

Reductio ad Absurdum

Modern Physics' Incomplete Absurd Relativistic Mass Interpretation

And the Simple Solution that Saves Einstein's Formula.

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Abstract

This note discusses an absurdity that is rooted in the modern physics interpretation of Einstein's relativistic mass formula when v is very close to c . Modern physics (and Einstein himself) claimed that the speed of a mass can never reach the speed of light. Yet at the same time they claim that it can approach the speed of light without any upper limit on how close it could get to that special speed. As we will see, this leads to some absurd predictions. Because even if a material system cannot reach the speed of light, an important question is then, How close can it get to the speed of light? Is there really no clear-cut bound on the exact speed limit for an electron, as an example?

Key words: Relativistic mass, maximum velocity of subatomic particles, boundary condition, Haug maximum velocity.

1 Introduction

Einstein's relativistic energy mass formula [1, 2] is given by

$$\frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}. \quad (1)$$

Further, Einstein commented on his own formula

This expression approaches infinity as the velocity v approaches the velocity of light c . The velocity must therefore always remain less than c , however great may be the energies used to produce the acceleration¹

Carmichael (1913) [3] came up with a similar statement in relation to Einstein's theory:

The velocity of light is a maximum which the velocity of a material system may approach but never reach.

We certainly agree with Einstein's formula². Our question is, How close can v be to c ? Modern physics says nothing about this, except that it can approach c , but never reach c . Does this mean that one can make it as close to c as one wants? This is what we will look into here, and we will show that without a more specific boundary condition on v this can lead to truly absurd predictions.

Einstein's relativistic mass equation predicts that a mass will keep increasing as the velocity of the mass approaches the velocity of the speed of light. If $v = c$, then the mass would become infinite. Einstein and others have given an ad hoc solution to the problem, namely in claiming that indeed the relativistic mass never can become infinite, as this would require an infinite amount of energy for the acceleration.

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¹This quote is taken from page 53 in the 1931 edition of Einstein's book *Relativity: The Special and General Theory*. English translation version of Einstein's book by Robert W. Lawson.

²As a matter of fact, I have proven that Einstein's formula is consistent with atomism, a belief system that I have reason to believe contains the ultimate depth of reality.

The newly introduced maximum velocity puts a series of limits on subatomic “fundamental particles”:

- The maximum frequency is the Planck frequency: $f_{max} = 2\frac{c}{l_p}$.
- The maximum relativistic Doppler shift is equal to the Planck frequency.
- The maximum relativistic mass a subatomic particle can take is the Planck mass.
- The maximum relativistic momentum a subatomic particle can take is just below the Planck momentum.
- The maximum kinetic energy a subatomic particle can take is close to $\frac{\hbar}{l_p}c$.
- The maximum relativistic length contraction of a subatomic particle is $2l_p$, which is the length of the Planck mass.

4 Ways to Write the Maximum Velocity Formula

There are several ways to write the maximum velocity for subatomic particles that will all give the same answer; here we present some of them

In terms of reduced Compton wavelength:

$$v_{max} = c\sqrt{1 - \frac{l_p^2}{\lambda^2}} \quad (4)$$

In terms of particle mass

$$v_{max} = c\sqrt{1 - \frac{m^2}{m_p^2}} \quad (5)$$

where m is the rest mass of the particle and m_p is the Planck mass.

As a function of Newton’s gravitational constant

$$v_{max} = c\sqrt{1 - \frac{Gm^2}{\hbar c}} \quad (6)$$

All these formulas are basically the same, but require somewhat different input:

$$v_{max} = c\sqrt{1 - \frac{l_p^2}{\lambda^2}} = c\sqrt{1 - \frac{m^2}{m_p^2}} = c\sqrt{1 - \frac{Gm^2}{\hbar c}} \quad (7)$$

Electron the maximum velocity

For an electron, the maximum velocity can be written as function of the dimensionless gravitational coupling constant⁷

$$v_{max} = c\sqrt{1 - \alpha_G} \quad (8)$$

this is no surprise, since the dimensionless gravitational coupling constant is given by $\alpha_G = \frac{m_e^2}{m_p^2} = \frac{l_p^2}{\lambda_e^2}$

5 Conclusion

We conclude that simply by saying that a mass must travel more slowly than the speed of light, but when it can approach the speed of light, we may get absurd predictions such as the idea that an electron could attain a relativistic mass equal to the rest mass of the Moon, the Earth, the Sun, and even the Milky Way or entire galaxy clusters. Haug has recently addressed this absurdity by showing that there must be a precise maximum velocity for anything with mass given by $v_{max} = c\sqrt{1 - \frac{l_p^2}{\lambda^2}}$.

⁷For information about the dimensionless gravitational coupling constant see [12, 13, 14, 15].

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