The Existence of a Physical Phenomenon that Accelerates Particles with Mass to the Speed of Light and Transforms Them into Dark Energy and Dark Matter

Bezzar zouhair

Bezzar.zouhair@gmail.com

Introduction:

The present theory explores the behavior of the expression of relative mass $M(v)$ with respect to the speed of light $(v = c)$ and suggests that dark matter or dark energy could be composed of ordinary particles with mass that have reached the speed of light.

The theory delves into a mathematical analysis of the series representing the relative mass function, M(v), and discusses its divergence at $v = c$, drawing parallels with the regularization of the Casimir effect using the Riemann zeta function, which gives $M(c) = -M(c-1)$ at $v = c$.

It proposes the existence of a natural phenomenon that accelerates ordinary matter with mass to the speed of light and transforms it into dark matter or dark energy with negative relative mass and finite energy.

1.Representation of the Divergence of Relative Mass at $v = c$:

Consider the function of Relative Mass:

$$M(v) = \frac{m_0}{\sqrt{1-\left(\frac{v}{c}\right)^2}}$$, where $v \in]-c; c[$, $m_0 \in \mathbb{R}^{*+}$, and $c = 3.10^8$.

I let $x + 2 = 1/(c - v)$, so $v = c - 1/(x + 2)$ Consequently:

$$M(c) = \lim_{v \to c-} M(v) = \lim_{x \to +\infty} M(c - 1/(x + 2)).$$

Thus, we have:

$$M(c) = \lim_{v \to c-} M(v) = \lim_{x \to +\infty} M(c - 1/(x + 2)) = \lim_{n \to +\infty} M(c - 1/(n + 2))$$

I let $S_n = M(c - 1/(n + 2))$ so $U_n = S_n - S_{n-1}$ so $S_n = U_0 + U_1 + U_2 + \ldots + U_n$

and $S = U_0 + U_1 + U_2 + \ldots$.

Hence, we have :

$$M(c) = \lim_{v \to c-} M(v) = \lim_{n \to +\infty} S_n = S$$

Therefore, S indeed represents the divergence of $M(v)$ at $v = c$.

2.Application of zeta function regularization on the divergence of relative mass at $v = c$:

You can just separate off the divergent part of M and define it via zeta function regularization.

Define:

$$M_d(n) = m_0\sqrt{\frac{c}{2}}\sqrt{n}$$

And write:

$$U_n = \left[M\left(c - \frac{1}{n+2}\right) - M_d(n+2) - M\left(c - \frac{1}{n+1}\right) + M_d(n+1)\right] + [M_d(n+2)] - [M_d(n+1)]$$

And sum the 3 square brackets separately. Note that the combination of the first two terms in the first square brackets vanishes for $n \to \infty$, and therefore, since the sum over the first square brackets telescopes, that sum reduces to:

$$S^{(1)} = -M(c-1) + M_d(1)$$

The sum over the second square brackets is:

$$S^{(2)} = m_0\sqrt{\frac{c}{2}}\sum_{n=2}^{\infty}\sqrt{n} = m_0\sqrt{\frac{c}{2}}\left(\zeta\left(-\frac{1}{2}\right) - 1\right)$$

And analogously for the third square brackets:

$$S^{(3)} = m_0 \sqrt{\frac{c}{2}}\, \zeta\left(-\frac{1}{2}\right)$$

$$\begin{aligned} S &= S^{(1)} + S^{(2)} - S^{(3)} \\ &= -M(c-1) + M_d(1) - m_0\sqrt{\frac{c}{2}} \\ &= -M(c-1) \end{aligned}$$

So, the entire sum reduces to the finite value:

$$\begin{aligned} S &= S^{(1)} + S^{(2)} - S^{(3)} \\ &= -M(c-1) + M_d(1) - m_0\sqrt{\frac{c}{2}} \\ &= -M(c-1) \end{aligned}$$

The divergence of $M(v)$ at $v = c$:

$$M(c) = -M(c-1)$$

This formula $M(c) = -M(c-1)$ is derived by considering that $c = 3.10\text{^}8$ has no unit of measurement and that v is a real variable between $[-c, c]$. However, what will be obtained if c has a unit of measurement and v is a vector?

