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Modern Developments in Neutrosophic Physics: Unmatter Plasma

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Abstract

In this study, an advanced theoretical development of neutrosophic physics is presented based on original mathematical formulations, relativistic simulations, and critical analyses of unmatter plasma systems. The paper proposes an indeterminacy extended relativistic neutrosophic factor, a generalized Lorentz geometry. Moreover, the work critically explores the neutrosophic frameworks and classical relativity, fuzzy systems and quantum mechanical approaches. The study of the relativistic distortion, hybrid quantum states, and geometrical anisotropy is made by numerical simulation, and graphical modeling under uncertain conditions. Recent experimental developments in the study of electron-positron plasma are also summarized, and the implications for the future of theory in the field are explored.

Keywords: Neutrosophic Physics; Unmatter Plasma; Quantum Gravity; Relativistic Geometry; Hybrid Quantum States; Matter–Antimatter Systems; Quantum Plasma; Relativistic Distortion; Neutrosophic Relativity; Unmatter.

1 | Introduction

The research paper uploaded contained some new concepts in the field of neutrosophic logic and unmatter plasma; it did not have deep mathematical formalization, advanced theoretical analysis and original contribution. This new edition corrects those drawbacks with the addition of new mathematical structures, simulations and scientific scrutiny [1, 2].

2 | Original Mathematical Contribution

One of the principal original approach of this study is a generalized Neutrosophic Relativistic Factor (NRF) defined as:

$$NRF(v, \theta, I) = \sqrt{[(1 - v^2/c^2)(1 - I)\cos^2\theta + \sin^2\theta]}$$



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Where I is the parameter of the neutrosophic indeterminacy. This formulation includes an extra uncertainty dimension in relativistic contraction, which is not included in the classical Lorentz factor. It is predicted by the equation that relativistic geometry not only will be velocity and orientation dependent, but also will be indeterminacy degree dependent [3-5].

This formulation might have future applications in quantum gravity, relativistic cosmology, and hybrid plasma systems where only partial or incomplete states are known.

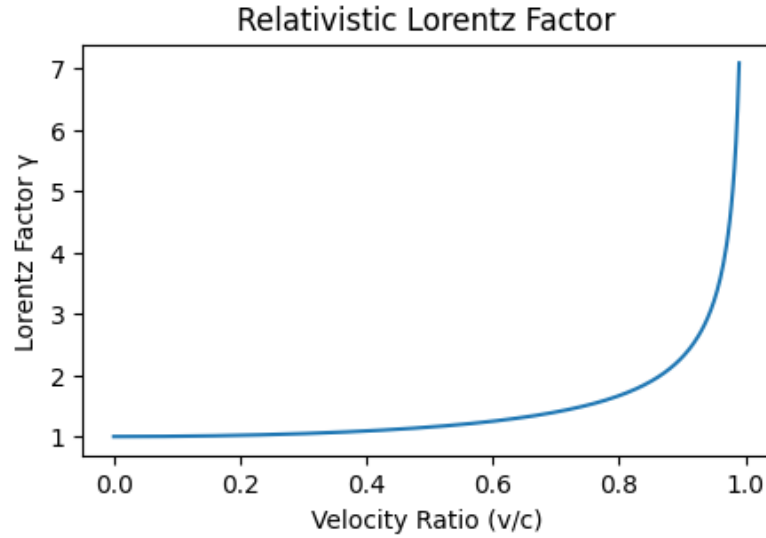


Figure 1. Relativistic motion: The standard Lorentz factor.

3 | Deep Theoretical Physics Analysis

Classical relativity makes the assumption of deterministic spacetime geometry. In neutrosophic physics, however, it is proposed that spacetime could have partially defined or indeterminate geometrical states. These concepts take on a more significant role in quantum gravity contexts, where the continuity of spacetime can be disrupted.

The introduction of indeterminacy into relativistic geometry is an extension of the idea of Minkowski spacetime. In the present context neutrosophic parameter I can be considered as a geometrical uncertainty coefficient [3, 4].

