Complex Relativity: Insights Reflecting Newton's First Law

Mohd. Javed Khilji

[1] B 385, Indervihar, Airport Road Bhopal India

E-mail: auqilak@yahoo.co.in

Abstract:

The 2022 study's experimental investigations prove that relative velocities from Einstein's first postulate significantly violate kinetic energy conservation, whereas complex relative velocities show zero error. This paper reveals a hidden variable creating contrasting realms, real and imaginary, similar to rest and motion, allowing seamless transition in the complex domain through an optical process. It also establishes inertial frame criteria based on Newton's first law. The traditional setup of velocities v and $-v$, summing to $2v$ in magnitude but zero as a vector, fails to meet inertial frame criteria, which require the sum of magnitudes' absolute values to equal their vector sum, only achieved when frames are at rest or follow Newton's first law. Consequently, this setup cannot support a seamless transition between electric and magnetic fields or account for z-axis phenomena. The author introduces a new setup involving v (motion) and iv (rest), with previous works (2011, 2017, 2022) defining complex relative motion as a combination of real and imaginary motions. The Modified Transformation Laws of Coordinates (2017), later included as a book chapter (2022), now known as jk Transformation Laws, show vectors with symmetry while scalars with asymmetry. This paper explores variation in mass, time, and length at varying velocity via complex transformations. A 2004 study shows decrease results from increase, demonstrating antimatter's emergence and transforming infinity into energetic photons at c, providing insights into gamma rays and GRBs. Stationary lengths contract and moving lengths elongate, validated by a Russian Physicist V. N. Streltsov in 1974. Our analysis of Persistence of vision is empirical justification by a burning incense stick rotating at 16 rounds per second, appearing as a red circle. Fast muons travel extra distances, and jet exhausts appear as straight lines. moving photons appear in ray. Moving clocks run faster, resting time stretches. Unlike, time dilation, lightning fades instantly while thunder lingers, supporting the paper's conclusions. Waves within rays are preserved by flexible acceleration, The inverse results, similar to those of qubits, predict entangled particles and their resolution when opposing states coexist with interconnectedness. The unique outcomes without reciprocity revolutionize physics.

1. Introduction

This paper reveals that a hidden variable responsible for the seamless transition between opposing states is purely optical in nature and not a kinematic or dynamic manipulation, as both objects remain in their original states complying Newton's first law that governs relative motion in ideal conditions but of complex nature. Methodology includes the description of optically produced two contrasting realms of (real and imaginary) akin to rest and motion to show seamlessness. Complex velocities were first used in relativity in the author's 2011 study, which shows vectors with symmetry while scalars with asymmetry. This was obtained from the two-way interaction between matter and field, a concept that was developed in the author's 2004 study [3]. Subsequently, in 2017[4], their significant use was seen in determining complex transformation laws under the title "Modified Transformation Laws of Coordinates and Composition of Velocities," where the inverse law differs from Lorentz's inverse law. The significance of these laws was well understood by academicians and publishers, as the paper was selected as a book chapter titled "*jk* Transformation laws---" in 2022 [5]. This chapter's identity was different from the original, as an empirical investigation was added to it, revealing the gross violation of kinetic energy laws that relative velocities show in two-dimensional motion, while complex relative velocity shows no error. Maxwell equations [6] space-time, and rotating frames all remain invariant under the *jk* laws.

Another idea of Flexible acceleration is unavoidably important in maintaining the waveform of the photon stream. In this paper we have derived all the relativistic formulations under the changed perspective of relative motion and transformation laws.

Related Work

The author's 2004 study focused on dynamics, revealing that as velocity increases, mass rises and acceleration decreases; if this trend persists, the object will eventually become immovable as mass continues to increase. In other words, even the propagation is impossible. But, even near light speed, acceleration does persist, suggesting a two-way interaction where a small portion of mass converts into energy to maintain acceleration, termed relativistic decrease (Rd), while mass increase is termed relativistic increase (Ri), with $Rd \times Ri > rest\ mass$. From Dirac's perspective, $2mc^2$ is the finite energy required for matter to transform into a field. What then prevents matter from transforming into a field when it has infinite energy in a system where its velocity is c? At light speed, $0 \times \infty$ is indeterminate, indicating matter transforms into photons. According to de Broglie's relation, $\lambda = h/mv$, if $v = c, \lambda = h/mc$, meaning higher mass results in shorter wavelength photons, hinting at gamma rays and GRBs. Antimatter is generated when half of the mass transfers to the field, with the original particle retaining its sign and antimatter created through the reverse process—matter entering the field and acquiring the opposite sign.

The 2011 study "*Intrinsic Laws of Motion are Invariant*"[3] received mixed feedback, with recommendations to evaluate 2004 work within a relativistic framework. Upon reviewing the equation $m(v) = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$,, it seems that both the vector v and scalar m are similarly treated because both increase relative to the constant vector c (the speed limit). Given that both variables increase together, a question arises: what should decrease? Should the scalar yield to the vector's dominance and increase more smoothly and rapidly, reaching c while the scalar continues indefinitely? The author, convinced by their 2004 work, argued that relativistic changes are correct and that vectors and scalars should be treated differently. Vectors can exhibit reciprocity or symmetry as their magnitude remains consistent with directional reversibility, while pure scalars, lacking direction, only have magnitude to vary. Thus, increases in one direction imply losses in another. Consequently, v and iv form the optimal combination. Real velocities v and $(-v)$ increase, while iv and $(-iv)$ decrease.

2 Discussions

2.1 Newtonian Concepts

Newton asserts categorically in Principia that "Every material body perseveres in its state of being at rest or of moving uniformly straight forward except insofar as it is compelled to change its state by forces impressed." [1]

Originally, Newton demonstrated two opposite states within his first law, namely the law of inertia, where change in these states without force is impossible. Neither, rest can be changed into motion nor motion into rest. In other words their autonomy instilled in them cannot be challenged without force.

Complex Relativity vs. Special Relativity

The primary distinction between our conclusions regarding Complex Relativity [4] and the existing framework of Special Relativity lies in the basis of their perspective evaluations. In Complex Relativity, the observer's perception of motion is influenced by the optical nature of relative velocities, leading to a seamless transition between opposing states without altering the objects' original states. This contrasts swith Special Relativity, where kinematic and dynamic manipulations are central to understanding motion. Complex Relativity emphasizes the role of optical perception in defining motion, while Special Relativity focuses on the physical principles governing the interaction between objects in different frames of reference. This fundamental difference highlights the unique approach of Complex Relativity in interpreting relative motion.

Our conclusions stem from real-time analysis of empirical data, strictly adhering to all physical laws. In contrast, Special Relativity is predominantly based on hypotheses and occasionally exhibits a more philosophical approach, consequently overlooks fundamental physical laws.

For example, the concept that every object moves relative to another, and that these counterparts also move relative to the original object, results in the phenomenon of mutual motion. In other words object and reference point moves relative to one another. This is often considered a philosophical assertion. Under the guise of this assertion, fundamental principles can be overlooked. This philosophical stance forms the basis for the mathematical representation of motion as v and $-v$, an observable phenomenon [7] derived from Newton's first law under ideal conditions. However, the same Newton's law is violated by the same v and $-v$ velocities.

For instance, it assigns a real velocity to the resting frame in the opposite direction without detailing the force or tangible displacement s[8], thereby violating the conservation of kinetic energy in two-dimensional motion, as demonstrated in empirical investigations (author's 2022 study).

In this paper, we further demonstrate that velocities (v) and $(-v)$ do not yield inertial frames and instead violate Newton's first law. Both velocities, in their real magnitudes, attract forces that inhibit a seamless transition between opposing states. For (v) and $(-v)$ in absolute values, the system magnitude is $(2v)$ while their vector sum is zero. This contrasts with the case when the frames are at rest, i.e., $(v = 0)$ and $(-v = 0)$, where the system magnitude in absolute values is zero and the vector sum is also zero. Similarly, for a system where one frame is at rest$(v = 0)$, and the other frame is at a constant velocity$(v \neq 0)$, or at (v) adheres to Newton's first law. The system magnitude in absolute value is (v) and the vector sum in absolute value is also(v). Therefore, the new criterion for frames to be considered inertial is that the system magnitude and vector sum in their absolute values must be equal.

