A Geometric Axiom for Missing Transverse Energy

Abstract

We propose a geometric axiom as an alternative interpretation of Missing Transverse Energy (MET) observed in high-energy hadronic collisions. Rather than postulating undetected massive particles, we suggest that MET may arise from a local failure of the Euclidean metric structure under extreme energy density conditions.

Axiom I (Geometric Energy Transfer)

At sufficiently high localized energy density, the effective spacetime metric undergoes a topological transition such that energy transfer may occur into non-Euclidean degrees of freedom without particle emission.

Formally, let T be the local quaternionic transfer matrix describing energy-momentum propagation in the interaction region. Then:

$$\det(T) < 0$$

signals a geometric phase transition in which energy is transferred into an imaginary geometric sector rather than into detectable particles.

Interpretation

1. Missing Transverse Energy does not necessarily imply emission of weakly interacting massive particles.

2. MET may instead represent a local breakdown of Euclidean metric completeness under extreme curvature or energy density.

3. The resulting structure forms a stable geometric configuration (Geon-like excitation) representing stored geometric tension rather than propagating matter.

Consequences

- No additional particle species are required. - The phenomenon emerges from geometric structure alone. - Experimental signatures remain identical at detector level, but differ ontologically.

Outlook

This axiom suggests that certain collider anomalies traditionally interpreted as missing matter may instead reflect incomplete geometric modeling. Further development requires a rigorous treatment of quaternionic transfer operators in curved spacetime.