

## Acta Universi as a Research Framework and Ontological Bridge: An Invitation to Work

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### Title

Acta Universi as a Research Framework and Ontological Bridge: An Invitation to Work

Acta Universi как исследовательская рамка и онтологический мост: приглашение к работе

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### Abstract (English)

The Acta Universi (AU) hypothesis is presented as a working ontological framework rather than a finished theory. Its central object is the entropy field of thought-forms  $S_\Theta$ , understood as a non-local archive of irreversible records, from which spacetime, matter, interactions and certain informational effects are treated as emergent. The paper addresses researchers seeking a coherent language and a set of open problems rather than ready-made answers. AU is characterised both as a unifying framework (providing basic objects, a clear separation of empirical, interpretive and speculative levels, and a route from archive to observed physics) and as a bridge between cosmology, quantum information, emergent gravity and questions of irreversibility and consciousness. Concrete research opportunities are outlined: reformulation of long-standing problems, derivation of new observable signatures, rigorous formalisation of currently schematic structures, and the conversion of “unknown unknowns” into poorly investigated but approachable domains. The text emphasises that the value of the framework will be determined by the appearance of testable statements, clearer problem formulations and actual research programmes, and issues an open invitation to critical engagement.

**Keywords:** Acta Universi; information-entropic paradigm; research framework; ontological bridge; emergent spacetime; dark energy; falsifiable predictions; interdisciplinary research; theoretical cosmology; philosophy of physics.

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### Аннотация (русский)

Гипотеза Acta Universi (AU) представлена как рабочая онтологическая рамка, а не как законченная теория. Её центральный объект — поле энтропии мыслеформ  $S_\Theta$ ,

понимаемое как нелокальный архив необратимых записей, из динамики которого пространство-время, материя, взаимодействия и ряд информационных эффектов рассматриваются как эмерджентные. Текст адресован исследователям, ищущим связный язык и набор открытых задач, а не готовые ответы. AU характеризуется и как объединяющая рамка (базовые объекты, явное разделение эмпирического, интерпретативного и спекулятивного уровней, путь от архива к наблюдаемой физике), и как мост между космологией, квантовой информацией, эмерджентной гравитацией и вопросами необратимости и сознания. Обозначены конкретные исследовательские возможности: переформулировка долговременных проблем, вывод новых наблюдаемых сигнатур, строгая формализация пока схематичных структур, перевод «непознанного неизвестного» в плохо исследованные, но доступные для работы области. Подчёркивается, что ценность рамки будет определяться появлением проверяемых утверждений, более ясных формулировок проблем и реальных исследовательских программ. Текст содержит открытое приглашение к критической работе с предложенной конструкцией.

**Ключевые слова:** Acta Universi; информационно-энтропийная парадигма; исследовательская рамка; онтологический мост; эмерджентное пространство-время; тёмная энергия; фальсифицируемые предсказания; междисциплинарные исследования; теоретическая космология; философия физики.

## 1. Introduction

Contemporary fundamental science is simultaneously experiencing a period of impressive success and deep conceptual tension. On the one hand, the Standard Model, general relativity, and  $\Lambda$ CDM cosmology demonstrate high predictive power. On the other hand, a set of long-standing problems persists: the nature of dark energy and its possible dynamics, the cosmological-constant problem, the black-hole information paradox, the problem of time in quantum gravity, the origin of fundamental constants, the relationship between information, entropy and gravity, as well as questions about the place of consciousness and irreversible informational processes in the physical picture of the world.

The Acta Universi (AU) hypothesis offers not a replacement for existing theories, but an **additional ontological framework** in which these problems can be reformulated in a unified language. Its central object is the entropy field of thought-forms  $S_\Theta$ , understood as a non-local archive of irreversible records. Spacetime, matter, interactions and a number of observed effects are treated as emergent with respect to the dynamics of this field and the associated field of integrated information  $\Phi$ .

The present text is addressed to researchers who are looking not for ready-made answers, but for a **working construction**: a language, a set of concepts, possible directions for testing, and space for their own developments. The aim is to show how AU can be useful as a framework and as a bridge between different ontologies.

## 2. AU as a Framework and as a Bridge

AU performs two related functions.

**As a framework** it provides:

- a single ontological level (the informational-entropic archive);
- basic objects ( $S_\Theta$ , the non-local kernel, the thought-form as an act of recording, Kairos-time);
- a way of transitioning from the archive to observed physics (emergence of constants, structures, interactions);
- a clear separation of levels: empirical data — interpretation within AU — speculative extrapolations.

**As a bridge** it allows one to connect:

- cosmology (dynamical dark energy, effective  $\Lambda$ ) with informational and entropic approaches;
- quantum field theory and gravity with questions of irreversibility and the archive of events;
- theories of consciousness (in particular, integrated information) with physical dynamics;
- certain anomalous or weakly explained phenomena with the general structure of non-local correlations.