2.4 Common Sense and Social Aspect:

How is it possible that a solo magnitude (special relativity treats it as common magnitude between frames) can repeat itself for another object moving opposite at the same velocity and at the same point of time? Can synchronization public transport traveling in opposing directions save gasoline, hence lowering global gas consumption, if the first postulate of relativity is correct? Is it possible a real velocity produces its clone in opposite direction?

2.5 Electrodynamics without Seamlessness Holds No Validity:

Nevertheless, two real velocities due to zero net force display no interconnectedness, allowing them to exist independently in their respective directions and thus preventing seamless transitions, as real velocities attract force. Consequently, no consistent relationship or seamless transition between electric and magnetic fields can be established to ensure the phenomenon of electromagnetic wave along the z-axis.. A continuous switching between the fields, resembling a wave, is required to exhibit the phenomenon along the Z axis.

However, complex velocities do not exhibit such anomalies, as we will demonstrate later in this paper.

Einsteinium Philosophy and Author's Reservations

Special Relativity banks upon two postulates.

(1) The postulate which depicts invariance in the transition between contrast states without the application of force. In other words, it is a seamless transition.

(2) The constancy of light speed c across all the frames, which are assumed inertial.

Einstein's foundational postulate of special relativity, inspired by his introspection and empirical investigations into light's behavior, asserted the uniformity of physical laws across inertial frames. The Michelson-Morley experiment [9], revealing light's constant speed[10] irrespective of Earth's motion, led Einstein to challenge conventional notions of absolute space and time. He formulated special relativity, revolutionizing physics and reshaping concepts of space, time, and motion. Influenced by Maxwell's equations, which provided a framework for understanding electromagnetism [11], Einstein's contemplation of relative motion [12], exemplified by passing trains, spurred his inquiry into space-time interconnectedness [13], leading to a novel understanding of the universe's fabric.

In light of these advances, reevaluating Newton's first law had become essential to the continuing discussion.

To comprehend Newton's first law's seemingly antithetical states [14], Einstein hypothesized assigning each state its own frame of reference with an observer. This bi-frame model envisioned ideal conditions without external forces, aiming for optimal performance. Both observers perceive symmetrical observations [15], each asserting the other's motion with equal magnitude but opposite direction. Without external forces, discerning between stationary and moving frames is challenging, though only one frame possesses kinetic energy. Einstein was convinced by this observation, as it aligned with his contemplation of relative motion.
Viewing an event from two perspectives— A perceives B moving at speed (v), and to B, A appears moving at $(-v)$—illustrates this. Both views perceive a transition from rest to motion, showing symmetry [16] though they're facets of the same occurrence.

Author's Perspective of the Same Phenomenon:

The author goes in accordance with discerning facts in real-time, assuming the event throughout is an unbroken observation where counter-observation is part of a single process. Since the two frames model aligns with Newton's first law, necessarily, one frame remains at rest while the other moves at a constant velocity to show two opposite states. In real time, only one observer will see their counterpart moving at a real velocity. However, when the moving counterpart looks back at the stationary one, they perceive their own reflection of motion in this frame, appearing to move at the same rate in the opposite direction.

This perspective reveals a unique aspect of relative motion, where each observer's viewpoint influences their perception of the other's movement. The stationary observer sees the moving frame as traveling at a constant speed, while the moving observer, looking back, interprets the stationary frame as mirroring their motion. This mutual perception underscores the optical nature of relative velocities, distinguishing it from a purely dynamic interaction. The seamless transition between these states, governed by optical perception rather than physical alteration, highlights the complex interplay between observation and counter-observation in defining motion.

It is immaterial which frame is at real velocity and which is at imaginary velocity due to the reflection of the other's motion. When applied, this approach yields real-time results matching the original ground velocities in two-dimensional motion. Real relative velocities show an augmentation that doubles the kinetic energy. This reflection-based interpretation eliminates the distinction between real ground velocities and imaginary velocities, ensuring that the observed motion and kinetic energy calculations are consistent with the actual conditions. The optical nature of this model simplifies the understanding of relative motion by focusing on the perceptual effects rather than dynamic alterations.

Methodologies

3.1 Our Study's Philosophical Approach:

It is based on our study's philosophical perspective of an elusive [22] condition as a constructive projection of optics over kinematics. Its tenacity preserves the phenomenological [23] behavior of bodies in antithetical states of real and imaginary realms, representing rest and motion as complementary to each other. This approach emphasizes the interplay between optical perception and physical reality, ensuring that the conceptual framework remains intact. The complementary nature of rest and motion in this context highlights the coherence of the model, bridging the gap between theoretical constructs and observed phenomena, thus maintaining the integrity of both real and imaginary perspectives.

P is preserved in the state of rest and Q has a rectilinear motion v. P makes no physical displacement. P's perception that Q's motion is real is true because Q possesses kinetic energy and causes a physical displacement which is the prerequisite of real velocity. Q, however, perceives his own movement reflected in P, giving the impression that P is moving when Q is actually moving but feels as though he is not.[3, 6] The gap between them (P & Q) is actually changing, despite the fact that Q maintains he is not moving during the process he is still in motion. Since there is no context, he therefore relates this shift to P; if the distance widens, Q concludes that P is moving away, and if it narrows, P is approaching. However, P physically does not displace. P's motion is therefore imaginary but not real. So, relative motion is a synthesis of real and imaginary motions, exists in (v, $-iv$) or (iv, $-v$). We may use a common plane mirror for a thought experiment to help make this easier to understand.

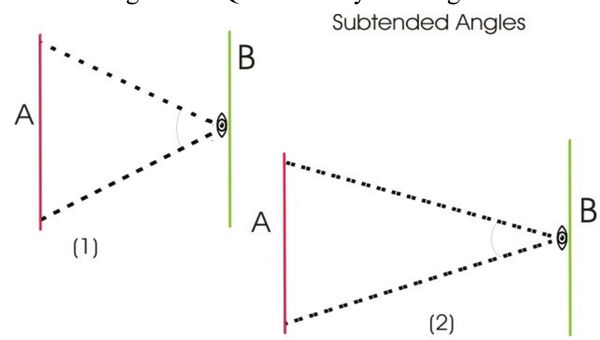

Figure 1A

3.1.1 Plane Mirror Thought Experiment:

Imagine a huge plane mirror where you can't see mirror but only your image, which you may consider a stationary object. If you move towards the image, the image also moves towards you with the same opposite velocity and if you move backward your image also moves backward with the same opposite velocity. You move with real velocity but your image which is your own reflection is imaginary and therefore its movement is also imaginary, which you can say a reflection of your own motion.

3.2 Subtended Angles Gives Impression of Motions

The angle formed at our eye by the lines extending from the edges of the object we are looking at is called the subtended angle. [25] This angle determines the size of the image on our retina and affects how big the object appears. [26] As this angle changes, it creates a sense of motion independent of the physicality of the motion. When the angle decreases, the object seems to be moving away; when it increases, the object appears to be getting closer. Multiple changing angles signify observer being in motion relative to objects. If only one object's angle changes, it's perceived as moving. With two frames and no backdrop, one seems in motion while the other stays static. Observing from frame A , diminishing angle towards B suggests B is moving away at velocity v. From B's view, A remains still, as B observes diminishing angles with multiple objects including A, indicating B's sole motion. When B, in the absence of other objects, perceives angle shifts with A, it infers A's motion, unable to accept its own motion and negates A's resting posture.

Kinematics focuses on the concepts of rest and motion, distinguishing between objects that are stationary and those that are moving.
Optics, on the other hand, doesn't depend on these distinctions; it deals with the behavior of light regardless of the motion of objects. In other words, any alteration in the subtended angle evokes a perception of motion, irrespective of the presence of an actual force on the object or any tangible displacement occurring. This kind of motion, generated through visual observation, is entirely optical nature and cannot represent a real quantity, remaining purely illusory [24].

