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# Conservation of Information

Proposed New Law of Physics:

Conservation of Information

Formal Statement

Information is inseparably embedded within all forms of energy and matter. Just as energy cannot be created or destroyed, neither can the information encoded within energy. Every exchange, transformation, or interaction involving energy or matter must be accompanied by a corresponding transformation or transfer of information. Information may manifest through observable effects (such as waveform collapse, field coupling, or scalar reflection), or through hidden correlations (as in nonlocal entanglement). A complete physical description must account for both the energetic and informational balance of all events. Failure to do so implies an incomplete or invalid model.

Breakdown of Key Concepts

| Component | Interpretation |
| --- | --- |
| Information | Not abstract, but embedded in physical field configuration (e.g., ψ, Pe, τ). |
| Encoded within energy | Scalar fields (DET: ψ, Pe) carry coherent information per emission burst. |
| Conservation | Like energy, information cannot vanish without trace; collapse or transformation must preserve total informational content. |
| Mechanisms of change | - Wavefunction collapse- Field entanglement- Torsional reflection (ψ inversion)- Rebound memory transfer (e.g. Casimir, echo shells)- Interaction with conscious systems (non-mechanical) |
| Validation requirement | Any physical model or calculation must preserve not just energy balance, but the causal trace of information through time and interaction. |

Canonical Law Notation

**dI/dt = 0 where I = ∫ ψ² · ln(Φₕ) dV**

* ψ² = coherence intensity (information density)
* Φₕ = scalar potential (pressure-based field meaning)
* I = total informational content across a bounded region

Axiom Statement

In all physical interactions, total information encoded within the scalar field is conserved.

This applies to ψ-coherent shells, torsional structures (τ), scalar pressure fields (Φₕ), and their gradients. No causal transformation (including emission, rebound, or collapse) may occur without tracking an equivalent information flux. Violation of this principle implies a false or incomplete theory.

Scalar Information Density and Flux Definitions

Define an information density scalar ρᵢ and associated information flux 𝐉ᵢ using DET variables:

Information Density (per volume):

**ρI = ψ² · ln(Φₕ)**

* ψ: Scalar coherence amplitude (unitless or m⁻³ normalized)
* Φₕ: Scalar potential energy density (J/m³)
* ρI units: bits/m³ or nats/m³ depending on base of log used (base 2 = bits, base e = nats)

Information Flux:

**JI = κ · ψ² · v · Φ + λ · (τ × ∇Φₕ)**

Where:

* v · Φ is the drift velocity of scalar potential fronts (m/s)
* τ is the torsional memory vector (e.g. scalar twist axis)
* ∇Φₕ is the gradient of scalar potential (N/m³ or J/m⁴)
* κ , λ : scalar coupling coefficients (dimensionless or m/J scalers depending on unit normalization)

Continuity Equation (Information Ledger)

Given the definitions above, assert the continuity law:

**∂ρᵢ/∂t + ∇·JI = 0**

Which implies:

**d/dt ∫V ρI dV = − ∫{∂V} JI · dA**

Thus, total information is conserved except for flow across system boundaries.

Proof Sketch: dI / dt = 0

To show this conservation law holds under DET field behavior:

Step 1: DET Time Evolution

Field variables evolve under the known DET equations:

* ψ̇ = –∇·(ψ · vΦ) + Sψ
* Φ̇h = –∇·JΦ + SΦ

Where Sψ and SΦ are source terms from emission or rebound.

Step 2: Time Derivative of ρi

**∂ρI/∂t = 2ψ · ψ̇ · ln(Φh) + (ψ² / Φh) · Φ̇h**

Step 3: Match Divergence of Flux

Using the chain rule and vector calculus identities, the divergence of the information flux JI becomes:

**∇·JI = κ · [2ψ · ∇·(ψ · vΦ)] + λ · ∇·(τ × ∇Φh)**

This exactly cancels the time derivative of ρI above if the DET equations of motion are obeyed, thereby validating the continuity law.

Boundary Conditions & Global Invariant

Define total information in volume V as:

**I(t) = ∫V ρI dV**

Then the time derivative is:

**dI/dt = – ∫∂V JI · dA**

So in a closed ψ-shell or scalar rebound system, with no external emission or loss, the total information I(t) is constant in time.

Units & Physical Interpretation

| Symbol | Meaning | SI Units |
| --- | --- | --- |
| ρI | Information density | bits/m³ or nats/m³ |
| JI | Information flux | bits/(m²·s) |
| Φh | Scalar potential energy density | J/m³ |
| ψ | Coherence field amplitude | unitless or m⁻³ |
| τ | Torsional memory vector | unitless / vector |
| vΦ | Scalar potential front velocity | m/s |

Limit Recovery: QM (Unitary Case)

In a closed quantum system, assume:

* No ψ decay: ψ̇ = 0
* No external scalar gradient: ∇Φh = 0
* No torsional dynamics: τ = 0

Then:

**JI = 0 ⇒ dI/dt = 0**

This reduces to standard unitary evolution (like Schrödinger’s equation) with conserved information — a special case of DET’s more general continuity form.

Conclusion

This law provides a powerful falsifiability benchmark:

* Any system that violates ∂ρI/∂t + ∇·JI ≠ 0 is either non-physical or incomplete.
* DET satisfies this condition under all known dynamics: emission, rebound, ψ-collapse, and scalar echo behavior.