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Mini Review

# Absolute Mass of Photons Based upon the Hamiltonian of Energy Content

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## ABSTRACT

In this article, the mass energy equivalence is analyzed based on the total energy content and inertia of a body. The analysis included quantum energy formalization with relativity. The finding suggests that photons have absolute mass to justify their momentum. The fact that mass energy withdraws from a body becomes the energy of radiation makes no difference, so we can conclude that the inertia of a body is the measure of its energy content and vice-versa.

**Keywords:** Inertial mass energy; *Vis-viva*; Vis-mortua; Quantum mass energy factor

## INTRODUCTION

In Albert Einstein raised the question that does the inertia of a body depends upon its energy content? And he concluded that if a body gives off the energy E in the form of radiation, its mass diminished by $E/c^2$ (where c is the speed of light). But here, we ask the question again in its reversal form that does the energy content of a body depend upon its inertia? It follows because of my recent work on de Broglie's hypothesis on the matter waves, in which I derived an equation of total energy (Hamiltonian) of a particle having rest (absolute) mass m and relative velocity v and a frequency f because of matter wave observed by an observer (in a relative frame of reference) [1].

$$\text{If } \beta = \frac{v}{c} \;\&\; \alpha = \frac{1}{\gamma} = \sqrt{1-\beta^2} \text{ then } \alpha mc^2 + \left(\frac{1}{2} mv^2 + hf\right) = mc^2$$

$$\sum E = mc^2$$

Now we know that Einstein never considers quantum energy in his theory of relativity. So how can it appear in his theory of special relativity? To analyze this, let have a look at his above paper in which he gives the change in kinetic energy by T.

$\Delta T=(\gamma-1)mc^2$

If we expand the above in binomial terms, we get:

$$\Delta T = mc^2\left(\frac{1}{2}\beta^2 + \frac{3}{8}\beta^4 + \frac{5}{16}\beta^6 + \frac{35}{126}\beta^8 + \cdots\ldots\ldots\right)$$

Now if we see his paper, he smartly hides the quantum energy by neglecting the fourth and higher orders and approximates the result for low velocity as:

$$\Delta T \approx \frac{\beta^2}{2}mc^2 = \frac{1}{2}mv^2$$

Let the sum of all binomial terms (excluding first) is Q, then:

$$\Delta T = \frac{\beta^2}{2}mc^2 + Q$$

If $\upsilon \ll c$ then Einstein approximation holds well. But for velocities near c the quantity Q grows fast and creates catastrophe at c. The term Q demands explanations because the theory of special relativity is the study of high velocities. And that is the point where I build my argument in my recent work on the de Broglie hypothesis. If we denote inertial energy by $E_\alpha$, kinetic energy by $E_k$ and quantum energy of matter wave by $E_q$ then work done (by the force, which is the reason behind the motion) in the center of mass frame is given by the change in inertial energy [2].

$(1-\alpha)mc^2=E_k=+E_q$

The work done (by the same force as stated above) in the relative frame is given by the change in kinetic energy by equation, which can be expressed as:

$(\gamma-1)mc^2=\gamma(E_k=+E_q)$

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We can see that both are an equivalent statement.

# LITERATURE REVIEW

## *Vis-viva* and vis-mortua

The competition between two physical quantities (momentum and kinetic energy) to describe the changes in nature rise in late 1650 by two sides of philosophers. One side leaded by German mathematician Gottfried Leibniz with Emilie Du Chatelet for *vis-viva* (energy). And the defendants of momentum led by Rene Descartes of France and Newton himself. Descartes belief that God, the general cause of all motion in the universe, preserves the same quantity of motion and rest put into the world at the time of creation. The measurement of this quantity is termed as momentum, P=mv. While Leibniz objected and argued that the quantity which remains absolute and indestructible is not momentum but *vis-viva*. Now, these two principles are understood as complementary together [3]. But we can see that the 'living force' (*vis-viva*) gets more attention from philosophers over the 'dead force' (vis-mortua). The dead force or as I like to call it sleeping force/energy is the concept, which not got eyes. But I find it useful in my analysis. It can be interpreted as inertial mass/energy. On the other hand, the living force gets limited to kinetic energy. If we see the equation then, we can compare the terms as the living/awaken energy [4].

$$\left(\frac{1}{2}mv^2 + hf\right)$$

And whenever there is an increment in relative motion then the sleeping thing gets awaken and becomes a living thing and vice-versa. Now we can ask that what is Newton's idea of force? "It is an agent, which produces a change in nature". The reason by which energy flows in an isolated system. The force can only change the inertia of a body and can't change the absolute or overall energy when applied to that body [5].

