

# A LONG-LASTING DILEMMA AROUND THE RELATIVISTIC MASS IN THE SPECIAL THEORY OF RELATIVITY RESOLVED WITH EXPERIMENTAL PROOF:

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## **ABSTRACT:**

The actual description and properties of the term relativistic mass in the special theory of relativity has been bugging the physicists for a long time; skipped and neglected by many during its explanation, in order to avoid confusion in further explaining the theory. In this paper we can conclude everything about the term with certainty.

## **DISCUSSION:**

Mass: The actual substance that we measure using a balance scale in our frame of reference provided that both the scale and the substance we measuring are at rest with respect to the frame. (Actually this is what we normally do, but in order to explain further in this paper I detailed the simple explanation.)

The term Relativistic Mass refers to the Mass of an object measured from our rest frame of reference, while its moving in its own frame of reference (which is at rest in its own frame), which is a very tough call as we can't appreciate the change in mass at low velocities of our day to day life, we can't measure the system as a whole within which the objects are accelerated at very high velocities like Cyclotron and Large Hadron Collider. Thus, came to the classical system, an atom, especially a type of hydrogen atom called protium ( $1H^1$ ), where there will be zero binding energy per nucleon, thus we can exclude its involvement in calculation.

1. Now, We know;

$$\text{Mass of electron, (Me)} = 9.1093837139 \times 10^{-31} \text{ Kg } (^1)$$

$$\text{Mass of proton, (Mp)} = 1.6726219259 \times 10^{-27} \text{ Kg } (^1)$$

$$\text{Mass of Protium, (1H}^1) = 1.6735328406 \times 10^{-27} \text{ Kg}$$

$$[ \text{Relative Atomic Mass of } 1H^1 = 1.0078250322 \text{ Da } (^2); 1 \text{ Da} = 1.6605390689 \times 10^{-27} \text{ Kg} ]$$

$$\text{Me} + \text{Mp} = 1.6735328642 \times 10^{-27} \text{ Kg}$$

$$(1H^1) - (Me + Mp) = -2.36 \times 10^{-35} \text{ Kg}$$

Thus, the change in mass is  $-2.36 \times 10^{-35} \text{ Kg}$

2. Relativistic mass of an electron,  $RMe$  and proton,  $RMp$  are given by;

⇒ Velocity of electron inside Protium,  $Ve = 2.1872784727 \times 10^6 \text{ m/s}$

$$[v = (Z e^2) / (2 \epsilon_0 h)]$$

⇒ Velocity of proton inside Protium,  $Vp = 1.1912290711 \times 10^3 \text{ m/s}$

$$[Mp Vp = Me Ve]$$

➔ (A) As,  $RM = M / (1 - v^2/c^2)^{1/2}$ ; ( According to Special Theory of Relativity )

⇒  $RMe = 9.10962618 \times 10^{-31} \text{ Kg} \Rightarrow dMe = 2.424661 \times 10^{-35} \text{ Kg}$

⇒  $RMp = \text{Lorentz Factor} \approx 1 \Rightarrow dMp - \text{negligible}$

⇒ Total  $dM = 2.424661 \times 10^{-35} \text{ Kg}$

➔ (B) As,  $RM' = M (1 - v^2/c^2)^{1/2}$ ; (<sup>3</sup>, <sup>4</sup>)

⇒  $RM'e = 9.10914126 \times 10^{-31} \text{ Kg} \Rightarrow dMe = -2.424539 \times 10^{-35} \text{ Kg}$

⇒  $RM'p = \text{Lorentz Factor} \approx 1 \Rightarrow dMp - \text{negligible}$

⇒ Total  $dM = -2.424539 \times 10^{-35} \text{ Kg}$

Thus, the value in the 1. & 2. (B) coincides along with the sign convention, which implies that the actual mass of an object decreases with increase in velocity, due to the coincidence in the values of the Lorentz Factor in both ways ( direct; inverse ) at low speeds lead as to the current illusionary convention as increase in velocity will increase the mass. Now, this will lead to the interesting view that singularity is not with an infinite mass but rather with a very light one and it tries to replenish the lost energy due to its very high self velocity, by absorbing all forms of energy that goes near it !!

From the (<sup>3</sup>), we know that how this aspect applied to explain the Gravitational field, and in (<sup>4</sup>), which also contains this aspect and ideologies about many unresolved issues in the physics and thus, conclude with the experimental proof to resolve the long-lasting dilemma and the glitch in the Special Theory of Relativity around the relativistic mass.

#### REFERENCES:

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