# Conservation Of Time From Parity Symmetry

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(Dated: July 17, 2020)

A parity symmetry can be established between any pair of identical clocks. The rest frames of each clock can also form a parity symmetry. The time of each rest frame is independent of the direction of the motion of each clock. The elapsed time is identical for both rest frames. Consequently, the elapsed time is conserved in all reference frames. Conservation of elapsed time is a property of parity symmetry.

## I. INTRODUCTION

The time of one reference frame may be different from the time of another reference frame. The direction of the relative motion between two reference frames casts no effect on the time difference. Place a stationary clock at the origin. Let another identical clock move in any radial direction. The time difference between two clocks does not depend on the choice of the direction due to isotropic symmetry.

Such special property can be clearly demonstrated with parity symmetry. Let two identical clocks travel in the opposite direction so that their motion become mirror image of each other. The physics for one clock should be identical to the physics for the other clock.

## II. PROOF

Consider one-dimensional motion.

### A. Parity Symmetry

Let two identical clocks, $CK_1$ and $CK_2$,be stationary relative to a reference frame $F_3$. The rest frame of $CK_1$ is $F_1$. The time of $F_1$ is $t_1$. The rest frame of $CK_2$ is $F_2$. The time of $F_2$ is $t_2$.

$F_1$ is identical to $F_2$. Therefore,

$$t_1 = t_2 \tag{1}$$

Let $t_3$ be the time of $F_3$. At $t_3 = 0$, let $F_1$ be under acceleration A relative to $F_3$. Let $F_2$ be under deceleration -A relative to $F_3$. $F_1$ becomes a different reference frame from $F_2$

$F_1$ and $F_2$ form a parity symmetry in $F_3$. The motion of $CK_1$ is the mirror image of the motion of $CK_2$. The direction of motion is insignificant in parity symmetry.

The time difference between $F_1$ and $F_3$ is identical to the time difference between $F_2$ and $F_3$ due to the parity symmetry.

$$t_1 - t_3 = t_2 - t_3 \tag{2}$$

From equation (2),

$$t_1 = t_2 \tag{3}$$

The time of $F_1$ is identical to the time of $F_2$ at any time of $F_3$.

### B. Elapsed Time

In general, the synchronization between two clocks is seldom perfect.

$$t_1 = t_2 + K \tag{4}$$

K is a constant due to imperfect synchronization. From equation (4),

$$dt_1 = dt_2 \tag{5}$$

The elapsed time of $F_1$ is identical to the elapsed time of $F_2$.

## III. CONCLUSION

The elapsed time is conserved in all reference frames. The parity symmetry can be established for any pair of reference frames. The symmetry ensures the elapsed time is identical in both reference frames. With perfect synchronization, time can be universal in all reference frames.

The elapsed time for two simultaneous events is zero. Therefore, zero elapsed time in one reference frame is also zero in all other reference frames. Two simultaneous events are simultaneous in all reference frames. Lorentz transformation[1.2.3] incorrectly claims two simultaneous events in one reference frame can not be simultaneous in another reference frame. This is proved to be false. Consequently, the theory of special relativity, which is based on Lorentz transformation, is also incorrect.

Furthermore, any theory that violates the conservation of elapsed time is invalid in physics.

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