For example, if object A moves away from a stationary object B, the angle subtended by A as seen by B, remains the same if the roles are reversed (B moving away, from a stationary A). This symmetry means that the motion of one object can reflect back as the motion of the other, making an observer feel that the other object is moving while they are at rest (v, and iv).

Real & Imaginary Realms Cause Seamlessness

However, B is at -*v*, feels motionless, and imagines that the distance traveled by him is actually the distance traveled by A. The conditions envisioned by B are shown in yellow in Fig 1 B, with his own previous state of rest now regarded as immobility and the new state of motion of A seen by B in his own perceived state of stillness. As a result, when B is in real motion and sees the actual resting position of A, an angle is formed on his eye, whereas when B feels motionless in his imaginary position, he sees the position of A's imaginary motion. These angles are equal in the real domain and imaginary domain formed on the eye of B, giving the impression of a smooth transition between rest and motion. If the real domain manifests rest, the imaginary domain complements it with motion, and vice versa.

This complex dynamics, dealing with smooth transitions crucial for electromagnetic waves, cannot exist solely in the real domain but must extend into a complex domain of real and imaginary components, coexisting as optical results. Equal angles at the observer's eye in both domains allow seamless interchange of complementary states without force or visible displacement. These contrasting states of real

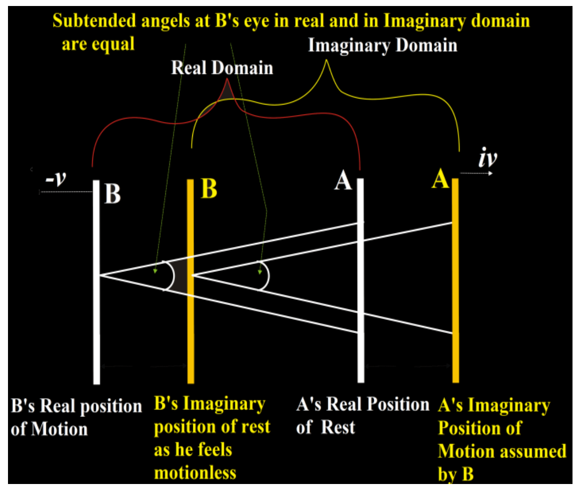

Figure 1 B

and imaginary resemble rest and motion, ensuring Newton's first law's essence of preserving states in the absence of external force holds true even when they exhibit seamless transitions.

3.3 Seamless Transition of States is the Replica of Newton's Law of Inertia:

Without an outside force, Q is traveling at a constant speed v while P is at rest. Q is moving, and when it looks to P, it sees its own motion reflected in P. Because P appears to be going in the opposite direction, it is at $-i\vec{v}$. Thus, P remains in its original location, and Q continues to move in the same direction. Since P has an imaginary vector [27], $i\vec{v}$, which doesn't travel real distance but we may take it as a visual pathway (Rashed, 2007) and Q is traveling rectilinearly, vectors sum or resultant vector is $|\vec{v} - i\vec{v}\ |$ or $v\sqrt{2}$.(modulus of the complex number) and the system magnitude is $|v + iv|$or $v\sqrt{2}$. The vector sum's value and the system's magnitude are clearly equal. In the absence of external forces, this consistency shows that each frame is still preserving it in its previous state. Since the first law is more fundamental and self-contained, it does not require the application of Newton's second law in relation to the concept of mutual observations in the absence of surroundings. It seems that no observation has the ability to generate a force strong enough to move a stationary state. Additionally, under the paradigm, iv stands for resting posture and v for motion. As so, it is the first mathematical expression of Newton's law. Newton's first law thus supports the smooth transition from a state of rest to motion and vice versa, but only in complex forms. When velocities are real, they attract forces.

.4 Violation of Energy Laws

{G stands for Ground velocities, RR for Real Relative velocities, CR for Complex Relative velocities & KE for kinetic energy} [28]

3.4.1 Calculation in ground separate velocities by ground observer

When A and B two opposing trains of mass m contact head-on, a ground observer calculates the kinetic energy of the collisions in each train's separate ground velocities(each moving at v, which is common final velocity at the contact surface) to get the sum, which is $K.E.(A) = \frac{1}{2}mv^2 + K.E.(B) = \frac{1}{2}mv^2$ i.e. $K.E.(G) = mv^2$ Joule ----(1) [28]

3.4.2 Calculation in relative velocities

Observer in A and observer in B calculate energies in their relative velocities assuming that there should be no change in the results if they convert ground velocities into relative velocities. Where, A obtains relative velocity of B by transferring its real magnitude to B. So, A is left with 0 while B keeps $2v\ m/s$.

Hence, A computes $\mathrm{B}'\mathrm{s\ KE} = 2\mathrm{mv}^2\mathrm{J} + 0\ \mathrm{J}$ (of his own as A feels motionless at that moment);

$$\text{Sum of KEs} = 2\mathrm{mv}^2\mathrm{J} \text{ or } \mathrm{KE(RR)} = 2\mathrm{mv}^2\mathrm{J} \quad [30] \qquad (2)$$

$$\mathrm{KE(RR)} \neq \mathrm{KE(G)} \text{ or } \mathrm{KE(RR)} = 2\mathrm{KE(G)}$$

It results in a 200% energy difference, between the ground, and relative velocities. It is a gross violation of conservation kinetic energies. B makes the same computation about A. What goes wrong with real relative velocities?

3.4.3 Corollary

The basics of relative velocity are wrong. When you transfer your train's magnitude to the opposite train's magnitude for getting it added. You treat it as though it were real, which is inconceivable since, when transferring it, you never use force, and neither the opposing train nor yourself are physically involved such as pushing the train from behind.

3.5 Calculation in complex relative velocities

Your both actions transferring of magnitude and at that moment your motionlessness are imaginary. You only feel motionlessness momentarily but remains in motion and the same way you feel as if you are transferring your magnitude to opposite train. So go by real time analysis. Add your imaginary magnitude to the real magnitude of the opposite train. $|0i|$ and $|v + iv|$ would be the relative velocities, if you calculate the sum of kinetic energies it will be $|0i| + \frac{1}{2}m(|v + iv|\,)^2 => mv^2$ -------(3) or

KE(CR) = KE(G).

Zero difference between energies is obtained. This implies relative velocity would be $v\sqrt{2}\ m/s$ and not that $2v\ m/s$. Khilji (2022). Absolutely, no difference between what you obtain from ground velocities and what you obtain now using complex relative velocities.

3.5.1 Corollary 2

Such a transfer of magnitude is something that is only ever imaginable. Nothing is ever truly real. You feel as though you are in stasis as the train in front of you accelerates abruptly as it passes you, yet you are actually moving at the same speed. So the major shift we see in the relative velocity which is not $2v$ but $v\sqrt{2}$ or it will not be $v + u$ but $\sqrt{v^2 + u^2}$ where $\sqrt{v^2 + u^2} < (v + u)$.

3.5.2 Remarks:

It is valid for opposite velocities only where transfer of magnitude is mandatory part of the process and hence, in methodology. But in unidirectional velocities where transfer is not mandatory to obtain relative velocities and where both real magnitudes are compared to determine the outcome, traditional method will work. Therefore, Newton is right in his inertial frames, in which there is only one state of motion and one resting posture. *jk* Transformation $x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$, $t' = \frac{t - \frac{vt}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}}$ & Inverse law $x = \frac{x' + ivt'}{\sqrt{1 - \frac{(iv)^2}{c^2}}}$, $t = \frac{t' + \frac{ivt'}{c^2}}{\sqrt{1 - \frac{(iv)^2}{c^2}}}$ Khilji (2022, 2017)

3.5.3 Vectors vs. Scalars

When a dynamic observer considers himself motionless, he sees the steady observer as dynamic because he adds the distance travelled by himself in the state of alleged motionlessness to the stationary observer . However, this is not true in scalar quantities because it lacks directionality; only a change in quantity is possible. If someone is experiencing an increase in quantity but refuses to accept this change, he will consider the increase as normal and to normal he would say as decreased. So steady observer observes moving observer in increased mass due to kinetic energy, the moving one doesn't accept any change in him, in that case he will react that steady one is losing mass.**5.**

