The Essence of Relativity: The Theory of Composite Motion under Impulse Duality

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Abstract

This work presents an alternative interpretation of kinematic phenomena currently attributed to time dilation and spacetime curvature. Based on mechanical experiments involving impulse duality (Primary and Secondary), it demonstrates that the addition of the speed of light to the speed of its source in absolute space is not only logically possible but essential for the correct interpretation of physical reality.

Part I – Mechanics of Composite Motion

In this first part, I shall attempt to demonstrate this physical phenomenon on a purely mechanical basis.

Experiment 1

Imagine two sheets of carbon paper placed exactly on top of one another (meaning movement on the top sheet is imprinted onto the bottom one). These papers act as observers of a mechanical phenomenon—the movement of a ball in space—recording the result, i.e., the trajectory of the ball's motion.

Let us define a longitudinal axis on these papers and mark points A and B. Let the distance between A and B be *o1* = 1m. At point A, we have a ball with a circumference *d* = 10cm. Now, imagine a single point on this circumference that leaves a mark every time it touches the paper.

Phase One of the experiment: We give the ball a motion impulse of such character that it moves by rolling from point A to point B at a speed of one full rotation per second. The ball reaches point B at a speed *c* = 1rotation/s, meaning it covers the distance *o1* = 1m in time *t* = 10s. By rolling, the ball records its trajectory on both papers simultaneously, while the single point on its circumference marks each completed rotation along that trajectory.

Result of Experiment 1: The ball recorded an identical trajectory on both papers. Both observers recorded the same distance *o1* travelled by the ball at speed *c* in time *t*. Along this trajectory, including the start and finish, it marked eleven points and ten segments of length *d*, each equalling one rotation.

Experiment 2

Now, we add a second motion impulse. For easier understanding, we will demonstrate this second motion through the movement of the observer. We know the principle of relativity applies: it does not matter whether the observer or the observed phenomenon is moving; the result is the same. Therefore, if we granted this impulse to the ball instead of the observer at the same moment as the first impulse, the outcome would be identical. For clarity, however, we grant the motion to the observer—the bottom paper.

This second impulse moves the paper in a direction perpendicular to the direction of the rolling ball at a speed v = 10cm/s. This means that simultaneously with the ball movement from A to B, the paper moves in a perpendicular direction at speed *v* in the same time *t*.

Result of Experiment 2: The ball recorded two different trajectories on the two papers.
On the static paper, it recorded the same trajectory as in Experiment 1.
On the moving paper, it recorded a longer trajectory from point A to point C (distance p), which equals the hypotenuse of a right-angled triangle where one side is trajectory *o1* (the rolling ball) and the

second hypotenuse is trajectory *o2* (the moving paper). In our setup, o1 = o2. This example clearly shows us that the resulting geometrically recorded longer trajectory is the result of two different motions (from two different impulses) occurring simultaneously in the same time *t* = 10s.

Here we reach the core of the problem. Geometrically, the resulting trajectory is the vector sum of two motions. However, the essence is that in the case of two impulses of different natures producing motions with different properties, these motions retain their properties in their respective directions. The resulting motion are, in fact, two motions occurring simultaneously in the same timeframe.

Proof for this assertion: If there were a simple vector addition of these two motions, the result would be the same as if we calculated a speed *w* from the vector sum of velocities *c* and *v*, which the ball would need to cover distance *o* in time *t* = 10s.
If the ball covered distance *o* at speed w in time *t* = 10s, the point marking each rotation would create segments of length *d* = 10cm, and there would be more than 10 of them.

In our experiment of two different motions, however, the ball recorded exactly 10 segments on trajectory *o*, but their length is now longer than *d.* Thus, we see that although the geometric result is the same, the real execution is different.

The ball motion retained its properties in both directions.
Despite traveling a longer distance in the same time, it maintained those 10 rotations (internal rolling speed *c*).
While maintaining internal speed *c*, it covered a longer distance corresponding to the vector sum *c* + *v*.

A simple mechanical phenomenon. No time dilation. Higher speed while maintaining internal rolling speed.

