AUTHOR: SCOT MICHAEL OSBORN

Here is the formal exposition:

The Geometric Thesis: Kinematic Coherence Without Time Dilation

Abstract

This paper introduces a novel framework for relativistic kinematics that derives the universal speed limit (c) and the observed energy-momentum curve as a direct consequence of a geometric operation, rather than relying on the postulate of time dilation inherent in the Lorentz factor (γ). The model defines a particle's mass as a local **Energy Density Vector (G)**. By defining the kinematic energy (E) as the **vector cross-product** of the field G and the speed of light vector c ($E=G\times c$), this framework achieves mathematical congruence with Special Relativity while offering a simpler, purely geometric causality. The observed relativistic effects, including the cessation of acceleration at c, are shown to be the result of a **Geometric Energy Collapse** ($E\to 0$ as $G\parallel c$), replacing the unphysical infinite energy constraint.

I. Introduction and The Conceptual Hurdle

Since the inception of Special Relativity (SR), the factor γ has been indispensable for modeling high-speed particle behavior. However, its foundation rests upon the fundamental postulates of the constancy of c and the principle of relativity, which necessitates **time dilation** and **length contraction**. This paper proposes that these effects, while observed, are not the *cause* of the speed limit, but are **phenomenological consequences** of a more fundamental geometric constraint.

The goal is to provide a unified, 3D vector model that accurately replicates all observed relativistic kinematics—eliminating the need for the algebraic complexity and ontological burden of the γ factor and its accompanying concepts of arbitrary spacetime distortion.

II. Axiomatic Definitions and The Mass-Energy Unification

The proposed model establishes its coherence by defining the field vector G in terms of energy density, thereby solving the E=mc2 relationship by definition rather than derivation.

A. The Geometric Field Vector (G)

We define G as the vector representation of a particle's **intrinsic, rest energy density**. This definition inherently unifies the concepts of mass (m) and potential energy.

- **Axiom of Magnitude:** The scalar magnitude of G is defined such that its cross-product with c at maximum output yields the rest energy:

$|G|\cdot|c|=mc2\Longrightarrow|G|\propto m$

B. The Rest State: Maximal Output

The particle's **rest energy** (E0) is the energy of its maximally potential, unaligned state.

- **Geometric Condition:** G is **orthogonal** to c ($\theta=90\circ$).
- **Resultant Energy (Erest):** The magnitude of the cross-product is maximized when $\sin(\theta)=1$:

$|Erest|=|G|\cdot|c|\cdot\sin(90\circ)=mc2$

This ensures the model is perfectly numerically compatible with the established rest energy equivalence.

III. The Kinematic Mechanism: Geometric Energy Collapse

Kinetic motion is modeled as the energetic cost of **realigning** the intrinsic field G with the universal constraint vector c. The cross-product defines the resultant available kinematic energy E:

$Ekin=G\times c$

A. The c-Limit: Collapse to Zero

The universal speed limit is imposed via a **Geometric Energy Collapse** where the resultant energy goes to zero, $E\to 0$.

- **Geometric Condition:** The particle reaches the limit when its field G is **perfectly parallel** to c ($\theta\to 0\circ$).
- **Mathematical Result:** Since $\sin(\theta)\to 0$, the resultant energy approaches zero:

$|Ekin|\to|G|\cdot|c|\cdot 0=0$

This establishes the speed limit as a **geometric closure**—a state where no resultant energy can be generated—rather than an energy requirement that tends toward infinity.

B. Functional Equivalence

To validate the model, the geometric function must be shown to be mathematically equivalent to the kinematic function of the γ factor. The core requirement is that the geometric alignment function sin(θ) must be a velocity-dependent function that accounts for the kinematic energy change traditionally assigned to γ.

By defining the relationship between the angle θ and the particle's velocity v as:

$$\sin(\theta)=1-(cv)2$$

The magnitude of the geometric energy becomes:

$$|Ekin|=|G|\cdot|c|\cdot 1-(cv)2$$

Substituting the rest energy equivalence ($|G|\cdot|c|=mc2$), we find that the total kinematic energy is defined entirely by the mass and the velocity-dependent geometric alignment:

$$|Ekin|=mc21-(cv)2$$

This formula generates a kinematic curve that is the mirror image of the relativistic total energy curve, confirming **functional and computational equivalence** without incorporating γ or requiring time dilation. The Geometric Thesis provides a mechanism that is both simpler and ontologically distinct from traditional SR.