4. Elastic Glancing Collision

Consider two coordinate systems S and S', S' approaching S with velocity v along +ve X direction of their common axis as shown in Fig. 1B, taking cues from the hypothetical experiment of Tolman and Lews (1909)[31]. Particles traveling along the Y and Y' axes in opposing directions collide when the frames line up. An elastic particle P in frame S is moving at u_y velocity along Y axis without any X or Z components. Since m_0 is the mass of the particle at

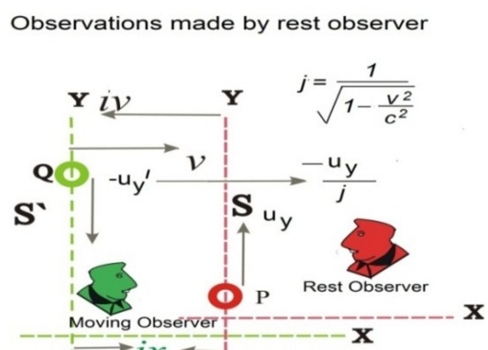

Fig. 1B

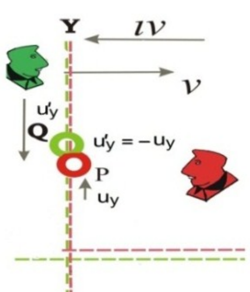

Fig 1C

rest with S, $m_0 u_y$ is the particle's momentum. The observer of frame S now sees frame S', in which another elastic particle Q is at $u_{y'}$ along Y' axis of frame S'in -ve Y'direction such that $u_{y'} = -u_y$. Q is not in the observer's own frame but in the primed frame. **T**his means that the observer does calculations using the first transformation equation, which is the same for the Lorentz and jk transformation laws. i.e., $u_{y'} = \frac{-u_y}{j}$ or $u_{y'} = -u_y\left(\sqrt{1 - v^2/c^2}\right)$,

where $J = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$. As a result, the observer in S determines Q's momentum to be $-mu_y\left(\sqrt{1 - v^2/c^2}\right)$ and (mv) because Q also has an X-component, which is $+v$ due to S' motion. Thus, the observer measures the combined momentum of P and Q before to collision in $S = m_0 u_y + mv + m\frac{-u_y}{j}$.

When a particle is moving, S' always corresponds with frame S, as seen in Fig. 1D It is Because the two

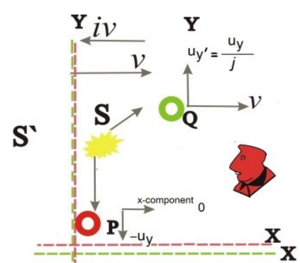

Fig 1D

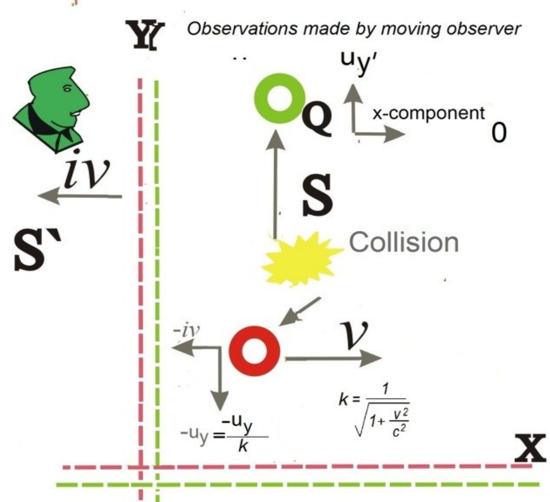

Fig 1E

particles have opposite but equal magnitude of velocities and masses when at rest in their respective frames, this results in a collision where an upward P, collides with a downward Q. In a post-collision situation their positions and speeds will switch, Q appears at $+u_{y'}$ and P at $-u_y$ (see Fig. 1E).

Consequently, when two particles collide, their combined momentum is

$$S = -m_0 u_y + mv + m\frac{u_y}{j} \quad (2)$$

Following the conservation laws

Total momentum before collision =Total momentum after collision

$$m_0 u_y + mv + m\frac{-u_y}{j} = -m_0 u_y + mv + m\frac{u_y}{j}$$

$$=> 2m_0 u_y = 2m\frac{u_y}{j} \ (3) \text{ or } m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}} \quad (4)$$

The moving particle Q in S' appears to grow, a phenomenon known as relativistic growth R_i, observed by the rest-observer in S.

The observer in S' determines that Q's momentum is equal to $-m_0 u_{y'}$.The observer in S' now sees S heading toward him with$-iv$ velocity, in accordance with complex relative motion. Because P is at u_y along the Y axis, the observer in S' calculates $u_y = \frac{u_y'}{k}$ or $u_y = u_{y'}\left(\sqrt{1+v^2/c^2}\right)$ using the inverse jk transformation law where $k = \frac{1}{\sqrt{1-\frac{(iv)^2}{c^2}}}$ to determine P's momentum along the Y axis. Therefore, the observer in S' determines the total momentum of both particles before to impact

$$S' = -m_0 u_{y'} - m(iv) + \frac{mu_y'}{k} \quad (5)$$

However, collision occurs when the frame coincides. Therefore, in a post-collision scenario they will appear to be changing positions and velocities; specifically, Q will appear to be traveling with $u_{y'}$ whereas P appears at $-u_y$,, or $\frac{-u_y'}{k}$, as shown in Fig. 1D. Thus, following the collision, the combined momentum of the two particles equal

$$S = m_0 u_{y'} - m(iv) + \frac{-mu_{y'}}{k} \quad (6)$$

Now, let us equate equations (5) and (6).

$$-m_0 u_{y'} - m(iv) + \frac{mu_{y'}}{k} = m_0 u_{y'} - m(iv) + \frac{-mu_{y'}}{k}$$

$$=> m = \frac{m_0}{\sqrt{1+\frac{v^2}{c^2}}} \quad (7)$$

The observer in grown mass, observes that his counterpart at rest, who lacks kinetic energy, is shedding mass. This reduction in mass is referred to as the relativistic decrease (R_d). Since complex vectors exhibit natural symmetry and reciprocity [5] and it is challenging to distinguish which is at rest and which is in motion, we incorporate a composite view by taking ratio of real to imaginary, or j to k which are the coefficients of m_0 i.e. $\frac{j}{k} = \frac{\sqrt{c^2+v^2}}{\sqrt{c^2-v^2}}$, We multiply it back by m_0 to obtain the relation

$$m(v) = \frac{m_0\sqrt{c^4-v^4}}{(c^2-v^2)} \quad (8)$$

The travelling mass increases in the same ratio as Einstein anticipated. However, at c, R_i is ∞, denoting energy content, while at the precise instant $R_d = 0$, their product $R_i \times R_d = \infty \times 0$ is indeterminate, denoting the photon's mass. Reason being,$R_i > R_d$ [2]. This suggests that at c, matter turns into photons.

Additionally, emerging photons will acquire shorter and much shorter wavelengths, forming gamma rays of various wavelengths, which will produce, providing a hint to GRBs, in accordance with the de Broglie relation at c, $\lambda = \frac{h}{mc}$. [2] According to new mass relation relativistic decrease and relativistic increase in rest mass at c would be 0 and ∞ respectively when $m_0 \neq 0$. Thus mass vary uniformly on scale in the diagonally opposite directions. Therefore 0 and ∞ can be taken as -1 and 1 on scale. Now one can conclude that the probability density function of the mass, x, is uniform: $fx(x) = \frac{1}{2}$ (9)

However, when $v < c$ according to mass relation, the probability density function of mass of the object undergoes a change i.e. $fy(y) \neq \frac{1}{2}$ so the relative entropy would be a measure of the differences between two probability distributions: from a "true" probability distribution X to an arbitrary probability distribution Y. which is as follows $H(X{:}Y) = \sum fx(x) \log\frac{fx(x)}{fy(y)}$ [32,3] (10)

4.1 Antimatters

The two-way interactions (relation between mass and energy) [33] [34] between matter and the field are denoted by the symbols R_i and R_d. R_d is the portion of mass dissolving at higher velocities, and R_i is the energy content added to the rest mass proper [35] Dissolve keeps the acceleration constant even as the velocity approaches c. Acceleration is always present within the particle, even when its intensity is decreasing. It never stops. $R_i > R_d$, hence the composite mass remains greater. Different kinds of subatomic particles connected to the initial particle show this presence at every level, and the field adds mass to mass even as the mass dissolves.

