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Mass-Energy Equivalence in Relation to Massless Particles and Singularities

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Abstract: ***This paper proposes an extension to Einstein's renowned equation, E=mc², offering a way to calculate the energy of massless particles and singularities. Drawing from quantum field theory and the properties of massless light particles, the newly suggested equation seeks to address limitations in current energy calculations. Advances in quantum computing and artificial intelligence are also considered for their potential to enable more accurate observations.***

Keywords: Massless Particles, Quantum Mechanics, Energy Equation, Artificial Intelligence, Quantum Computing, Science Breakthrough

1. Introduction

Einstein's mass-energy equivalence fundamentally shaped our understanding of how mass and energy interact. However, $E=mc^2$ primarily describes entities with rest mass and does not fully account for energy in massless particles, such as photons, or quantum singularities. With ongoing progress in science and technology, there is a growing need to re-express this relationship within a more inclusive framework.

2. Rationale for a New Approach

Previous studies ([1], [2], [3]) have detailed the shortcomings of the classic mass-energy relation, especially its inability to describe energy in massless particles and quantum singularities. As quantum mechanics uncovers phenomena including entanglement and dark matter fields, a more comprehensive equation becomes necessary.

The Proposed Energy Equation
To encompass both massive and massless entities, this work introduces a generalized equation:

$$\mathbf{E = Sc^2}$$

Where:
S = Singularity (dimensionless, set as 1)
c = Speed of light in vacuum ($\approx 3.00 \times 10^8$ m/s)

This approach is further advanced by introducing the concept of quarts, or string particles, denoted as N within the observable microsystem. Integrating quantum particles into the energy framework—at scales such as pico, nano, femto, atto, zepto, or yocto—may facilitate the identification of previously unmeasured phenomena. By augmenting the equation accordingly, both singularities and additional quanta are systematically incorporated into the calculation of energy.

$$\mathbf{SE = (S + N)\, c^2}$$

Example Calculation
For instance, in a system containing one singularity and ten quark light particles:
$E = (1 + 10)\, c^2 = 11c^2$

Here, S = 1 and N = 10.

This approach demonstrates that even systems without rest mass exhibit energy based on their quantum composition.

3. Implications and Measurement

Key implications include:

- Every object with mass contains both a singularity and a quantifiable number of light particles.
- A 1-gram object may consist of N massless light particles alongside the singularity S.
- Advancements in artificial intelligence and quantum computing could allow greater accuracy in measuring these energy forms.

4. Conclusion

The revised equation offers a universal and adaptable model for determining the energy of both massive and massless particles. This innovation holds promise for quantum field theory, astrophysics, and future technologies, highlighting the importance of continuously evolving scientific laws as our understanding deepens.

References

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