

# The Birth of the Universe

## A Physical Hypothesis Based on the Principle of Contrariety

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### Abstract

*This document provides a detailed development of a cosmological hypothesis. It presents a mechanism for the origin of the Universe in which the key role is played by the **Principle of Contrariety (PC)** – a dynamics where the system's reaction to the Big Bang is a drive towards self-annihilation. In this model, from the primordial state of “pramateria” (PM), due to incomplete annihilation and a fluctuation, the **Great Segregation** of matter and quasi-antimatter occurs. This process, cooled by inflation, leads to the emergent baryon asymmetry and the formation of the cosmic structure we know, with matter concentrated at the center and quasi-antimatter pushed to the periphery.*

## Introduction

Let us once again use the known diagram showing cardboard tubes, colored corks, and plastic lids. Explanations for it are contained in ref. 1 of the bibliography.

However, we will make one change. Let's imagine a large tube the size of a 200 l barrel standing on the left side. It symbolizes "something" that arose during the Big Bang (BB) at time  $t = +0$ , where "plus zero" denotes the smallest possible interval of time that elapsed from the moment of BB. We can call this "something" the primordial atom, proto-atom, but I will call it “**pramateria**” (PM). Since BB ejected PM from itself, it means that it is the raw material for future matter (M), antimatter (Am), and everything that came into being, which may still be hidden from us. We will also make further assumptions:



Figure 1: Illustration of the model with tubes, corks, and lids. Source: Own work.

1. The first thing that appeared at the moment of BB was PM.
2. A higher dimension exists, the 5D spacetime (SP5D), being an almost infinite ocean of PM. Its volume is not measured in  $m^3$ , but in  $m^4$ .
3. BB was powered from SP5D.

## Energy and Scale

At the moment  $+0$ , PM comes into being. It is unknown how much of it there was. Let's assume that at time  $+0$  s (e.g., Planck time) the entire known Universe (U) was created. Its total energy is  $3.24 \times 10^{71}$  J and this value is equal to the internal energy of PM. Particle physics theorists predict that empty space should seethe with energy at a density of  $10^{113}$  J/ $m^3$ . Cosmologists observe that empty space has an energy density on the order of  $10^{-10}$  J/ $m^3$ . The difference between these two numbers is 120 orders of magnitude (i.e., the number 1 followed by 120 zeros). Creating the entire U requires  $3.24 \times 10^{-42}$   $m^3$  of quantum vacuum. We can also say that our entire U can be compressed back into this microscopic volume, about 3200 times larger than the volume of a single proton.

## The Principle of Contrariety and the “Digestion” of PM

During BB, the system, guided by the **Principle of Contrariety (PC)**, sought to restore equilibrium by zeroing out the intruder – the PM state. Since the direct return of PM to SP5D proved impossible, the system attempted to “digest” and “reprocess” it from within.

The key mechanism of this process was creation, powered by additional energy from SP5D. CPT symmetry appears, converting PM into matter GP(+) and antimatter aGP(-). We

now have the primary explosion (the most intense), and the boundary of the Universe also forms. PM should be treated as mass without voids, i.e., as  $(\text{FSP})_{\text{max}}$ .

$$(\text{PM (pramateria)} = \text{FSP}_{\text{max}}) + 2 \times mc^2 \rightarrow \text{FSP}(+) + \text{FSP}(-) \rightarrow \text{GP}(+) + \text{aGP}(-) \quad (1)$$

$\text{GP}(+)$  denotes matter, but in this analogy, I am thinking of a hypothetical proton star (GP). Writing GP, I mean the analogy, not an actual proton star, although I feel I am close to the truth.

In this “cosmic crucible”, under the influence of this energy, PM – treated as the maximally condensed form of spacetime ( $\text{FSP}_{\text{max}}$ ) – underwent transformation into matter-antimatter pairs. The system encompassing BB now attempts to fight the effect and get rid of the intruder. The Universe tries to break down PM, attempts to “digest” and “reprocess” it.

## Explanation of the Process:

- **PM ( $\text{FSP}_{\text{max}}$ )** constituted the primary raw material with mass  $M$ .
- **Energy**  $2 \times mc^2$ , supplied from the outside (from SP5D).
- **Products:  $\text{GP}(+)$  and  $\text{aGP}(-)$**  are hypothetical, primordial packets of matter and antimatter. Their total rest mass is equal to the sum of the mass of PM and the mass  $m$  corresponding to the supplied energy, thus fulfilling the mass-energy conservation principle.

This process can be compared to the work of a “cosmic device”: on one side, we input the raw material (PM) and supply energy, and on the other, we receive ready, stable products – matter and antimatter – which will not undergo immediate annihilation, serving as building blocks for the further evolution of the Universe.

Reaction (1) was a crucial step in “unpacking” the maximally condensed spacetime  $(\text{FSP})_{\text{max}}$ . It required converting PM into FSP varieties ( $\text{GP}(+)/\text{aGP}(-)$ ), which could mutually zero each other out, thereby initiating the chain of events leading to the formation of the reality we know.

## Primary and Secondary Annihilation

The next stage of “digesting” the decay product of PM is primary annihilation. In this phase, the process of cosmological inflation had maximum acceleration. Primary annihilation is like the annihilation of a proton star  $\text{GP}(+)$  with an anti-proton star  $\text{aGP}(-)$ .

$$\text{GP}(+) + \text{aGP}(-) \rightarrow 2 \times mc^2 \quad (2)$$

Sum total (1 + 2):

$$\text{PM} \rightarrow 2 \times mc^2, \quad \text{where } m \text{ is the mass of PM} \quad (3)$$

From the vacuum energy density, one can calculate what volume of SP was created that absorbed this energy, because there is no pure energy without its carrier. It's like wanting to have a spring without the spring.

