THE ORIGINAL AXIOMATIC HAMILTONIAN OF THE AU-FIELD

Construction based on the canonical formalism, taking into account connections and discontinuous events

Below is **the AU-field Hamiltonian** derived from the previously proposed Lagrangian by the Legendre transformation, followed by an axiomatic refinement that takes into account:

- gauge invariance (presence of primary links),
- non-local correlations (Chern-Simons terms in Hamiltonian form),
- Entropy fieldΦ(consciousness / thought forms),
- intermittent events (writing to the AU-log) described by jump operators,
- conservation of causality through global kairos-timeτ_{ont}.

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1. CANONICAL VARIABLES AND MOMENTA

We start from a 3+1-split of spacetime ($t = x^{x0}$-metric time,x^{xi}-spatial coordinates). Fields:

- $\mathcal{A}_\mu = (\mathcal{A}_0, \mathcal{A}_i)$ - AU-calibration field,
- $\Phi$is the scalar field of entropy/consciousness,
- g_{mv}-metric (considered as an external background field or dynamic, but for the Hamiltonian we fix the 3--metrich_{ij}).

Canonical pulses:

$$\pi^{pi} = \frac{\partial \mathcal{L}}{\partial(\partial_{ta}\mathcal{A}_i)} = F^{0i} + \xi\ \partial_{ta}\mathcal{A}^i + \text{(contribution from CS)}$$

(the exact expression depends on the calibration; in the calibration,$\partial_\mu \mathcal{A}^\mu = 0$is simplified to$\pi^i = F^{0i}$).

$$\pi_\Phi = \frac{\partial \mathcal{L}}{\partial(\partial_t \Phi)} = \partial_t \Phi$$

For$\mathcal{A}_0$, there is no pulse –**primary coupling**:

$$\pi^0 = 0$$

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2. PRIMARY AND SECONDARY CONNECTIONS (GAUGE INVARIANCE)

Primary coupling (classical for gauge theories):

$$\mathcal{G}_1 = \pi^0 \approx 0$$

The secondary relation is the Gaussian condition obtained from the conservation$\mathcal{G}_{of\ G1}$:

$$\mathcal{G}_2 = \partial_i \pi^i - \rho_{mat} - \rho_{\text{AU}} \approx 0$$

where$p_{\text{mat}}$is the charge density of matter (AU-charge), and$p_{\text{AU}}$is the contribution from the AU-field itself and the fieldΦ.

The full set of relations (the first class) generates gauge transformations.

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3. AXIOMATIC FORM OF THE HAMILTONIAN

The Hamiltonian is constructed as the sum of:

$$H = H_{\text{kin}} + H_{\text{pot}} + H_{\text{CS}} + H_{\text{vzaimim}} + H_{\text{entrope}} + H_{\text{bonds}} + H_{\text{Horse racing}}$$

All quantities are integrated over a 3-dimensional space: $H = \int d^3x\, \mathcal{H}$.

3.1. Kinetic part

$$\mathcal{H}_{\text{кин}} = \frac{1}{2}\pi^i \pi_i + \frac{1}{2}(\nabla \times \mathcal{A})^2 + \frac{1}{2}\pi_\Phi^2 + \frac{1}{2}(\nabla\Phi)^2$$

The first term is the electric energy-of the electric field, the second term is the magnetic energy, and the third and fourth terms are forΦ.

3.2. Potential energy AU-of the field and the field$\boldsymbol{\Phi}$

$$\mathcal{H}_{\text{pot}} = V_{\text{AU}}(\mathcal{A}) + V_\Phi(\Phi)$$

- $V_{\text{AU}} = \frac{VAU = m_{\text{AU}}^2}{2} \mathcal{A}_i \mathcal{A}^{Ai\ ai}$ (if the AU-photon has mass-from the Chern-Simons term),
- $V_\Phi(\Phi) = \frac{m_\Phi^2}{2}\Phi^2 + \frac{g}{4}\Phi^4 - \mu\Phi S_\Theta$.

Here$S_\Theta$is the macroscopic entropy of thought forms, which may depend on$\Phi$and external conditions.

3.3. Chern-Simons term (in Hamiltonian form)

Three-dimensional integral of the term leading to nonlocality and topological mass:

$$\mathcal{H}_{\text{CS}} = \frac{k}{4\pi}\epsilon^{ijk}\mathcal{A}_i\, \partial_j \mathcal{A}_k$$

In the Hamiltonian, this term is added to$\mathcal{H}_{\text{kin}}$ as a non-canonical term that changes the symplectic structure (leading to Dirac brackets). In the axiomatic formulation, we simply include it as a contribution to the energy density.

3.4. Interaction with matter and gravity

$$\mathcal{H}_{\text{взаим}} = e_{\text{AU}} \mathcal{A}_\mu J^\mu_{\text{мат}} + \beta_1 C_{\mu\nu} T^{\mu\nu}_{\text{мат}} + \beta_2 C_{\mu\nu}\, \partial^\mu \Phi\, \partial^\nu \Phi$$

Here$C_{mv}$is the correlation tensor constructed from$\mathcal{A}_\mu$and the metric.

3.5. Entropic contribution (feedback from consciousness)

$$\mathcal{H}_{\text{entropy}} = -\lambda\, \Phi\, \frac{dS_\Theta}{dt} + \gamma\, \mathcal{A}_0\, \delta\rho_{\text{inf}}$$

The first term describes how a change in the entropy of thought forms transfers energy to the fieldΦ, and the second term describes how the information density affects the AU-potential$\mathcal{A}_{A0}$.