# DISCUSSION

## Factors for energy in special relativity

The equivalence factor for inertial energy is α and for kinetic energy is $\beta^2/2$ and we can derive the 2 factor of equivalence for quantum energy $E_q$ by equation (Table 1).

$$E_q = \left(1 - \alpha - \frac{\beta^2}{2}\right)mc^2$$

$$E_q = Amc^2$$

Where A is the equivalence factor for quantum energy, which has the value of

$$\left(1 - \alpha - \frac{\beta^2}{2}\right)$$

**Table 1:** The values of relative factors, when velocity is increasing by v=0 → c.

| v | β | γ | α | $\beta^2/2$ | A |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 0 | 0 |
| 29979245.8 | 0.1 | 1.0050378152 | 0.9949874371 | 0.005 | 0.0000125629 |
| 59958491.6 | 0.2 | 1.0206207261 | 0.9797958971 | 0.02 | 0.0002041029 |
| 89937737.4 | 0.3 | 1.0482848367 | 0.9539392014 | 0.045 | 0.0010607986 |
| 0.0010607986 | 0.4 | 1.0910894511 | 0.9165151389 | 0.08 | 0.0034848611 |
| 149896229 | 0.5 | 1.1547005383 | 0.8660254037 | 0.125 | 0.0089745963 |
| 149896229 | 0.6 | 1.2500000000 | 0.8660254037 | 0.18 | 0.0200000000 |
| 209854720.6 | 0.7 | 1.4002800840 | 0.7141428428 | 0.18 | 0.0408571572 |
| 239833966.4 | 0.8 | 1.6666666667 | 0.6000000000 | 0.32 | 0.0800000000 |
| 269813212.2 | 0.9 | 2.2941573387 | 0.4358898943 | 0.405 | 0.0800000000 |
| c | 1 | ∞ | 0 | 0.5 | 0.5000000000 |

The table for values of these factors is given below as relative velocity increases 0 to c. In this table, we can see that how the quantum energy of matter wave in a moving body evolves with kinetic energy and create a catastrophe in the relative energy for photons [6-8].

### Photons

The relative energy is given by the expression, $E_\gamma=\gamma mc^2$, if we manipulate this equation, then

$(E\gamma)^2=(mc^2)^2+(P\gamma c)^2$, where $P_\gamma=\gamma mv$

$(\gamma mc^2)^2=(mc^2)^2+\gamma mvc^2$

$E^2+(mc^2)^2=(\alpha mc^2)^2+(mvc)^2$

And it is not mathematically right to derive, the total energy E of photons by equation, because it is relative energy not the total energy of the photon. The total energy of a photon can be measure by equation only. Obtaining momentum from equation by ignoring $\gamma$ term is a serious mathematical mistake, which is defiantly an obstacle for quantum energy to get formalize with relativity. It's just equivalent to saying that infinity or zero is equal to some real number. A photon has all its inertial (sleeping) energy in the awaken (*vis-viva*) state and contains an absolute mass, which causes momentum. The Lorentz transformation declares that the relative mass energy of photons must be infinite to hold the second postulate of special relativity. The rest mass notation $m_0$ for create confusion and destroy the beauty of relativity [9,10].

## CONCLUSION

From equation it directly follows that if a body absorbs any radiation of frequency f in the Hertz then its absolute mass get increases by:

$2hf/c^2$ or $(1.4745 \times 10^{-50}f)$ kg

The fact that mass energy withdraws from a body becomes the energy of radiation makes no difference, so we can conclude that the inertia of a body is the measure of its energy content and vice versa.

## DECLARATION

The author has no conflict of interest.

## REFERENCES

1. Einstein A. Does the inertia of a body depend upon its energy content. Ann Phys. 1905;18(13):639-641.
2. Iltis C. Leibniz and the *vis viva* controversy. Isis. 1971;62(1):21-35.
3. Okun LB. The concept of mass (mass, energy, relativity). Sov Phys J. 1989;32(7):629.
4. Papini G, Wood WR. A geometric solution to the de broglie variable mass problem. Phys Lett A. 1995;202(1):46-49.
5. Umul YZ. Universality of the De Broglie Einstein velocity equation. J Nonlinear Sci. 2007;33(2):676.
6. Gross EP. Hydrodynamics of a superfluid condensate. J Math Phys. 1963;4(2):195-207.
7. Parker L, Fulling SA. Adiabatic regularization of the energy momentum tensor of a quantized field in homogeneous spaces. Phys Rev. 1974;9(2):341.
8. Jamet P, Drezet A. A mechanical analog of Bohr's atom based on de Broglie's double solution approach. Chaos: An Interdisciplinary. J Nonlinear Sci. 2021;31(10):103-120.
9. Amoroso RL. Neo Cartesian unified fluid theory: From the classical wave equation to De Broglie's Lorentzian quantized mechanics and quantized gravity. Gravtion Sci J. 1998;12(1): 454-460.
10. Holland PR. The quantum theory of motion. 1995 Edition. Cambridge university press, Cambridge, UK, 1995, pp. 618.