4.Representation of the Divergence of Relative energy at $v = c$:

Due to the definition of the energy-momentum four-vector, in particular its time coordinate, we end up with the expression of the total energy of the particle in the laboratory reference frame, that with respect to which the particle is animated with the speed $\vec{v}$ because the energy depends on the frame of reference in which it is calculated!) in the form of:

$$E = \frac{m_0 c^2}{\sqrt{1-\left(\frac{v}{c}\right)^2}} = c^2 M(v)$$

At $v = c$:

$$E = c^2 M(c) = -c^2 M(c-1)$$

Rest energy is the energy associated with a particle's mass. A free particle of mass $m0$ has rest energy:

$$E_0 = m_0 c^2$$

energy of motion (kinetic energy, K):

$$K = E - E_0 = c^2 M(v) - m_0 c^2 = (M(v) - m_0)c^2$$

At $v = c$:

$$K = (M(c) - m_0)c^2 = -(M(c-1) + m_0)c^2$$

If we interpret its results, there may exist particles with a mass m0 that have a negative total energy and a positive rest energy, and they move with negative kinetic energy. These particles could have been generated by a physical phenomenon that accelerates particles with mass to the speed of light.

3.Analogy of the theory with Casmir effect:

Here is an example of using regularization via the zeta function in the Casimir effect:

Mathematical calculations lead to the famous divergent series

$$1 + 2 + 3 + 4 \ldots$$

However, the physical results do not correspond to infinite values for the energy of the moving plates.

To resolve this issue, we applied regularization through the Riemann zeta function. Eventually, we obtain a finite value of -1/12 for the divergent series$1 + 2 + 3 + 4 \ldots$ and this result provides a good explanation for the Casimir effect.

In analogy with the Casimir effect, it is possible that the value $-M(c - 1)$ obtained from the divergent series representing the relative mass at $v = c$,

$U0 + U1 + U2 + U3. ..$, has a physical meaning to explain 95% of the missing energy in the universe.

Hence, my hypothesis suggests the existence of a natural phenomenon that accelerates ordinary matter with mass to the speed of light and transforms it into dark matter or dark energy with negative relative mass and finite energy.

4.Here are some experiments that can be conducted to test this theory:

One can test this theory using an already constructed simulator to verify the motion of the universe since the Big Bang, taking into account the idea that particles with mass reach the speed of light and become negatively relative mass with finite energy, thus replacing dark energy or dark matter. The aim would be to see if it is possible to obtain the same observations and locate possible areas and the potential source of this natural phenomenon.

Additionally, we can test if there are any missing particles during their acceleration in the Large Hadron Collider before their collisions, and whether certain particles have already transformed into $-M(c-1)$ without being detected, while their gravitational effect is present during the collision, while conserving total energy.

Please note that these experiments and simulations would require the participation of researchers and scientists in the field of particle physics and astrophysics. They would have the necessary resources and expertise to design and conduct such tests to explore the validity of the proposed theory.

Conclusion:

The presented theory offers a fresh perspective on relative mass concerning the speed of light and introduces the concept of particles with positive relative mass transforming into invisible counterparts with negative relative mass if they reach the speed of light. It draws connections to regularization methods used in the Casimir effect to explain dark matter and dark energy, which constitute 95% of the missing energy in the universe.

Although the theory proposes a compelling mathematical hypothesis in the case where c has no unit of measurement and v is not a vector, it requires extensive experimental verification and further exploration by researchers in the fields of mathematics to study the scenario where c has a unit of measurement and v is a vector, as well as the involvement of researchers in the fields of particle physics and astrophysics.

Developing a more advanced mathematical formulation and conducting experiments and simulations to test the theory's predictions would be essential to validate its proposed implications.

References:

1. Wikipedia: 1 + 2 + 3 + 4 + ... (sum of natural numbers). https://en.wikipedia.org/wiki/1_%2B_2_%2B_3_%2B_4_%2B_%E2%8B%AF
2. Wikipedia: Casimir effect.

   https://en.wikipedia.org/wiki/Casimir_effect
3. Wikipedia: Cosmological constant. https://en.wikipedia.org/wiki/Cosmological_constant
4. Wikipedia: Dark matter.

   https://en.wikipedia.org/wiki/Dark_matter
5. Wikipedia: Dark energy.

   https://en.wikipedia.org/wiki/Dark_energy
6. Wikipedia: Negative energy

   https://en.wikipedia.org/wiki/Negative_energy

Note: The references to the Wikipedia pages are provided to direct readers to additional information on specific topics discussed in the theory.