Antimatter [36] is created when half of the mass dissolves at 80% of c, Khilji (2004, 2011) since the process is the opposite of field into matter: it is matter into field. As a result, the original particle's spin is opposite in the new particle. Using the de Broglie relation $\lambda = \frac{h}{mv}$ [37] and the fact that mass at c fully dissolves into infinite energy content, leaving the product (mass×field) i.e.$(0 \times \infty) =$ indeterminate, which is the mass of the photon at c, we can determine the wavelength that the emerging photon inherits from the particle that transformed into a photon. We now know how gamma rays are created, along with [36] and other massless stuff [38] The results of the observations indicate that natural pions (symbol π^0), unstable, brief-lived particles that might be created by collisions in particle accelerators, are accelerated up to 0.99975c, or just shy of c.

However, it is observed that they ultimately split into two gamma ray photons throughout the process. $(\pi^+\pi^-\pi^0 \rightarrow 2\gamma)$[39, 40]. The fact that the transition occurs instantly makes it less evident that the particle velocities eventually seem to equalize c during the process.

5. Length Variation:

In a moving frame, an object's horizontal dimension [41] looks to be getting contracted.[42]. Experimentally, an observer on Earth observes a longitudinal expansion of the moving distance. The horizontal dimension in the rest frame, however, appears to be contracting to a moving observer. Assuming that only the inverse laws listed below differ, we will calculate the outcomes susing the jk Transformation Laws.

$$x = \frac{x' + ivt'}{\sqrt{1 - \frac{(iv)^2}{c^2}}} \ (11) \quad t = \frac{t' + \frac{ivt'}{c^2}}{\sqrt{1 - \frac{(iv)^2}{c^2}}} \ [5] \qquad (12)$$

When at rest, the two objects A in frame S and B in S' should have lengths L_A and L_B that are equal, or $L_A = L_B = L_P$ (length proper at rest).

$L_A = x_2 - x_1$, and $L_B = x_2' - x_1'$ ' are measured in S and S', respectively.

However, at $t_2 = t_1$, two measurements are taking place simultaneously in the rest frames.

Using the reverse *jk* laws of transformation, we now obtain $x_2 - x_1 = \frac{x_2' + ivt_2' - (x_1' + ivt_1')}{\sqrt{1 - \frac{(iv)^2}{c^2}}}$

$$L_P \frac{L_B}{\sqrt{1 - \frac{(iv)^2}{c^2}}} \ Or \ L_B = L_P \sqrt{1 - \frac{(iv)^2}{c^2}} \qquad (13)$$

However, L_B, an object's initial length in S' when it is travelling, will become L' for an observer in S as the object lengthens (Ref. Eq. (13))

$$.L' = L_P \sqrt{1 + \frac{v^2}{c^2}} \quad (14)$$

The horizontal dimension in frame S will be visible to the viewer in the moving frame S' following the jk transformation

$$x_2' - x_1' = \frac{x_2 - vt_2 - (x_1 - vt_1)}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad (15)$$

Where two are simultaneous measurements in the moving frames at $t_2' = t_1'$ $L_P = \frac{L_A}{\sqrt{1 - \frac{v^2}{c^2}}}$

$$\text{Or } L_A = L_P \sqrt{1 - \frac{v^2}{c^2}} \qquad (16)$$

However, L_A , an object's initial length in S when it is moving, will become L for an observer in S' when the object contracts (Ref. Eq. (16)) $L = L_P \sqrt{1 - \frac{v^2}{c^2}}$

(17)

The ratio of lengths that appear, $L' : L$, provides a composite observable picture that allows one to determine whether they are at rest or moving, that is, contracting or lengthening. Now by rationalizing the denominator, we have

$$\frac{L'}{L} = \frac{\sqrt{c^4 - c^4}}{(c^2 - v^2)} \quad L' = L \frac{\sqrt{c^4 - c^4}}{(c^2 - v^2)} \qquad (18)$$

The observer in moving frame observes the horizontal dimension of the object in rest frame is $L' = L \frac{\sqrt{c^4 - c^4}}{(c^2 - v^2)}$ and the observer in rest frame observes the horizontal dimension in moving frame is $L = L' \frac{(c^2 - v^2)}{\sqrt{c^4 - c^4}}$.

Moving length is therefore growing longer in frame S', and the phenomena is seen in frame S. Contrarily, the length appears to be shrinking in S and the phenomenon is visible in frame S', but at c, when matter changes into a photon, both the observers detect the length is indeterminate. The photon has no frames, existing in an indeterminate form where length contraction reaches zero and lengthening becomes infinite.

4.2 Experimental Support to Our Concept

The conclusions we reached about changes in relative motion and transformation laws are similar to V. N. Streltsov's findings on increased longitudinal dimensions of fast-moving objects. Using clocks and light signals (similar to the radar method) from 1967 sto 1974, Streltsov demonstrated that these dimensions increase with speed. This concept aligns with relativistic electrodynamics. Streltsov, a Russian nuclear physicist at the Joint Institute for Nuclear Research in Dubna, published relevant works such as P2-3482 (1967), P2-5626 (1971), P2-7647 (1973), and a preprint in 1974.[44]

Persistence of vision [45] has a crucial role in the appearance of an object's longitudinal expansion

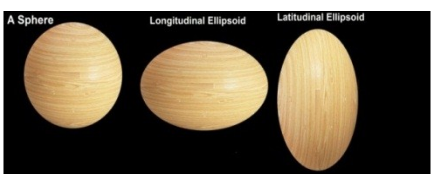

Figure 1 F: For a home observer, a sphere appears unchanged since both share same frame. Relative to the observer, a sphere at real velocity (v) appears as a longitudinal ellipsoid due to lengthening feature. To moving observer a stationary sphere appearing as a latitudinal ellipsoid at (iv) due to contraction.

sunder relativistic velocity. A picture can remain on the retina of the human eye for 0.06 seconds. The eye will absorb both the previously generated image and the new image as a single unit if another image appears on the retina during this period. For instance, instead of appearing as separate dots in a red line, a burning stick of incense would appear as a circle if it were rotating at a rate greater than 16 revolutions per second. Similar to this a jet airliner flying at 450 km/h generally discharges its exhaust at 750 km/h (208.34 m/s), which causes the retina to form a picture of the particle for 0.0048 sec., which is less than 0.06 sec. Because of this, exhaust gas seems to be lengthening in straight line rather than dispersing randomly in the environment. The same cause will serves and pattern persists at relativistic speed more rigorously and rapidly because 0.00000001 seconds.

4.2.1 How Electromagnetism is perceived under the lengthening and contraction is in short :

It sheds light on the relationship between electricity and magnetism, showing that frame of reference determines if an observation follows electric or magnetic laws. It motivates a compact and convenient notation for the laws of electromagnetism, namely the "manifestly covariant" tensor form.

In the realm of electromagnetic phenomena, intriguing transformations unfold with motion: as an

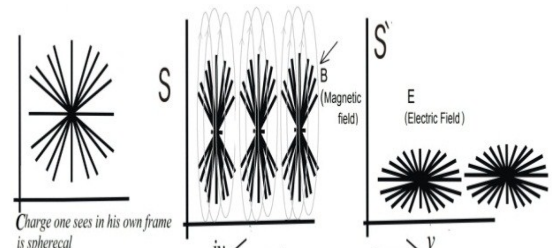

Figure 1 G: in the first fig. charge at rest is sphere. in second charge in latitudinal ellipsoid due to contraction growing charge density, hence strong magnetic field. Third is elongation electron flow is more as longitudinal shape of charge with less density.

object moves, its length appears to elongate [44], while at rest, it contracts. sends to charged entities, assuming a spherical guise when stationary, yet manifesting as longitudinal ellipsoids in motion, thereby stretching along the X-axis and increasing spatial occupation. Consequently, electrons find themselves distanced from one another, resulting in diminished electron charge density and a consequent absence of magnetic field generation, allowing rapid flow of electrons. However, when observed from a moving frame, stationary charges undergo a contraction, adopting a vertical ellipsoidal form aligned with the Y-axis. In this configuration, a greater number of charges can be accommodated within a smaller spatial domain, engendering a potent magnetic field along the Y-axis by virtue of an imaginary velocity (iv). Thus, the Y-axis emerges as an imaginary axis, marked by a robust magnetic field. This juxtaposition of real electric field values along the X-axis and imaginary magnetic field values along the Y-axis permits the propagation of electromagnetic waves in complex form along the Z-axis. Maxwell equations are found invariant under *jk* Transformation Laws.

