This indicates that a concept of an absolute zero velocity does exist.

40. There are further ramifications of this theoretical test.