After the primary annihilation phase ended (reaction 2), secondary annihilations occurred. If reaction (3) had proceeded fully, our U would not exist. Already at the stage of primary annihilation, signs of “fluctuation” appeared. It means the reaction does not proceed perfectly symmetrically. The system may thus contain slightly more GP(+) than aGP(-), and the system immediately used this to promote a random winner in the battle of attrition. Annihilation means decay, i.e., the straightening of FSP into RSP through many intermediate stages, in which partially straightened or, equivalently, partially crumpled spacetime structures can form. Such intermediate states can be structures of matter (nucleon, atom), quasi-matter (qM), antimatter (anti-atom), and quasi-antimatter (qAn). If, as a result of the fluctuation, there was more GP(+), then the system ended up with slightly more M, qM relative to An and qAn. Matter and antimatter underwent secondary annihilation. The interaction of these structures with the boundary of U now played a key role. From the water analogy, it follows that thumbtacks always group together and move towards the center of the water vessel, while polystyrene balls also group together but repel from the thumbtacks and migrate towards the edges of the vessel (they are attracted to the boundary). Matter and qM thus undergo densification, while qAn undergoes dispersion. If An formed somewhere, it was in small quantities; it did not form stars and galaxies. Due to densification, all qM transformed into M, and qAn dispersed and formed a “foam” or “halo” surrounding the entire Universe (cU). Quasi-antimatter still retains the ability to annihilate with M, but the reaction does not occur in a 1:1 ratio; it is matched to the “amount” of opposite polarizations in M and qAn.

## Key Distinction:

### Antimatter vs. Quasi-Antimatter

In light of the presented hypothesis, it is necessary to explain a fundamental distinction that resolves an apparent contradiction between theory and observations.

- **Stable Antimatter (A)**, such as antihydrogen atoms, possesses a full, compact geometrical structure (FSP(-)). Consequently, its gravitational interaction is **identical** to that of matter. This means that in experiments such as ALPHA-g at CERN, antihydrogen will fall in Earth’s gravitational field just like ordinary hydrogen. We should not expect any anomalies for it.
- **Quasi-Antimatter (qAn)**, however, is a **dispersed, “foamy,” or “nebulous”** state. Its geometry is incomplete, partial (e.g., 0.001 FSP(-)), which makes it incapable of forming stable, compact objects. It is precisely this **fuzzy character and low density** that result in qAn being subject to an effective repulsion from matter clusters on a cosmological scale.

This distinction is crucial. The observed lack of antimatter galaxies and the negative results of previous gravity measurements for antimatter **do not contradict our hypothesis – they confirm it**. They indicate that the Universe does not contain significant amounts of **stable antimatter (A)**, and the dominant form of the “negative” state is **quasi-antimatter (qAn)**, which, due to its emergent properties, has been physically separated from the world of matter.

## Inflation as Cooling

The Universe has already “digested” PM, but the pressure and energy of this process threaten to blow it apart from within. The system must now cool down quickly. One method is for the system to perform work and increase its volume, i.e., cosmological inflation. Similarly, gases after the detonation of explosive material perform expansion work. Energy is dissipated over an increasingly larger volume.

At extremely high densities (before inflation occurs), reaction (4) might also take place: the flipping of part of the GP(+) mass into its symmetric counterpart from the symmetric Universe (the tube with the red cork on the left in row II of the illustration). What will the coins (bibliography, item 2) tell us this time about how to carry out this process?

This process requires having negative mass and energy, so it is probably impossible. Nature must itself create a symmetric Universe II (U II) and allow U I to “borrow” a symmetric GP(-) from U II. This method, being highly speculative, we abandon for now, since we know the system chose cooling through inflation and the conversion of energy into mass (M + An + qAn). SP5D

## Summary Chronology

Let’s summarize what we have:

1. **Period 1.** SP5D “gave birth” to cU in the form of PM in a separate entity, a system.
2. **Period 2.** Thanks to energy from SP5D, the transformation of PM into GP(+) and GP(−) occurred, but with a quantitative fluctuation.
3. **Period 3.** Primary annihilation occurred.
4. **Period 4.** Secondary annihilation occurred, the system became ordered. Matter (M) was created, a little An, and a lot of qAn. The amount of  $M = A_n + qA_n$ .
5. **Period 5.** qAn migrated to the edge of cU.

Somewhere deep in the Universe, further annihilation occurs, but this time qAn with M. This process is stable, slow, and peacefully drives the transformations within cU.

## References

- [1] Okupski, A. *A Tale of Deep Symmetry in the World*. GitHub Repository, (2024).  
[https://github.com/ArkOkupski-WAT/A-Tale-of-Deep-Symmetry-in-the-World/blob/main/A\\_Tale\\_of\\_Deep\\_Symmetry\\_in\\_the\\_World.pdf](https://github.com/ArkOkupski-WAT/A-Tale-of-Deep-Symmetry-in-the-World/blob/main/A_Tale_of_Deep_Symmetry_in_the_World.pdf)
- [2] Okupski, A. *Energy Balance*. GitHub Repository, (2024).  
[https://github.com/ArkOkupski-WAT/A-Tale-of-Deep-Symmetry-in-the-World/blob/main/Bilans\\_Energii.pdf](https://github.com/ArkOkupski-WAT/A-Tale-of-Deep-Symmetry-in-the-World/blob/main/Bilans_Energii.pdf)
- [3] Okupski, A. *On the Six Fasteners of Spacetime*. GitHub Repository, (2024).  
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- [4] Okupski, A. *Hydrodynamic Analogy for Matter-Antimatter Interactions*. GitHub Repository, (2024).  
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