

ON GLASS SPHERES AND SPECIAL RELATIVITY

Antonio León Sánchez

Retired Professor. Independent researcher in the foundations of science.

Abstract.—The fact that a very fragile glass sphere cannot undergo multiple and severe deformations simultaneously—as implied by the Lorentz transformation—and without breaking is sufficient to demonstrate the formal inconsistency of the theory of special relativity. And only the falsity of its second fundamental principle can be the cause of that inconsistency.

Keywords: relativistic length contraction, relativistic time dilation, principles of special relativity.

1. Impossible special relativity deformations

Let RF_o be the proper inertial reference frame of S_o , a hollow empty sphere of radius 1 m that is at rest on the X_oY_o plane of said inertial reference frame RF_o . The sphere S_o is an extremely fragile object due to its thin, rigid glass walls (Figure 1, left). In RF_o , the sphere S_o remains stable, without breaking, because no force acts on it except its own weight.

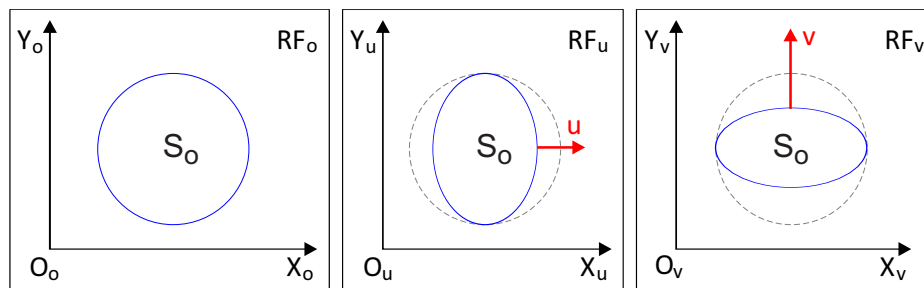


Figure 1 – Left: The fragile glass sphere S_o on the plane X_oY_o of its proper inertial reference frame RF_o . Center and right: Two impossible real and simultaneous deformations of S_o according to Lorentz transformation in RF_u and RF_v . In both cases, for comparison, the undistorted sphere has also been drawn (dashed lines).

Let RF_u and RF_v be two other inertial reference frames whose spatial axes coincide with those of RF_o at a certain instant, and such that, with respect to RF_u , the frame RF_o —and thus the sphere S_o —moves parallel to the X_u -axis of RF_u at a constant velocity u of, for example, $0.5c$ (Figure 1, center). And with respect to the second (RF_v), the frame RF_o , and therefore the sphere S_o , moves parallel to the Y_v -axis of RF_v with a constant velocity v of, for example, $0.75c$ (Figure 1, right), where c is the speed of light in RF_o , RF_u , and RF_v (Second Principle of special relativity).

According to the Lorentz transformation, in RF_u the sphere S_o would actually be shortened in the direction of its relative motion with respect to RF_u : its diameter in that direction, parallel to the X_u -axis of RF_u , would change from 2 m in RF_o to 1.73 m in RF_u . For the same reason, in the case of RF_v that shortening of S_o would go from 2 m in RF_o to 1.32 m in RF_v , now in the direction parallel to the Y_v -axis of RF_v . This implies a double impossibility:

- 1: It is not possible for the fragile sphere S_o to be **SIMULTANEOUSLY** undeformed (in RF_o) and intensely deformed in two very different ways (in RF_u and RF_v).
- 2: The intense deformations of S_o in RF_u and RF_v are not possible without that fragile glass sphere breaking. It also can't be both broken and unbroken at the same time.

But if the laws of physics are the same in all inertial reference frames (First Principle of special relativity), we must conclude that relativistic contractions of space and of the objects contained within that space cannot be real: those objects cannot **SIMULTANEOUSLY** be truly deformed in different ways and not deformed at all. According to those same laws, it is also impossible for objects as fragile as the sphere S_o to be deformed **SIMULTANEOUSLY** in such distinct and intense ways without breaking. Nor, obviously, can those objects be **SIMULTANEOUSLY** broken and unbroken. Consequently, these relativistic deformations of space and of the objects contained within it can

only be apparent, as apparent and false as the apparent and false daily rotation of the Sun around the Earth.

Consequently, the fragile glass sphere S_o must also be a fragile glass sphere, undistorted and of the same size, in all inertial reference frames, regardless of how its proper inertial reference frame RF_o moves relative to each of those other inertial reference frames (generalist, non-relativistic alternative). How is it possible to have spent more than 120 years firmly asserting the opposite and rejecting all dissent? What would need to be done to at least consider the generalist alternative just outlined?

2. Consequences

Let us return to the above inertial reference frames RF_o and RF_u of the previous section. In RF_o , a photon source PS_o is at rest, emitting photons in the direction of the X_o axis of RF_o toward a final screen FS_o located at a distance d_o from its point of emission at PS_o , a distance d_o that each photon travels in a proper time t_o . Consequently, the velocity c of these photons relative to RF_o will be:

$$c = d_o/t_o \quad (1)$$

According to the Second Principle of special relativity, with respect to RF_u , the velocity c of the photons emitted by PS_o will be the same as the velocity c of those photons with respect to RF_o :

$$c = d_u/t_u \quad (2)$$

where d_u is the distance that the photons emitted by PS_o travel with respect to RF_u , and t_u the proper time of RF_u taken by those photons to travel that distance. According to the conclusion of the previous section, the following must hold: $d_u = d_o$, therefore, and now according to (1) and (2), it must also hold:

$$t_u = \gamma_u \left(t_o + \frac{d_o u^2}{c^2} \right) = t_o \quad (3)$$

which holds true only if $u = 0$ and $\gamma_u = 1$. In consequence, the only consistent measurements of distances and times are those made in the inertial reference frame proper to those distances and times; in our case, those made in RF_o . Therefore, the distortions of space and time prescribed by special relativity can only be apparent, i.e., false. The theory of special relativity is, therefore, inconsistent, and the reason for its inconsistency can only be its Second Principle, because the First is confirmed by the overwhelming empirical evidence of the consistent evolution of the observable universe under the control of physical laws.

Note: Measurements of mass and the relationship between mass and energy are not included in this discussion because both can be derived using arguments unrelated to special relativity [7], [4], [1], [6],[5], [2], [3].

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