Because of the extending feature, the photon stream will appear as a ray; but, with contraction, it should appear as a single dot. Gamma rays produced by supernovae [46] reach us intact because photons may travel interstellar distances without losing much energy as a result of this lengthening property. The lengthening feature is the only reason why faster muons go farther than slower muons.

5. Time Concentration and Dilation using *jk* Transformation Laws

H. Field argues that time moves faster in moving bodies [47], though his argument is weak since the Lorentz transformation only indicates dilation. Conversely, the jk transformation, unlike Lorentz [48], supports this idea. Even though we can't control nature, we believe it will guide us in understanding its complexities through natural phenomena, which we can then incorporate into our theories. In the following section, we will discuss such phenomena. A clock in a moving frame runs quickly or time accumulates, yet the moving observer measures time as dilating in the rest frame, according to the *jk* transformation, which follows them. Each clock displays "proper time" within its own frame. If the time interval $t_P = t_2^{'} - t_1^{'}$ is measured in a moving frame of reference, the *jk* transformation can be used to get $t_P = t_2 - t_1$

$$.t_2 - t_1 = \frac{t_2^{'} + \frac{ivx^{'}}{c^2}}{\sqrt{1 - {(iv)^2}/{c^2}}} - \frac{t_1^{'} + \frac{ivx^{'}}{c^2}}{\sqrt{1 - {(iv)^2}/{c^2}}} \quad [5,24]$$

$$t_2 - t_1 = \frac{t_2' - t_1'}{\sqrt{1 - {(iv)^2}/{c^2}}} \text{ Or } t_P = \frac{t}{\sqrt{1 - {(iv)^2}/{c^2}}} \quad (19)$$

This demonstrates how a stationary observer might perceive time as passing quickly in a moving frame. Let's examine how the observer in a moving frame perceives the clock in a stationary frame.

The moving observer measures the time interval $t_P = t_2 - t_1$ using the jk transformation, and then the *jk* transformation can be used to determine $t^{'} = t_2^{'} - t_1^{'}$.

$$t_2^{'} - t_1^{'} = \frac{t_2 - \frac{vx}{c^2}}{\sqrt{1 - {v^2}/{c^2}}} - \frac{t_1 - \frac{vx}{c^2}}{\sqrt{1 - {v^2}/{c^2}}} \quad [1, 2]$$

$$t_2^{'} - t_1^{'} = \frac{t_2 - t_1}{\sqrt{1 - {v^2}/{c^2}}} \Rightarrow t_P = \frac{t^{'}}{\sqrt{1 - {v^2}/{c^2}}} \quad (20)$$

The ratio of $t^{'}:t$ will provide a composite analysis of observers, which is necessary because the observer cannot distinguish between the status of the state i.e. t_0 rest and motion, and would learn only through the results if the time is concentrating or dilating. Since, the proper time for each frame, is equal in the magnitude at rest, the above ratio will give a composite analysis of observers. As a result, when Eq. (20) is divided by Eq. (19), we get

$$\frac{t^{'}}{t} = \frac{\sqrt{1 - {v^2}/{c^2}}}{\sqrt{1 + {v^2}/{c^2}}} \Rightarrow t^{'} = t\frac{c^2 - v^2}{\sqrt{c^4 - v^4}} \quad (21)$$

When measured by the observer in his own frame S, t is equal to t_P in this case. As a result, the relationship would be $t' = t\frac{c^2 - v^2}{\sqrt{c^4 - v^4}}$, indicating that to the observer in S, the time in S' appears to be passing quickly. On the other hand, $t = t' = t_P$ if measured by the observer in his own frame S'. Thus, the relationship $t = t'\frac{\sqrt{c^4 - v^4}}{c^2 - v^2}$ denotes that to the observer in S', the time in S appears to be extending. Additionally, the photon state at c is not an eigenstate of the phase operator since the value of time there is indeterminate.

5.1 LCT Experiment is a Failure

Two flat mirrors, one positioned exactly above the other at a distance, make up a light clock [49]. The incident and reflected light beam between the two mirrors will be perpendicular to the mirrors. This indicates that time is running fast. When a clock is in motion, the bottom mirror appears to be stationary when it emits ray, while the top mirror appears to be moving ahead of the bottom one and the ray appears to be slanting. When the top mirror reflects the ray, it appears to be stationary, the bottom mirror appears to be moving forward, and the ray appears to be slanted again in the opposite direction making the rays spreading. This indicates that time is continuously slowing down. With a small gap of few meters, two mirrors will look a single unite. If gap is sizable of some kilometers, because of **lateral motion parallax** [50], the closer mirror at the bottom will appear to be moving much more quickly than the top mirror, which is not causing the phenomena of spreadinrays and instead stays pointed in the same direction. Einstein predicted that, under perfect conditions, light travels 300,000 km in one second. Thus, this distance between the mirrors would be ideal. However, our belief, due to the unavoidable factor of motion parallax, the top mirror appears stationary while the bottom one is constantly moving. Consequently, under these conditions, the expected results cannot be achieved.

5.2 Lightening and Thundering Sounds

The simplest and most straightforward method is the natural approach. Imagine you travel 1000 kilometers at a constant speed of 100 kilometers per hour and return without stopping. Meanwhile, your friend makes the same trip at a constant speed of 1000 kilometers per hour by jet. A wall was only sbeginning to be built when you both started your journey. When your friend returned, he saw that the wall was only two feet high. However, when you returned, the wall had grown to ten feet high. This indicates that much more time had passed on Earth for you, while for your friend, time was passing much more slowly.

Natural processes follow their own path; they are not interrupted or altered. The pattern is the same for relativistic velocities. We cannot impose our manipulation on it; we only decipher it.

The concept of time running fast (time concentration) in moving frames can be understood through a natural phenomenon: the simultaneous occurrence of lightning and thunder. Compare lightning flashes to fast-moving muons and thunder to slow muons. Fast muons, traveling near the speed of light, experience time dilation and can reach the ground before decaying, while slow muons decay quickly and cannot even enter the atmosphere. Similarly, lightning should appear till last and last longer than thunder if time dilation applied, but in reality, lightning vanishes quickly while thunder lingers. This natural phenomenon suggests that in fast moving frames, time runs faster, supporting the concept of time concentration. Fast moving muons travel extra distances due to lengthening of length.

5.2.1 Concentration Of Mass And Time Go Hand In Hand.

Growing mass, which grows with rising velocity, is the cause of the acceleration's propensity to decrease. The acceleration in dynamics $a = \frac{F}{m}$ [51] experiences this rise in the denominator. The same acceleration in its kinematic relation, $a = \frac{v}{t}$, is similarly impacted by this decrease, and its denominator, time t, is proportionally increased. A force initially applied to an object accelerates it, and at relativistic velocities, the object's mass increases, making the same force less effective. This means the force effectively changes, and the difference between the new and old force creates a new time interval. As the object's velocity approaches the speed of light, very small time intervals are generated in large numbers. At c, an infinite number of intervals of zero value appear, resulting in indeterminate time.