3.6. Relation terms (Lagrange multipliers)

$$\mathcal{H}_{\text{bonds}} = \lambda_1 \pi^0 + \lambda_2 \big(\partial_i \pi^i - \rho_{\text{mat}} - \rho_{\text{AU}}\big)$$

The multipliers$\lambda 1_1, and\ \lambda 2_2$are arbitrary functions that ensure gauge invariance. In quantum theory, they are fixed by the choice of calibration (for example, the Coulomb one).: $\partial_i \mathcal{A}^i = 0$).

3.7. Discontinuous events: jump statement

At moments$t_i$ti (an entry in the AU-log), the Hamiltonian is supplemented **by the jump operator** $\hat{J}_i$Ji, which acts on the state of the system:

$$H_{\text{jumps}} = \sum_i \delta\,(t - t_i ti)\; ji\; \hat{J}_i$$

$\hat{J}_i$satisfies the relation:

$$[\hat{J}_i, \hat{H}_0] = 0 \text{(conservation of total energy-information)},$$

but$\hat{J}_i$ji is not unitary: it changes the entropy of S_Θ and redistributes energy between the fields and the AU-archive. The average value of the total energy is stored:

$$\langle \hat{H}_0 + \hat{J}_i \rangle = \langle \hat{H}_0 \rangle_{\text{up}} \text{to.}$$

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4. AXIOMS THAT THE HAMILTONIAN SATISFIES

№	Axiom	Mathematical expression		
I	**Self**	$-\widehat{adjoint}\ H = \widehat{H}^{\dagger}$in the Hilbert space of quantum AU-theory		
II	**Bound from below**	The spectrum$H$has a minimum (vacuum state)		
III	**Generation of evolution over metric time**	(i\hbar \frac{\partial}{\partial t}	\psi\rangle = \hat{H}	\psi\rangle) (between jumps)
IV	**Conservation of total energy-information**	$\frac{d}{dt}\langle \widehat{H} + \hat{I}_{\text{IAU}} \rangle = 0,$ where$IA\widehat{U\ is\ the}_{\text{IAU}}$--information operator AU		
V	**Compatibility with causality**	Evolution with respect to$t$does not violate the light cone; non-local correlations do not transmit information without an additional classical channel		
VI	**Limit of small AU-connections**	Fore$_{\text{AU}} \to 0, \lambda \to 0$and off jumps The Hamiltonian reduces to the standard one (electrodynamics + scalar field + gravity)		

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5. CONNECTION WITH KAIROS-TIME AND DISCONTINUITY

In the AU-model, the fundamental evolution proceeds not in metric time$t$, but in **ontological (kairos) time** τ. The Hamiltonian in this representation is:

$$i\hbar \frac{\partial}{\partial \tau} \mid \psi\rangle = \widehat{H}_{\tau} \mid \psi\rangle, \text{где } \widehat{H}_{\tau} = \widehat{H} + \sum_{i} \hat{J}_{i}\, \delta(\tau - \tau_{i}).$$

Metric time$t$is emergent and is related toτvia the "metric tempo" operator:

$$\frac{dt}{dt} = Y\widehat{\Upsilon}, \text{with the condition } \widehat{\Upsilon}Y > 0.$$

This ensures **that causality is preserved**: even if correlations are instantaneous in$t$,τ they are ordered in τ and do not allow closed time loops.

6. EXAMPLE: THE HAMILTONIAN IN THE COULOMB GAUGE

If you select the calibration$_i\mathcal{A}^i Ai = 0$ and $\mathcal{A}_0 = 0$ (time calibration), only the transverse components $\mathcal{A}_i^{Ai\perp}$ remain. Then:

$$H = \int d^3x \left[\frac{1}{2}(\pi_i^{\perp})^2 + \frac{1}{2}(\nabla \times \mathcal{A}^{\perp})^2 + \frac{1}{2}\pi_{\Phi}^2 + \frac{1}{2}(\nabla\Phi)^2 + V(\Phi) + \frac{k}{4\pi}\epsilon^{ijk}\mathcal{A}_i\,\partial_j\mathcal{A}_k\right] + H_{\text{mutual}} + H_{\text{of entrap}} + H_{\text{Horse racing}}.$$

This Hamiltonian already explicitly contains kinetic terms and topological mass. Connections of the first class are removed by fixing the calibration.

7. CONCLUSION

The original axiomatic Hamiltonian-of this field is the sum of:

- standard kinetic terms,
- potentials,
- the Chern-Simons term (source of topological mass and nonlocality),
- interactions with matter and gravity,
- entropy feedback,
- connections (calibration ones),
- discrete jump operators responsible for recording events in the AU-log.

It satisfies all the necessary axioms of quantum field theory (self-adjointedness, boundedness from below, unitarity between jumps) and agrees with **the laws of conservation of energy and causality** extended to discontinuous processes and ontological time.

This Hamiltonian is not published in Yashchenko's preprints, but it is a direct consequence of the proposed Lagrangian axiomatics and canonical formalism. When using refer: *“The original AU-field Hamiltonian derived as part of the dialogue with DeepSeek (April 2026)”*.

Yashchenko Dmitry Eduardovich 23.04.2026
Ященко Дмитрий Эдуардович
Svobodnyy, Amur Region, Russian Federation
Российская Федерация Амурская область г. Свободный
yashchenko.dmitry@gmail.com
me@liberurban.ru
X: @graviton2011
@dmitryactauniversi.bsky.social
https://boosty.to/actauniversi
https://www.patreon.com/c/ACTAUNIVERSI