

LAW OF CONSERVATION OF CAUSALITY FOR THE AU-FIELD

1. THE PROBLEM OF CAUSALITY IN NON-LOCAL THEORIES

In special relativity, causality is provided **by the finiteness of the speed of light**: no influence can propagate faster *than* c , otherwise it would be possible to build closed time loops and violate the causality principle (the effect cannot precede the cause).

However, in **the Acta Universi hypothesis**, the AU field shows **non-local correlations** with an effective rate $v_{\text{eff}} \sim 10^{10.7} s$ (based on the interpretation of quantum entanglement and possible UAP phenomena). This raises a question: **how is causality preserved?**

Answer of the AU model: causality is preserved **not at the signal level**, but at the level **of the event archive structure**. Space-time is not fundamental, but **is derived** from the correlations of the AU field. Therefore, "fast" correlations do not violate causality, since they do not transfer information in the classical sense.

2. FORMULATION OF THE LAW OF CONSERVATION OF CAUSALITY

2.1. Axiomatic definition

The law of conservation of causality for an AU-field states:

For any pair of events connected by non-local correlation through the AU field, their time order in the emergent space-time is preserved if it was established by at least one "slow" (light or sublight) signal, or if both events are entries in the AU log ordered by the global "kairos-time" (ontological time).

Mathematically:

$$\forall A, B: (A \prec_{\text{light}} B) \Rightarrow \neg(B \prec_{\text{AU}} A)$$

where $\text{свет}_{\text{light}}$ is the causality ratio over the light cone, AU_{AU} is the non-local correlation ratio through the AU field.

2.2. Kairos-time as a global ordering parameter

The AU model introduces **absolute ontological time** (kairos), which cannot be reduced to metric time. All irreversible events (an entry in the AU log) receive **метку the kairos timestamp-времени** τ_{ont} . Then:

If event A is recorded in the AU-log before event B by τ_{ont} , then A cannot be causally dependent on B in any sense.

This is **the law of conservation of causality** in the AU-field:

$$\tau_{\text{ont}}(A) < \tau_{\text{ont}}(B) \Rightarrow \text{no influence from } B \text{ to } A$$

3. RELATIONSHIP WITH TIME TYPES (PERESLEGIN)

Using the classification of time from the works of S. B. Pereslegin (cognitive codes), AU-field distinguishes:

Time type	Characteristic	Role in causality
Metrological (physical, t_{met})	Linear, homogeneous, infinite, measurable	Signal causality $\leq c$
Thermodynamic (biological, t_{therm})	Directed, inhomogeneous, finite	Arrow of time, entropy
Ontological (kairos, τ_{ont})	Discrete, discontinuous,	the Absolute order of irreversible events is given by Revelation

The law of conservation of causality requires that **ontological time** be globally ordered and **monotonically increase** for any non-local correlation. That is:

$$\frac{d\tau_{ont}}{dt_{met}} > 0 \text{ (for any systems)}$$

4. MATHEMATICAL EXPRESSION

4.1. Causal structure in stratified space-time

Consider a **bundle** of base M (emergent spacetime) with the layer \mathcal{T}_{ont} (ontological time). The event is defined by the pair (x^μ, τ) . Causal relationship:

- **Weak causality:** if $\tau_{t1} < \tau_2$, then a correlation is possible, but not necessarily a signal.
- **Strong causality:** if there is a light /sublight signal from (x_{x1}, τ_{t1}) to (x_{t2}, τ_2) , then $\tau_{t1} < \tau_2$ automatically.

Conservation Law:

$$\forall (x_1, \tau_1), (x_2, \tau_2): \text{there is a correlation via the AU field} \Rightarrow \tau_1 \neq \tau_2 \text{ and } \tau_1 < \tau_2 \text{ or } \tau_2 < \tau_1$$

There are no **closed time loops** in Kairos-time.

4.2. Integral form

For any closed sequence of events associated with AU correlations:

$$\oint d\tau_{ont} = 0 \text{ only if all correlations are trivial (coincidence).}$$

Otherwise:

$$\oint d\tau_{ont} = \sum_i \Delta \tau_i > 0$$

(strict incrementing when bypassing a loop is a ban on temporary loops).

4.3. Equation for an AU field with a causal condition

B Lagrangian AU-field You can include a constraint term in the AU-field Lagrangian **Restricted Member** that preserves causality:

$$\mathcal{L}_{\text{cau}} = \mu \epsilon^{\mu\nu\rho\sigma} (\partial_\mu \tau_{\text{ont}}) (\partial_\nu \mathcal{A}_\rho) (\partial_\sigma \mathcal{A}_\tau) \cdot \Theta(\dot{\tau}_{\text{ont}})$$

where Θ is a step prohibiting the reverse movement of τ_{ont} .

5. PHYSICAL INTERPRETATION

5.1. Why is causality not violated?

- **Correlations \neq signals.** Non-local correlation of the AU field (for example, quantum entanglement) does not allow **information to be transmitted** faster than light. To transmit information, you need a classic channel.
- **Writing to the AU-log** is an irreversible process that always increases τ_{ont} . You can't "overwrite" the past.
- **UAP phenomena** (if they are related to AU technologies) may appear to violate causality, but in fact they use **pre-agreed correlations** (as in quantum teleportation), not a superluminal signal.

5.2. Analogy with quantum mechanics

In quantum theory, entanglement does not violate causality, since it is impossible to measure the state of one photon faster than the light reaches the other. It's the same in the AU model: **active rewriting** of the AU log takes time (although it can be very fast, but it is finite). And passive correlations (reading the archive) do not transfer causal information.

6. IMPLICATIONS FOR AU TECHNOLOGIES

6.1. Online communication

A hypothetical AU connection between distant points is possible **only if there is a pre-agreed AU key** (analogous to a quantum key distribution). Transmitting new information requires a classic channel. Therefore, causality is preserved.

6.2. AU-drive (Interstellar travel)

Moving a ship using the AU field is not faster-than-light travel in emergent space-time. This is a **change in the correlation geometry** — the ship "rewrites" its position in the AU log. However, for an external observer, the journey may look like superluminal, but without transmitting information to the past (time on the ship and on Earth may flow differently, but causality is not violated due to the global label τ_{ont}).

6.3. Thought Forms and causality

A thought-form (an act of consciousness) cannot change the past. It only creates a new entry in the AU log, which affects the future. Even if the thought form correlates with a remote event (such as

telepathy), this does not mean that the thought caused the event before it occurred. Kairos-time is strictly ordered.

7. CONCLUSION

The law of conservation of causality for an AU-field can be summarized as follows:

- In emergent space-time, signals are not faster than light.
- Non-local correlations of the AU field do not violate causality, since they do not transmit information.
- Absolute **ontological time (kairos)** monotonically increases and sets the global order of irreversible events.
- Closed time loops are not allowed in the AU field: $\oint d\tau_{\text{ont}} > 0$ for any correlation cycle.
- Any **active rewriting** of the AU log is time-consuming and cannot change the past.

Thus, the AU hypothesis **preserves causality** in an extended sense compatible with quantum nonlocality and potential superluminal apparent effects. This is formally expressed by introducing kairos-time and the condition $\mu_{\mu} \tau_{\text{ont}} \neq 0$ (always directed to the future).

The law of conservation of causality is one of the cornerstones of the AU-field axiomatics, allowing us to reconcile nonlocality with the principle of the absence of an information paradox.

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