

World-Universal Cosmology. Principal Points

Digest

Vladimir S. Netchitailo
netchitailov@gmail.com

Abstract

The Hypersphere World–Universal Cosmology (WUC) addresses numerous unresolved issues in modern Astrophysics and Cosmology by providing alternative explanations to the prevailing Big Bang Theory (BBT).

WUC solves critical problems such as: 1) The Hubble tension; 2) The missing baryon problem; 3) The origin of Fermi bubbles; 4) The age of the Universe discrepancy; 5) The coronal heating problem; 6) Internal heating and diversity of gravitationally-rounded objects in the solar system; 7) The presence of Plutonium-244, with an 80-million-year half-life, in nature; 8) Faster core rotations of the Sun and Earth compared to their surfaces; 9) The faint young Sun paradox; 10) The black-body spectrum of cosmic microwave background radiation.

Additionally, **WUC eliminates** fundamental issues, including: 1) The need for the Universe to begin at $t=0$, avoiding a temporal singularity; 2) The angular momentum problem in galaxies and extrasolar systems evolution; 3) The matter-antimatter asymmetry; 4) The magnetic monopole problem; 5) The uneven distribution of matter and voids; 6) Singularities leading to black holes; 7) The formation of supermassive black holes; 8) The "Axis of Evil" anomaly in cosmic microwave background measurements; 9) The wave–particle duality dilemma.

1. Introduction

Scientific theories are founded on axioms, hypotheses, or assumptions, which serve as starting points for logical reasoning. The WUC is fundamentally distinct from the BBT, offering a framework that bypasses the initial singularity and inflation, while also addressing long-standing cosmological challenges.

Building upon P. Dirac's 1937 Hypothesis of Large Numbers and Variable Gravitational Constant, WUC incorporates a mechanism of continuous matter creation. This innovative approach resolves several key gaps in understanding the World's evolution and structure, paving the way for a more comprehensive cosmological paradigm.

2. Comparison between WUC and BBT

2.1. Space and Time

BBT posits that we exist within a spacetime framework, a mathematical model that unifies the three spatial dimensions (x, y, z) with a temporal dimension (ict). Here, i represents the imaginary unit, c is the speed of light in a vacuum, and t is cosmic time—a coordinate commonly used in BBT. This results in a "four-dimensional continuum" also known as spacetime, which is, in fact, a **4-manifold**. However, this abstract, imaginary construct may raise questions for those seeking a more intuitive understanding of the Universe.

In contrast, **WUC** proposes the **Hypersphere**, a **3-manifold** that locally behaves like a regular Euclidean 3D space. This concept is analogous to how the **2-manifold** surface of the Earth appears flat to observers on a small scale. Similarly, the Hypersphere provides a more physically grounded model of the World's structure. Within WUC, **absolute cosmological time** (τ) serves as a universal temporal factor, independent of any physical phenomenon or observer. This contrasts with the relative nature of time in BBT, offering a more straightforward and physical basis for describing temporal evolution. Overall, the **assumptions of WUC are rooted more deeply in physical intuition and observation compared to the abstract foundations of BBT.**

2.2. Initial Conditions

BBT introduces the concept of an "Initial Singularity," a state where all the matter and energy of the Universe were compressed into an infinitesimally small point with infinite energy density. At $t = 0$, spacetime began to expand extremely rapidly—a process known as inflation. However, this raises fundamental questions: *What existed before $t=0$?* and *Where is the center of the Universe's expansion?* These questions remain unanswered within the framework of BBT.

WUC offers an alternative explanation, suggesting that a fluctuation within the Eternal Universe gave rise to the **4D Nucleus of the World**. This nucleus, with an extrapolated radius equal to the fundamental unit (a), possessed a finite energy density—approximately 10,000 times less than nuclear density. Unlike BBT's singularity, the WUC model avoids infinite densities and inflation. The Nucleus expands in its fourth spatial dimension at a constant speed (c), a gravitodynamic constant. This results in the uniform stretching of the Nucleus's surface, forming the **Hypersphere World**. Crucially, this model eliminates the need for dark energy to explain cosmic expansion.

Key Difference: In BBT, all matter existed at $t=0$, originating from the singularity. In contrast, WUC posits continuous matter creation within the evolving World, offering a dynamic and non-singular explanation for the World's structure and development.

2.3. Structure of the World

BBT: Assumes an almost infinite homogeneous and isotropic universe around the initial singularity.

