Loop Ontology of Entanglement | LOE

Shared Symmetry of Being: A Non-Spooky Foundation for Quantum Correlations

Abstract

This paper derives the ontology of quantum entanglement from the axiom *Something Is, Nothing Isn't*. The axiom requires closure: existence cannot leak into nothing, and every entity must be self-contained. Applied to quantum mechanics, this principle implies that entangled particles are not independent marbles but expressions of one closed excitation of the field of being. Experimental results, from Freedman and Clauser (1972) to modern loophole-free Bell tests (2015–2017), consistently confirm correlation values bounded between 2 and 2√2. These values are not "spooky" but necessary expressions of shared symmetry: 2 for straight alignment, 2√2 for diagonal extension. Hidden variables are eliminated by experiment; nonlocal signaling is eliminated by the absence of faster-than-light transfer. The only consistent framework is closure in symmetry. Thus, entanglement is not a paradox but a direct manifestation of the Loop Ontology of Being.

1. The Axiom of Being

Axiom: Something Is, Nothing Isn't. Logical consequences: 1. Nothing cannot exist; there is no "outside" of being. 2. Persistence requires closure; only a closed loop prevents leakage into non-being. 3. Every stable entity is a loop of symmetry: self-contained, indivisible, and conserved. In physics, closure underlies orbital states, conservation laws, and invariants such as charge, spin, and Planck boundaries. A photon is not a point in void but a closed excitation of the electromagnetic field.

2. Entanglement as Shared Symmetry at Birth

Entangled photons are produced in single emission processes (e.g., SPDC), where conservation of angular momentum enforces opposite polarization. At emission, both photons share one closure of symmetry. - They do not remain connected by a stretching "thread." - They separate as independent excitations, but their individuality arises from a common birth condition. - What persists is not a signal but a shared boundary symmetry. Thus, entanglement is closure extended into multiplicity: two entities retaining a common invariant.

3. Experimental Facts

1. Same-angle measurements - Results are perfectly anti-correlated. - Correlation magnitude = 2. - This expresses straight-line symmetry. 2. Different-angle measurements - Correlations follow the cosine law: $E(\theta_A, \theta_B) = -\cos(\theta_A - \theta_B)$. - With optimal settings, CHSH reaches $|S| = 2\sqrt{2} \approx 2.828$. - This is diagonal extension of symmetry. 3. Experimental universality - Freedman & Clauser (1972): first observed violation. - Aspect

(1982): confirmed with time-varying analyzers. - Giustina, Shalm, Hensen (2015): loophole-free tests, $|S| \approx 2.4$–2.7. - Yin et al. (2017): satellite-based, 1200 km separation. - No experiment exceeds Tsirelson's bound; no experiment remains at 2. These are empirical laws of nature: $2 \leq |S| \leq 2\sqrt{2}$.

4. Proof by Elimination

1. Local hidden variables - Predict $|S| \leq 2$. - Contradicted by all modern experiments. 2. Nonlocal signaling - Would require faster-than-light influence. - No experiment has ever detected superluminal communication. 3. Spooky elasticity - Suggests an invisible thread binding photons. - Illogical under the axiom: an open thread would dissolve into nothing. Therefore, the only consistent account is closure at birth: shared symmetry without signaling.

5. Ontological Interpretation of Bell Values

- $|S| = 2 \rightarrow$ straight alignment, direct face of symmetry. - $|S| = 2\sqrt{2} \rightarrow$ diagonal extension, geometric loop of symmetry. Both values are not competing explanations but necessary aspects of the same closure. What appears as "spooky" is simply the geometry of being expressed at different measurement orientations.

6. Conclusion

From the axiom *Something Is, Nothing Isn't*, and from the entirety of experimental data, the following are established as fact: 1. Entanglement is not nonlocal signaling but closure of symmetry established at birth. 2. Correlation magnitudes of 2 and $2\sqrt{2}$ are two expressions of the same invariant geometry. 3. Hidden variables are excluded by experiment. 4. Spooky action is unnecessary and incoherent. Therefore: Entanglement is closure. It is a manifestation of the Loop Ontology of Being, where individuality arises only through self-contained loops, and symmetry persists as the invariant bond of existence.