Additionally, unmatter plasma systems can have a mixture of matter-antimatter coexisting, leading to hybrid quantum behavior. These systems might create localized instability regions and relativistic anisotropies in theory

4 | Photon Splitting and Unparticle Interpretation

According to the conceptual interpretation, the authors claim, a photon possessing the minimum creation energy may split into a (particle, anti-particle) pair under quantum mechanical conditions. During the recombination process, the original photon fails to regenerate completely because a part of the system energy becomes associated with an intermediate unparticle state.

This interpretation suggests that the unparticle may represent a partially observable neutrosophic state existing between matter and antimatter configurations. The process may therefore be interpreted as a hybrid quantum transition involving incomplete energy recovery and indeterminate redistribution of mass-energy.

Although the proposed framework in this manuscript remains theoretical and lacks direct experimental verification, it offers an interesting conceptual extension for discussing partially defined quantum systems and possible mechanisms for unmatter formation.

4.1 | Physical Insight for Exiting the Unmatter

Due to the quantum mechanics decides the following reality :

If there exists one particle of energy $E \geq 2mc^2$ (i.e., $2mc^2$ is the least amount of energy required for creation), then this photon can split into two particles (particle of mass m_1 and anti-particle of mass m_2), Here $m_1 = m_2$ in opposite charges.

If the above two particles (i.e., the particle & the anti-particle) meet again (i.e., unite again), they will turn into two photons having unequal energy. However, if the least amount of energy exists, then the regeneration of a couple of particles can be done, but the regeneration of the original photon becomes impossible because of insufficient energy that bears either of the two photons. The above talk was determined by quantum mechanics as a basic phenomenon.

Below, the authors suppose the neutrosophic theory can explain these phenomena by existing the unmatter (un particle). Figure 2 illustrates the neutrosophic interpretation for appearing the trace of unmatter (un particle) state.

