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Rebuttal to G.D'Abramo Paper "Astronomical Distances and Velocities and Special Relativity"

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Abstract

In a recent paper published in the Annales de la Fondation Louis de Brogle. G.D'Abramo analyses several aspects of special relativity, including the well-known relativistic muon experiments. In the abstract, mr. D'Abramo states that:

"We shall do that by providing a reanalysis of the so-called Andromeda paradox and by revisiting the standard explanation of the muon lifetime dilation given when this phenomenon is observed from muon's perspective".

In the following note we will expose a basic misunderstanding in mr. D'Abramo when it comes to the explanations of the muon lifetime and to Andromeda paradox.

Keywords: muon lifetime, principle of relativity

1. Introduction

Relative to the explanation of the extended muon lifetime, as viewed from a reference frame attached to the Earth, G.D'Abramo states (G.D'Abramo, 2020):

"A spaceship is located at a distance L from the Earth and heads towards our planet at constant velocity v. c. The distance L is intended as measured from the Earth. Suppose that the time L/v needed by the spaceship to reach us is greater than 100 years. According to special relativity, if v is suitably high, the observers on the Earth will measure a time dilation within the spaceship that makes it possible for the astronaut to reach the Earth in a shorter period of his own time, say 8 years. Now, in the reference frame of the astronaut, the same outcome can only be explained with length contraction. In order for the astronaut to reach the Earth in 8 years of his own time, the distance L should be suitably shorter from his perspective. The other possibility, namely that the Earth appears faster to the astronaut, cannot be accepted owing to the principle of relativity. The very same principle of relativity, however, discloses a problem with the length contraction explanation. According to this principle, there is no reason to believe that the spaceship moves and the Earth is a rest. It may well be the other way around. In that case, it should be the distance seen by the Earth to be contracted. At any rate, the distance measured from the Earth should be equal to that measured by the astronaut in the reference frame of the spaceship because nobody can say who is moving and who is at rest".

The basic error in the above thinking is that the distance L is proper distance in the frame of the Earth, so, even if we consider the Earth "rushing" towards the muon, the distance is invariant, it does not "contract" as mr. D'Abramo would want us to think. Therefore, the explanation of the extended life of the muon, as considered from the frame of the Earth, stands.

In the conclusion of his paper, D'Abramo states (G.D'Abramo, 2020):

"Thus, there are concrete elements to believe that something is actually not as it should be in the physical interpretation of Lorentz transformations and the allegedly real physical consequences of special relativity."

But the above statement is based on a basic misunderstanding of proper length as shown. Furthermore, there is also basic misunderstanding of the Andromeda "paradox". There is no "paradox" at all, as explained in the specialty literature. In relativity the *present* is a local concept that cannot be extended to global hyperplanes (D. Mermin, 2005). As noted by D. Mermin (D. Mermin, 2005):

*"*That no inherent meaning can be assigned to the simultaneity of distant events is the single most important lesson to be learned from relativity*".*

2. Conclusion

We have rebutted the incorrect conclusions of the D'Abramo paper by showing the correct application of the theory of relativity, confirmed by a multitude of experiments, contradicts his claims.

References

D. Mermin, (2005). *It's About Time* (Princeton University Press, Princeton)

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