It is important to emphasise: AU does not claim to become a new “final theory.” It offers a language in which a number of questions can be posed anew and in which one can check whether such a formulation leads to new observable consequences.

## 3. What AU Can Give a Researcher in Their Own Work

For a researcher working in cosmology, gravity, quantum information, complex systems theory, or at the interface of physics and the sciences of consciousness, AU can fulfil several practical roles.

### 3.1. A source of new research questions

Instead of the question “what is dark energy?” there appears the question: “what is the dynamics of the archive of irreversible records and how does it manifest itself in the effective equation of state?”

Instead of “why do the constants have these particular values?” — “which functionals of the archive fix the observed values of the constants and do they allow a slow drift?”

Such a reformulation is itself already a research move.

### 3.2. A tool for interdisciplinary connections

AU makes it possible to carefully link:

- DESI and other survey data with informational models of cosmology;

- entropic and holographic approaches with questions about the arrow of time;
- laboratory tests on random-number generators, interferometry and precision spectroscopy with cosmological predictions.

For a researcher seeking ways to move beyond narrow specialisation while remaining connected to data, this can prove useful.

### **3.3. Space for rigorous formalisation**

A significant part of AU still exists at the level of a conceptual scheme and sketches of equations. This means there is open ground for:

- constructing more rigorous Lagrangians and field equations;
- studying the stability of solutions;
- deriving precise predictions for specific observables;
- developing numerical models and comparing them with data.

Anyone who undertakes the mathematical elaboration of individual blocks obtains the opportunity to make an original contribution.

## **4. What AU Can Potentially Open**

If AU is regarded not as a finished theory but as a research programme, it points to several classes of possible discoveries.

### **4.1. New observable signatures**

- The character of the evolution of  $w(a)$  and its relation to the growth of the informational density of the archive.
- Possible slow variations of fundamental constants.
- Non-local corrections in the spectrum of gravitational waves.
- Specific correlations in the data of random-number generators and other sensitive systems during major informational events.

Even if some of these signals are not confirmed, the very formulation of the tasks already changes the landscape of questions.

### **4.2. Turning “unknown unknowns” into “poorly investigated” domains**

Many topics currently remain either marginal or too vague. AU offers a way to make them more operational:

- the nature of irreversible information recording in the physical vacuum;
- the connection between local decoherence processes and the global properties of the archive;
- possible informational aspects of gravity and cosmological expansion;

- graded forms of the relation between integrated information and the metric.

What previously remained in the realm of “interesting, but unclear how to approach” acquires at least a preliminary language and a list of possible tests.

#### 4.3. New theoretical structures

Work with the non-local kernel, recording operators, the relation between  $S_\Theta$  and  $\Phi$ , and Kairos-time may lead to the appearance of new mathematical objects and classes of models that turn out to be useful even beyond the original hypothesis.

#### 5. Where One Can “Earn” Here (in the Scientific Sense)

The reference is not to commerce, but to where a researcher can obtain a tangible result.

- **Novelty of formulation.** Reformulating known problems in an informational-entropic language can itself become material for papers and talks.
- **Concrete calculations.** The rigorous derivation of even a single observable consequence (for example, a relation between the growth of  $S_\Theta$  and the parameter  $w_a$ ) possesses independent value.
- **Interdisciplinary publications.** The interface of cosmology, quantum information and complex-systems theory is currently in demand.
- **Methodological work.** Clear separation of levels (data / interpretation / speculation) and the development of falsification criteria constitute a separate and respected direction.
- **Opening of new questions.** Sometimes the most cited contribution is not an answer, but a well-posed question that others begin to investigate.

For early-career researchers and for those working at disciplinary boundaries, this space is relatively open: large established schools do not yet exist here, and a first serious contribution can prove noticeable.

#### 6. On the Cost of Inaction

The history of science has repeatedly shown that the most productive researchers are not those who waited for complete clarity and institutional approval, but those who took a new framework and began to work with it — testing, refining, refuting, developing.

AU in its present form contains enough structure to be workable and enough open places to have something to do. It does not require abandonment of the Standard Model or general relativity. It requires a readiness to consider an additional ontological layer and to check whether it leads to new consequences.

Those who prefer to ignore such frameworks entirely on the grounds that they have not yet become mainstream risk missing the moment when the “strange” turns into a “research direction.” Curiosity, a readiness for cautious but real work with new concepts, and the ability to distinguish speculation from testable assertion remain among the principal qualities of a researcher.

## 7. Conclusion

Acta Universi is offered here not as ultimate truth, but as a **working ontological construction and research bridge**. It supplies a language, a set of basic objects, a way of connecting different levels of description, and a list of directions in which concrete work can be carried out — from rigorous formalisation to confrontation with data.

For those who seek not only answers within already established paradigms, but also ways of posing questions anew, AU may prove a useful instrument. The degree of its fruitfulness will be determined not by declarations, but by whether its use gives rise to new testable statements, clearer formulations of old problems, and real research programmes.

The invitation is open.

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