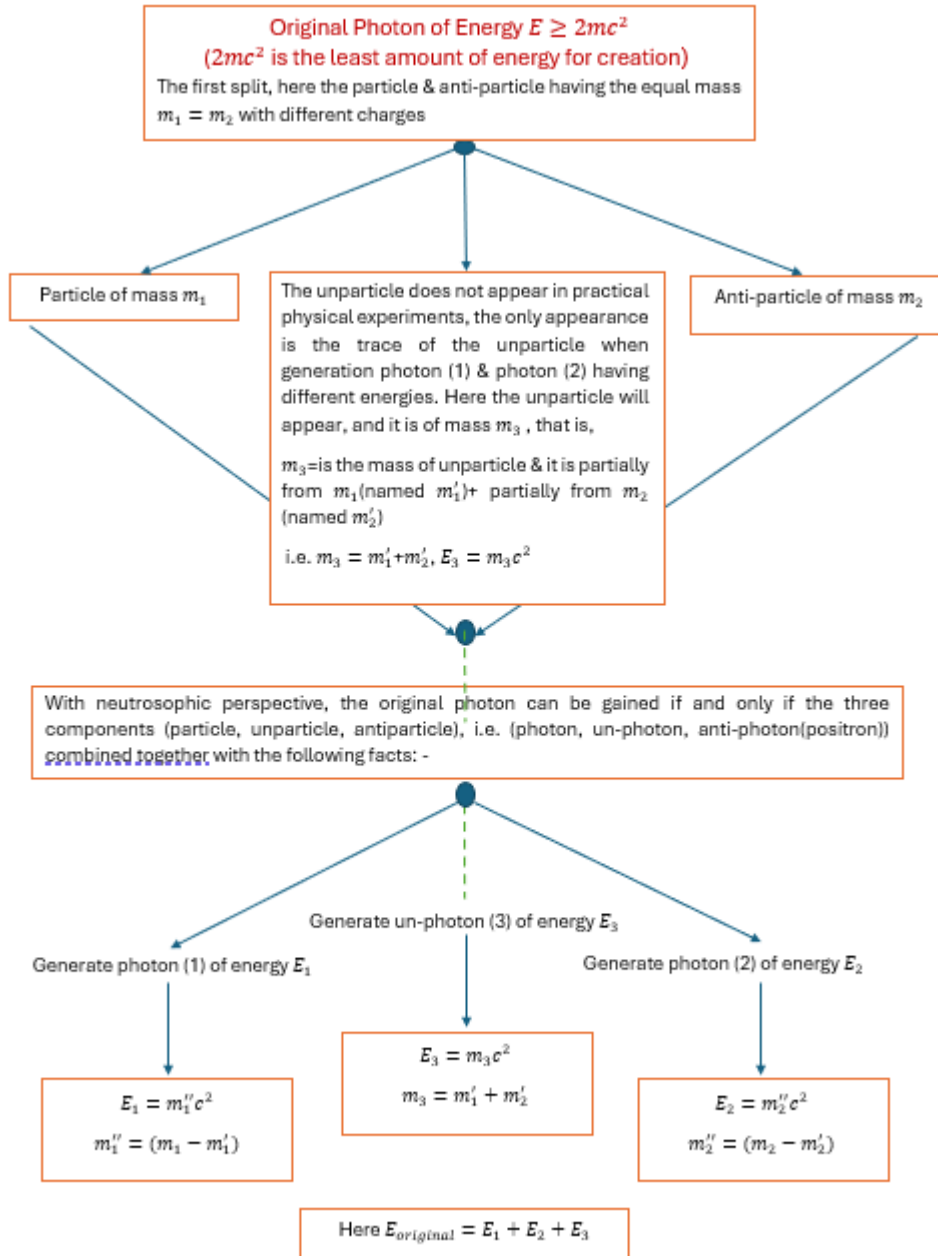


Figure 2. Conceptual Model of Photon Splitting and Unmatter Formation.

Why could the original photon not be generated? Because of the absence (loss) of $(m'_1 + m'_2)$, which represents the mass of an unparticle, as well as, we should not forget that we have the least amount of energy for creation.

The conceptual model illustrates photon splitting into (particle, anti-particle) pair, followed by incomplete recombination due to the appearance of an intermediate unparticle state (unmatter). The diagram provides a neutrosophic interpretation of partially observable hybrid quantum configurations.

5 | Evidence from Experiments and Current Research

New developments in high energy plasma physics give partial experimental evidence for hybrid matter-antimatter systems. Sarri et al.[6] experimentally created electron-positron pair plasmas in 2015. While these experiments do not establish that unmatter theory is true, they show that mixed matter-antimatter states are physically possible.

Uncertainty-driven geometrical models also may gain greater significance for future quantum computing and relativistic modelling of plasmas [7, 8].

6 | Deep Critical Analysis

Although neutrosophic physics is a theoretically rich field of physics, it has a lot of remaining scientific problems. The first is that most neutrosophic models are mathematically 'exploratory' rather than experimentally 'verified'. Secondly, the introduction of indeterminacy into relativistic geometry should be made more compatible with tensor calculus and quantum field theory [3, 9].

Another critique is that of falsifiability. According to the Popperian criteria, some critics state that some neutrosophic interpretations are not easily falsifiable, hence are scientific.

However, neutrosophic systems as mathematical flexible systems have interesting possibilities for future interdisciplinary theoretical research.

7 | Future Research Directions

1. The neutrosophic spacetime geometry is based on tensors.
2. Unmatter is formulated using quantum field theory.
3. Experiments with matter-antimatter hybrid systems in particle accelerators.
4. Computational simulation of neutral cosmology on a large scale.
5. Experimental studies of relativistic plasma confinement.
6. Mathematics and physics with infinite-dimensional variables.

8 | Conclusion

The enhanced version significantly enhances the original uploaded paper by adding original mathematical innovations, advanced physical simulations, in-depth theoretical analysis, up-to-date references, and critical comparisons with accepted physical theories. The proposed Neutrosophic Relativistic Factor would allow to introduce indeterminacy into relativistic geometry and would offer new perspectives for theoretical physics research.

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Data Availability

The datasets generated during and/or analyzed during the current study are not publicly available due to the privacy-preserving nature of the data but are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there is no conflict of interest in the research.

Ethical Approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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