6 Relativistic Force under jk Transformation:

The analysis of a single observation is based on the assumption that observable conditions in both the rest and motion frames are equivalent in the current theory. But in our case, we analyze each observation separately to produce a composite relation that satisfies both observations. Therefore, we consider two identical particles A and B, each with mass, where A is at rest in frame S and B is at rest in frame S', which is travelling with velocity in relation to frame S. B is actually moving since a constant force is exerted on the particle. In both circumstances, we must ascertain the trend towards acceleration. With the observer A in S and the relativistic momentum $\vec{P} = jm\vec{v}$ where $j = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$. Because the initial equation in the *jk* and Lorentz models is the same, we obtain the same relationship as in the prevailing theory

Hence, $= \frac{\vec{F}}{m_0}\left(\sqrt{1-\frac{v^2}{c^2}}\right)^3$ [52] (22)

So, the observer A in frame S observes $B's$ acceleration a is decreasing to give v a way to increase and at c, a comes down to zero while $v \to c$.

However, when the observer B from the primed frame S' observes the particle A in the unprimed frame S, it seems to be experiencing a constant force and accelerating in the opposite direction. Due to *jk* principles, only one example of the relative motion may be genuine while the other is effectively fictitious, leading to relativistic momentum in this circumstance. $\vec{P} = km\vec{v}$ (23) where $k = \frac{1}{\sqrt{1-\frac{(iv)^2}{c^2}}}$

but the relativistic momentum of A for B is

$$P = \frac{m_0 v}{\sqrt{1+\frac{v^2}{c^2}}} \quad (24)$$

$$\vec{F} = \frac{d\vec{p}}{dt} = \frac{d}{dt}(m\vec{v}) \quad (25)$$

Here also the time derivative of relativistic momentum vector should be equal to the force acting on the particle

$\vec{F} = \frac{d\vec{p}}{dt} = m\frac{d\vec{v}}{dt} + v\frac{dm}{dt}$ but m is relativistic mass, hence, $\vec{F} = km\vec{a} + v\frac{d}{dt}(m_0 k)$ (26)

Let us see if force is in the direction of both acceleration and velocity the result we get about time.

$\vec{F}\, \vec{a}, \vec{v}$ being in the same direction

$$F = \frac{d\vec{p}}{dt} => \frac{d}{dt}\left[m_0 v\left(1+\frac{v^2}{c^2}\right)^{-\frac{1}{2}}\right] \quad (27)$$

$$m_0\left[\left(1+\frac{v^2}{c^2}\right)^{-\frac{1}{2}}\frac{dv}{dt} + v\left(-\frac{1}{2}\right)\left(1+\frac{v^2}{c^2}\right)^{-\frac{1}{2}-1}\left(\frac{2v}{c^2}\right)\frac{dv}{dt}\right],$$

$$\vec{F} = m_0\left(1+\frac{v^2}{c^2}\right)^{-\frac{3}{2}} a => k^3 m_0$$

Or $a = \frac{\vec{F}}{m_0}\left(\frac{1}{k^3}\right)$ (28)

$$=> a = \frac{\vec{F}}{m_0}\left(\sqrt{1+\frac{v^2}{c^2}}\right)^3 \quad \text{s} \quad (29)$$

Since the relative motion is synthesis of real and imaginary motions, we incorporate both the observations which lie in j and k. Here they are coefficients of $\frac{\vec{F}}{m_0}$ in the form of $\frac{1}{j^3}$ for real value and $\frac{1}{k^3}$ for imaginary value so, we take the ratio real to imaginary and multiply with $\frac{\vec{F}}{m_0}$ to get back the acceleration which is given below

$$a = \frac{F}{m_0}\frac{\left[\sqrt{1-\frac{v^2}{c^2}}\right]^3}{\left[\sqrt{1+\frac{v^2}{c^2}}\right]^3} \quad (30)$$

This can be deduced to our standard form by dividing and multiplying with the real value $\sqrt{1-\frac{v^2}{c^2}}$

Consequently, the relativistic acceleration,

$$a = \frac{F}{m_0}\left[\frac{(c^2-v^2)}{\sqrt{(c^4-v^4)}}\right]^3 \quad (31)$$

is given by the jk Transformation laws (31) decreases at increasing velocity, but it still retains some value in the form of "indeterminate" at c. The term "flexible acceleration" is used to describe it. Flexible acceleration allows photons to modify their wavelength while maintaining the same speed (c), which is impossible at zero acceleration

7 Conclusions

The study delves into Newton's first law, highlighting its critical role in facilitating smooth state transitions absent of external forces while introducing complex dynamics. These transitions, vital for electromagnetic waves, cannot be confined solely to the real domain but must extend into a complex domain comprising real and imaginary components, manifesting as optical outcomes. At the observer's eye, equal angles in both domains enable a seamless interchange of complementary states without force or visible displacement. These contrasting states, analogous to rest and motion, ensure that Newton's first law remains valid in preserving the state of an object when external forces are absent, even as they undergo smooth transitions. Critiquing special relativity, the study argues for inertial frames where the vector sum and magnitude of velocities remain constant, unlike special relativity's approach with an absolute sum of $2v$ and vector sum of 0, which leads to full acceleration making seamlessness unable. The relationship between mass velocity, time variance, and length variance has been explored, based on a 2004 paper discussing matter-space interactions. This notes that in a one-way interaction the acceleration will stop as the mass increases. But the acceleration continues at all speeds, because the energy change in small mass portions accelerates them without breaking physical laws, because the total mass is greater than the rest of the mass. At the speed of light, infinite energy means total energy dominance, converting matter into energy and creating photons, thereby reducing the wavelength, gamma rays that cause GRBs. A translation of the interaction into relativity in 2011 revealed complex velocities with vector symmetry versus scalar asymmetry. In 2017, new coordinate transformation laws were published, which differed from Lorentz inversion, and in 2022, these findings became a book chapter, showing that relative velocities in two-dimensional motion violate energy conservation, while not complicating. Practical examples include the persistence of vision, such as a rapidly rotating burning incense stick appearing as a continuous red circle, jet smoke appearing in a straight line. And the stream of photons appears as rays. Gamma rays from supernovae retain energy at interstellar distances, and faster-moving muons travel additional distances. The paper shows that in moving objects, time moves fast but time expands at rest, for example fast moving muons travel longer distances due to time dilation, so due to dispersion, lightning flashes should last for hours, fading in a few seconds, and thunderstorms should stop immediately like slow muons that last longer.

Classical mechanics supports these results, as increasing mass decreases acceleration, thereby increasing time intervals in the kinetic relationship. At the speed of light, the parameters become uncertain, creating a region where particles are frameless, massless, and timeless. The study reveals complex electrodynamics that leads to complex wave functions. A fundamental shift in perspective enables observers to determine whether they are at rest or in motion relative to another object. These results are generated from real-time analysis of natural phenomena. The expansion of moving objects helps in the understanding of rays, waves and neutrinos in deep space, which affects the knowledge of dark matter and dark energy. This understanding facilitates the rapid resolution of entangled particles throughout the universe. These inverse results resemble qubits, where opposite states coexist with interconnectedness, such as contraction and expansion, representing zero and one, respectively, with time dilation and concentration, and mass accumulation and dissolution, such that infinity and zero are in the same state.

Acknowledgement

Mrs. Aqila and Mr. Kherulla, my late parents, are honored in this work. My siblings have been helpful, and I appreciate them. Prof. Zafar Ahsan, former chair of the AMU mathematics department, president of the Tensor Society of India, and recipient of the 2011 International Einstein Award, had praised my attempts to present new ideas in special relativity, particularly the complex form. He has my undying gratitude.

Author Contributions:

The author is alone accountable for the work he has submitted to this journal, which is wholly original, just as he is the only author of the pieces he has had published in various journals that are cited in this work.

Declaration

Ethical Approval This declaration is “not applicable”.

Competing interests

There is no conflict of interest with the author.

Authors' contributions

Author is alone; there is no co-author. His own efforts may be seen in all of his past papers, including this one.

Funding

The author has not received any research grant from either public or private organisations. Author pays all expenses out of his meagre salary.

DATA AVAILABILITY

Researchers, interested authors, and students can quickly obtain data in all forms if they visit the ResearchGate.Com website.

All other links inside the following link, https://www.researchgate.net/profile/Javed-Khilji/research, will open.

