Explanation of How the Speed of Light May be Exceeded without Violating the Requirement of Infinite Energy

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The paper proposes an explanation to the problem of exceeding the speed of light, discussed in a paper by Hill and Cox, who have made an extensive calculation of how the Lorentz transformation might be applicable to velocities larger than the speed of light, provided it would be possible. The solution focuses on the fact that when a moving body, due to the Lorentz transformation, becomes increasingly smaller, the Uncertainiy Principle may be applicable, causing thus velocities larger than speed of light to appear.

Keywords: Special Relativity Theory, Lorentz transformation for velocities larger than speed of light, exceeding the speed of light possible, Uncertainty Relation

1. Theory

J. M. Hill and B. J. Cox propose an extension of Special Relativity theory beyond the speed of light, without being able to explain how particles might be able to develop velocities greater than speed of light, c [1]. They focus on describing how the Lorentz transformation might be applicable for particles exhibiting velocities greater than the speed of light c. Thus far, the opinion has been that surpassing the speed of light requires that the energy of the particle exceeds infinity, which is, of course, impossible, since infinity is a concept for something that is by definition impossible to exceed. However, it may be observed that in the process of increasing the velocity, the Lorentz transformation describes how the moving object becomes increasingly smaller. At some point the extension in the direction of movement becomes so small that the Uncertainty Relation becomes relevant, as otherwise treated [2], [3]:

$$\Delta x \times \Delta p \geq h \tag{1}$$

For some Δx then,

$$\Delta p \geq mc \tag{2}$$

Since Eq. 2 is regarded to be a natural law, it follows that due to the smallness of Δx , the momentum may jump so much between two measurements that the speed of light is exceeded, but without touching the speed of light. One may describe the event by saying that the object is tunneling between the below speed of light region and the above speed of light region.

From Quantum Mechanics it is already well-known that the usual deterministic laws cease to exist. Hence, there will be no problem in connection with the process of surpassing the speed of light. It will just happen with some non-vanishing probability.

REFERENCES

1. James M. Hill, Barry J. Cox, *Einstein's special relativity beyond the speed of light*, Proc. R. Soc. A, doi:10.1098/rspa.2012.0340
2. D. Park, *Introduction to the Quantum Theory*, Mc Graw-Hill, 197, p. 49
3. R. T. Weidner, R. L. Sells, *Elementary Modern Physics*, Allyn and Bacon, 1974, p. 165