<u>Experiment 3</u>

I believe the essence of this phenomenon has been sufficiently clarified.
Now, let us apply it to a case where both impulses share the same direction.
I approach this now because visualizing this variant is slightly more demanding.

All experiment parameters remain the same, but the direction of the paper's movement will be now the same as the ball's rolling direction.

Result of Experiment 3: On the moving paper, the ball recorded a trajectory twice as long (*p1* + *p2* = 2m) in time *t* = 10s. Simultaneously, it kept its rolling speed (1rotation/s), marking 10 segments on the trajectory, but their length is not *d* (10cm) but *2d* (20cm).
If the trajectory were a simple sum of speeds (meaning the ball rolled at *c* + *v* = 20cm/s), it would have to mark 20 segments of length *d* (10cm).

Again, we can state that while maintaining the internal rolling speed *c*, the ball travelled a longer distance in the same time, corresponding to the vector sum *c* + *v*.
A simple mechanical phenomenon. No time dilation. Only higher speed while maintaining internal rolling speed. A geometric sum of two motions triggered by two different impulses.

If an observer measures at the destination that the ball arrived earlier and its "rotations" are faster, it is not because the ball rotated faster or time accelerated. It is merely the result of the ball performing two different motions simultaneously while retaining the characteristics of both these motions.

Conclusion of Part I – Definition of the Phenomenon

Based on two characteristically different motion impulses, a physical object performs two independent motions simultaneously in the same timeframe, retaining both motion characteristics granted by the individual impulses.
An object can carry two independent motion components that add up in absolute space without their internal characteristics affecting each other.

Part II – Electromagnetic Radiation (The Photon)

Now, let us substitute electromagnetic radiation—a photon, or visible light—for the ball in the previous examples.
Primary Impulse: Energy supplied to an atom releases a photon into space, propagating at its own constant speed *c*.

Secondary Impulse: At the moment of release, the photon also receives a secondary motion impulse given by the motion of the source (the atom), adding a secondary velocity *v*.

In this case, the photon travels a longer distance in space in time *t* (than would correspond to speed *c* alone), corresponding to the speed *c + v*, while maintaining its internal propagation speed *c*.

Explanation of Measurement: A photon is an object with an internal periodic "beat" propagating at speed *c*. Instruments measure c because they respond to this internal beat. The total velocity *c + v* manifests in the fact that because the "wave packet" reaches the observer faster, the wave frequency changes.

The fact that a photon moves in space at speed *c + v* while maintaining its internal speed *c* is a difficult "paradox" that modern physics failed to grasp, resorting instead to "erroneous" time dilation. Based on this dilation, it began building entirely unrealistic subsequent constructs.

A trivial example: light propagating at speed *c* in the direction of a rocket flying at speed *v*. If, at the moment of release, the photon receives a secondary impulse v from the source's motion in space, it must cover a distance corresponding to *c + v* in time *t*. This is not time dilation; it is the result of compounding two different motions—the photon's own motion and the rocket's motion. No ether or permanent bond to the rocket is required. There are simply two different impulses given at the moment of release. If the rocket disappeared or slowed down at time *t1*, the *c + v* motion would continue independently in space. It is not a matter of time dilation; it is simply the result of this phenomenon—the composition of two different motions occurring simultaneously in the same timeframe: the photon's own motion and the motion of the rocket. There is no need for any ether, nor any permanent bond to the rocket. There are only two distinct impulses of motion that the photon received at the moment of its release from the atom, which define the different characteristics of these two motions. If the rocket were to disappear or slow down at moment *t1*, the *c+v* motion would continue to propagate independently through space.

Summary:
We define a photon as an energy wave packet possessing:
Primary Impulse: Internal beat (frequency) and propagation speed *c* relative to its own system.
Secondary Impulse: Drifting velocity v acquired from the source at the moment of release.
The photon moves at speed *c + v* in space while maintaining its internal characteristic *c*.
Instruments measure *c* (internal beat), while velocity *v* manifests as a change in measured frequency and signal delivery time.

