The De Giuseppe Time Travel Model: Macroscopic Entanglement as a Geometric Constraint Without Energy or Velocity

Alex De Giuseppe[1]

[1]Independent Researcher, Italy

Abstract

We present a theoretical framework demonstrating the possibility, in principle, of macroscopic entanglement emerging without additional energetic input or relativistic velocities. The mechanism does not rely on dynamical interactions, force exchange, or spacetime curvature induced by energy, but instead arises from a geometric and informational constraint imposed during the preparation of the system. By extending the De Giuseppe Paradox and its associated configuration function f, we show that entanglement can be interpreted as a static topological condition within the proto-structural hierarchy (matrioska), rather than a dynamical process. This result establishes a clear conceptual bridge between quantum entanglement, emergent retrocausality, and constraint-based causality.

1 Foundational Assumptions

We adopt the following minimal assumptions:

1. Physical systems are fully described by their global state, not by independent local subsystems.
2. Causality emerges from admissible configurations of states, rather than from temporal ordering alone.
3. Entanglement is a property of state geometry, not of signal transmission.

No violation of Special Relativity, General Relativity, or Quantum Mechanics is assumed.

2 Proto-Structural Matrioska

We define three nested structural layers:

- ΔC: configurational layer (geometry of admissible states),
- ΔM: material layer (mass-energy realizations),

- ΔL: informational layer (logical and correlational structure).

A physical system is a projection:

$$\mathcal{S} : \Delta C \to \Delta M \to \Delta L$$

Entanglement occurs when the projection from ΔC to ΔM is non-factorizable.

3 Configuration Function f

We define a binary configuration function:

$$f(\Gamma) = \begin{cases} 1 & \text{if the global configuration is admissible,} \\ 0 & \text{otherwise.} \end{cases}$$

For a bipartite system A, B:

$$f(\Gamma_{AB}) = 1 \quad \text{and} \quad f(\Gamma_A) = f(\Gamma_B) = 0$$

This condition defines a non-separable global state.

4 Entanglement as a Geometric Constraint

Let $\mathcal{H}_A$ and $\mathcal{H}_B$ be Hilbert spaces associated with two macroscopic subsystems.

A standard separable state satisfies:

$$|\Psi\rangle = |\psi_A\rangle \otimes |\psi_B\rangle$$

We define macroscopic entanglement by the impossibility of such factorization:

$$|\Psi\rangle \neq |\psi_A\rangle \otimes |\psi_B\rangle$$

Crucially, this condition depends solely on the geometry of $\mathcal{H}_{AB}$, not on energy flow or velocity.

5 Absence of Energy and Velocity Requirements

The configuration constraint f is static:

$$\frac{df}{dt} = 0$$

No work is performed after preparation. No propagation, acceleration, or exchange of energy is required to maintain the correlation.

Thus:

- No relativistic motion is involved.
- No spacetime curvature is generated.
- No signal or force mediates the correlation.

The entanglement persists as a boundary condition.

6 Macroscopic Limit

Macroscopic size does not destroy entanglement in principle. Decoherence arises from uncontrolled coupling to the environment, not from scale.

If a macroscopic system satisfies:

$$\Gamma_{\text{system}} \subset \Gamma_{\text{admissible}}$$

then entanglement is preserved regardless of size.

7 Relation to the De Giuseppe Paradox

In the De Giuseppe Paradox, retrocausality emerges when spacetime points share a configuration constraint.

Here, entanglement emerges when subsystems share a configuration constraint.

Both phenomena are governed by the same function f acting on different layers of the matrioska.

8 Implications

- Entanglement is a static property, not a dynamical process.
- Energy and velocity are not fundamental requirements.
- Causality becomes a derived concept from configuration geometry.
- Macroscopic entanglement is possible in principle.

9 Conclusion

We have shown that macroscopic entanglement can arise without additional energy or velocity, provided that the system is prepared within a globally constrained configuration space. The phenomenon is purely geometric and informational, governed by the configuration function f. This framework unifies entanglement, emergent retrocausality, and constraint-based causality into a single proto-structural model, opening new conceptual avenues for foundational physics.