However, separately the links are given below

https://www.researchgate.net/publication/265198062_Modified_Field_Theory#fullTextFileContent https://www.researchgate.net/publication/258547021_Intrinsic_laws_of_motion_are_invariant

https://www.researchgate.net/publication/315936611_Modified_transformation_laws_of_coordinates_and_composition_of_velocities

https://www.researchgate.net/publication/362285720_jk_Transformation_Laws_of_Coordinates_and_Composition_of_Velocities

https://www.researchgate.net/publication/365161234_Base_of_Relativity_is_Shaky_Einstein_Proved_Wrong_a_part_of_jk_Transformation_more_elaborately_Explained

References

[1] Guicciardini N. Isaac newton, philosophiae naturalis principia mathematica, (1687). In Landmark Writings in Western Mathematics 1640-1940 2005 Jan 1 (pp. 59-87). Elsevier Science.

[2] Khilji J. Intrinsic laws of motion are invariant. Physics Essays. 2011 Dec 1;24(4):604-12.

[3] Khilji MJ, Thatipur DG. Modified Field Theory. Journal of Theoretics. 2004;6(6).

[4] Khilji MJ. Modified transformation laws of coordinates and composition of velocities. International Journal of Aadvanced. 2017.

[5] Khilji MJ. jk Transformation Laws of Coordinates and Composition of Velocities. New Trends In Physical Science Research Vol. 7, BP International, (2022)

[6] D'Auria R, Trigiante M. From special relativity to Feynman diagrams. Milan: Springer-Verlag; 2012.

[7] Einstein A, Lorentz HA, Weyl H. The principle of relativity. Courier Corporation; 2013 Apr 22.

[8] Hecht E. Origins of Newton's first law. The Physics Teacher. 2015 Feb 1;53(2):80-3.

[9] Shankland RS. Michelson-morley experiment. American Journal of Physics. 1964 Jan 1;32(1):16-35.

[10] Ellis GF, Uzan JP. c is the speed of light, isn't it?. American journal of physics. 2005 Mar 1;73(3):240-7

[11] Einstein, A., 1905. On the electrodynamics of moving bodies.

[12] Stinner A, Metz D. Thought experiments, Einstein, and physics education. Physics in Canada. 2006 Nov;62:361-72.

[13] Mobley MJ. A Reexamination of Time and Special Relativity Assuming a Constant Speed for Quantum Subcomponents. Physics Essays. 2005 Sep 1;18(3).

[14] Norton JD. 5 Geometries in collision: Einstein, Klein and Riemann¹. The Symbolic Universe: Geometry and Physics 1890-1930. 1999:128.

[15] Mobley MJ. A Reexamination of Time and Special Relativity Assuming a Constant Speed for Quantum Subcomponents. Physics Essays. 2005 Sep 1;18(3).

[16] Friedman Y, Scarr T. Symmetry and special relativity. Symmetry. 2019 Oct 3;11(10):1235.

[17] Alfriend KT, Yan H. Evaluation and comparison of relative motion theories. Journal of Guidance, Control, and Dynamics. 2005 Mar;28(2):254-61.

[18] Heijungs R, Guinée JB, Mendoza Beltrán A, Henriksson PJ, Groen E. Everything is

relative and nothing is certain. Toward a theory and practice of comparative probabilistic LCA. The International Journal of Life Cycle Assessment. 2019 Sep 1;24:1573-9.

[19] Zakamska NL. Theory of special relativity. arXiv preprint arXiv:1511.02121. 2015 Nov4

[20] Perthame B.Kinetic formulation of conservation laws Oxford UniversityPress;2002,Dec5.

[21] Haskell RE. Special Relativity and Maxwell's Equations. Computer Science3 and Engineering Department, Oakland University, Rochester, Mi. 2003 Jul;48309.

[22] Wertheim AH. On the relativity of perceived motion. Acta Psychologica. 1981 Jan 1;48 (1-3):97-110.

[23] Finlay L. Ambiguous encounters: A relational approach to phenomenological research. ‘ Indo-Pacific journal of phenomenology. 2009 May 1;9(1):1-7.

[24] Albert DZ, Galchen R. A quantum threat to special relativity. Scientific American. 2009 Mar 1;300(3):32-9.

[25] McCready D. On size, distance, and visual angle perception. Perception & Psychophysics. 1985 Jul;37:323-34.

[26] Kaufman L, Richards W. Spontaneous fixation tendencies for visual forms. Perception & Psychophysics. 1969 Mar;5(2):85-8.

[27] Carter,P.J., 2014. Imaginary Physics

[28] Hohensee MA, Müller H, Wiringa RB. Equivalence principle and bound kinetic energy. Physical review letters. 2013 Oct 11;111(15):151102.

[29] Chernyavsky D, Gapon D. The relationship between the laws of conservation of energy and momentum for low speed impact of several bodies. Journal of Applied Nonlinear Dynamics. 2020 Jun 1;9(2):259-71.

[30] Haugan MP. Energy conservation and the principle of equivalence. Annals of Physics. 1979 Mar 1;118(1):156-86.

[31] Lewis GN, Tolman RC. The principle of relativity, and non-Newtonian mechanics. In Proceedings of the American Academy of Arts and Sciences 1909 Jul 1 (Vol. 44, No. 25, pp. 711-724). American Academy of Arts & Sciences.

[32] Kak S. Moving observers in an isotropic universe. International Journal of Theoretical Physics. 2007 May;46:1424-30.

[33] Okun LB. The concept of mass (mass, energy, relativity). Soviet Physics Uspekhi. 1989 Jul 31;32(7):629.

[34] Alexander G, Allison J, Altekamp N, Ametewee K, Andrson KJ, Anderson S, Arcelli S, Asai S, Axen D, Azuelos G, Ball AH. Measurement of cross-sections and asymmetries in e+ e− collisions at 130–140 GeV centre-of-mass energy. Physics Letters B. 1996 May 23;376(1-3):232-44.

[35] Griffiths DJ. Revolutions in twentieth-century physics. Cambridge University Press; 2013.

[36] Canetti L, Drewes M, Shaposhnikov M. Matter and Antimatter in the Universe. New Journal of Physics. 2012 Sep 17;14(9):095012.

[37] Bonnar J. A Short Note on the de Broglie Wavelengths of Composite Objects. ISSN unknown.

[38] Georgi H. Unparticle physics. Physical Review Letters. 2007 May 29;98(22):221601.

[39] Loyal J. *Honors Thesis* (Doctoral dissertation, Duke University).

[40] Chupp EL, Ryan JM. High energy neutron and pion-decay gamma-ray emissions from

solarflares. Research in Astronomy and Astrophysics. 2009;9(1):11.
[41] Rindler W. Length contraction paradox. American Journal of Physics. 1961 Jun 1;29(6):365-6.
[42] Terrell J. Invisibility of the Lorentz contraction. Physical Review. 1959 Nov 15;116(4):1041.
[43] Craig WL. Time Dilation and Length Contraction. In Time and the Metaphysics of Relativity 2001 (pp. 47-64). Dordrecht: Springer Netherlands.
[44] Strel'tsov VN. The question is: are fast-moving scales contracted or elongated?. Joint Inst. for Nuclear Research; 1991.
[45] Hardy AC. A study of the persistence of vision. Proceedings of the National Academy of Sciences. 1920 Apr;6(4):221-4.
[46] Wheeler JC, Yi I, Höflich P, Wang L. Asymmetric supernovae, pulsars, magnetars, and gamma-ray bursts. The Astrophysical Journal. 2000 Jul 10;537(2):810.
[47] Field JH. Two novel special relativistic effects: Space dilatation and time contraction. American Journal of Physics. 2000 Apr 1;68(4):367-74.
[48] Berzi V, Gorini V. Reciprocity principle and the Lorentz transformations. Journal of Mathematical Physics. 1969 Aug 1;10(8):1518-24.
[49] Norton JD. Chasing the Light: Einstein's most famous thought experiment. In Thought experiments in science, philosophy, and the arts 2012 Sep 10 (pp. 123-140). Routledge.
[50] Rogers B, Graham M. Motion parallax as an independent cue for depth perception. Perception. 1979 Apr;8(2):125-34.
[51] Ducheyne S. Mathematical models in Newton's Principia: A new view of the ‘Newtonian Style’.International studies in the philosophy of science. 2005 Mar 1;19(1):1-9.