Part III – Detailed Analysis of Anomalous Phenomena (Mechanical Reinterpretation)

In this part, we apply the Theory of Composite Motion to key experiments currently misinterpreted as proof of relativity. We will demonstrate that the same measurement results can be obtained without the deformation of time and space.

1. **Extended Decay Path of Unstable Particles (Muons)**
   Muons created in the atmosphere have a very short half-life (2.2μs). According to classical physics (*c*), they should decay before reaching the Earth´s surface.
   Relativistic Interpretation: Time slows down for the fast-moving muon, allowing it to "live longer."
   Mechanical Interpretation: Upon creation, the muon receives a massive secondary impulse. Its resulting speed in absolute space is V = c + v.

Proof: The muon retains its internal "decay beat." Because it moves at a higher absolute speed, it covers a greater physical distance during that constant internal time. The muon reaches the ground not because it lived longer, but because it arrived sooner due to the sum of velocities.

2. **The Sagnac Effect**
   Two light beams sent in opposite directions around a rotating ring show a time shift upon meeting.
   Relativistic Interpretation: Relativity struggles with this in inertial frames and requires complex corrections.
   Mechanical Interpretation: This is direct proof of Experiment 3. The beam moving in the direction with the rotation has a speed of $c + v$ in absolute space; the one against it moves at $c - v$. The difference in arrival times is due to the difference in absolute speeds.

3. **Maxwell's Equations**
   Maxwell's equations describe fields, not the motion of the field carrier in absolute space. Maxwell described the Primary impulse (the photon's internal mechanism). The fact that a photon is subsequently carried by a Secondary impulse (the source) does not contradict Maxwell equation, only it simply adds kinematics to the entire packet in space.

4. **Transverse Doppler Effect**
   When a source moves perpendicularly to an observer, a frequency change is measured even if the distance isn't changing at that moment. The geometric extension of the trajectory (the vector hypotenuse), combined with a constant internal beat, creates exactly that time difference which is called dilation today.
   Relativistic Interpretation: Proof of time dilation.
   Mechanical Interpretation: Corresponds to Experiment 2. The photon travelled a longer trajectory p (the hypotenuse) in the same time t. Because the internal beat (number of waves) had to stretch over a longer distance, the observer measures a different frequency. This is a geometric consequence of compounding motions, not a change in the flow of time.

5. **Time Dilation in GPS**
   GPS satellites move at high speeds, and their clocks require synchronization corrections for the system to function.
   Relativistic Interpretation: Time flows slower due to speed (SR) and faster due to lower gravity (GR).
   Mechanical Interpretation: Satellite clocks transmit signals. Because the satellite is moving, it transmits these packets in absolute space at a velocity $c + v$ (vector towards Earth).
   The measured shift in frequency and signal delivery time corresponds exactly to Experiment No. 2.
   Corrections in GPS are not about "time flow," but about correcting the speed of information transfer.

6. **Stellar Aberration**
   Mechanical Interpretation: If light falls into a telescope and the telescope is moving, it must be tilted. Using the theory of adding vectors c and w, this angle is calculable through standard velocity composition—like tilting an umbrella while running in the rain.

7. **Dynamics in Particle Accelerators**
   When energy is supplied to particles, it creates the illusion that their mass increases and they cannot be accelerated beyond c.
   Relativistic Interpretation: Relativistic mass increases to infinity as v to c.
   Mechanical Interpretation: This is a limit of momentum transfer efficiency. If the secondary impulse (accelerating magnetic field) propagates at the speed c, then as the particle's speed increases, the relative difference between the field and the particle decreases. When the speed of particle is near c, the field can no longer transfer energy (the "nail" is moving away from the "hammer" as fast as the hammer falls). The mass increase is a mathematical illusion caused by acceleration inefficiency.

Conclusion

While Einstein's relativity requires the acceptance of paradoxes (time dilation, length contraction), the Theory of Composite Motion explains the same phenomena using classical Newtonian mechanics. This model removes the need for curved spacetime and returns physics to absolute space and time, opening the path to a new understanding of the nature of energy and matter.