WUC: Describes a Finite Boundless World (the Hypersphere of the Nucleus) as a Patchwork Quilt of various main Luminous Superclusters in the Cosmic Medium which emerged in different regions of the World at different cosmological times.

2.4. Cosmic Medium

BBT: Often implies a vacuum state in the universe.

WUC: Proposes that the World's homogeneous and isotropic Cosmic Medium (CM) consists of protons, electrons, photons, neutrinos, and Universe-Created Particles (UCPs), previously referred to as "Dark Matter Particles." WUC is a classical model, therefore classical notions can be introduced only when the very first ensemble of particles was created at the cosmological time $\tau \cong 10^{-18} s$. Time, Space and Gravitation are connected with the Impedance, Gravitomagnetic parameter, and

Energy density of CM, respectively. It follows that neither Time, Space nor Gravitation could be discussed in absence of CM. **There is no Cosmic Medium – there is Nothing!**

The rejection of the Luminiferous Aether by Special Relativity in 1905 was a critical moment for Classical Physics; however, CM proposed by WUC could be considered a revival of this concept, acting as a savior for Classical Physics.

2.5. Angular Momentum Problem

BBT: Does not explicitly emphasize the creation and conservation of angular momentum in its foundational principles.

WUC: Stands out as the only theory that provides a mechanism for angular momentum creation and is consistent with the fundamental law of its conservation.

2.6. Macroobject Formation

BBT: MOs form in the following sequence: Extrasolar Systems → Galaxies → Superclusters.

WUC: MOs form in the opposite sequence: Superclusters → Galaxies → Extrasolar Systems due to an Explosive Volcanic Rotational Fission of Superclusters' Overspinning Cores (made up of UCPs), which were created by the Universe during the "Dark (invisible) Epoch." The formation of Galaxies and Extrasolar Systems is not a process that concluded ages ago; instead, it is ongoing.

3. Hypersphere World-Universe Cosmology

3.1. Assumptions

World is a Finite Boundless Hypersphere of a 4D Nucleus of the World that is expanding along the fourth spatial dimension of the Nucleus with speed equals to a gravitodynamic constant c .

The Eternal Universe is **the Creator** of Universe-Created Matter, which is continuously created in the Nucleus. **The Universe is Everything!** Ordinary Matter is a byproduct of UCPs self-annihilation.

Two fundamental parameters in various rational exponents define all macro and micro features of the World: dimensionless Rydberg constant $\alpha = (2aR_\infty)^{1/3}$ (that is named the fine-structure constant now) and time-varying quantity Q that is, in fact, the Dirac's Large Number. I stress that the best theory is the one, which is based on minimum number of dimensionless parameters.

3.2. Hypersphere World

WUC introduced the concept of the Hypersphere World to address the absence of the center of expansion in the 3D universe, associated with "Initial Singularity." In frames of WUC, the center of expansion resides in the center of the 4D Nucleus. The expansion of the Nucleus causes a stretching of its surface, which constitutes the Hypersphere World.

Although we cannot directly measure the radius of the curvature R of the World in the fourth spatial dimension, we know that the World stretches without a center of expansion. According to WUC, all parameters of the World depending on a dimensionless time-varying quantity Q , which is a ratio of radius R to a ($Q = R/a$), are a manifestation of a Worlds' curvature in the fourth spatial dimension.

Leveraging the Inter-Connectivity of primary cosmological parameters revealed by WUC, we demonstrate that the gravitational parameter G_{av} , which can be measured directly, enables the determination of all other cosmological parameters that are not directly measurable. Using G_{av} , we calculate the radius of the curvature R as follows: $G_{av} \rightarrow Q_{av} \rightarrow R = a \times Q_{av} = 1.3459 \times 10^{26} m$.

3.3. Universe-Created Matter

In our previous articles, we followed the standard paradigm "**Dark Matter**" that is not quite right for WUC, in which the World consists of particles of Ordinary Matter: protons, electrons, photons, and neutrinos. On the other hand, there are particles created by the Universe –UCPs of a new kind of "**Universe-Created Matter**" (UCM). In 2024, we introduced a new term – UCPs, which have following characteristics: **UC Fermions (UCF)** or **Bosons** with **Rest Energies** of them, **Weak Interaction**, and **Self-annihilation**. Ordinary particles are a byproduct of UCPs self-annihilation. It is easy to switch from Dark (D) Matter to Universe-Created (UC) Matter.

It is worth noting that the rest energy of electron E_e equals to: $E_e = \alpha \times E_0$ and the Rydberg unit of energy is: $Ry = 0.5\alpha^3 \times E_0$ (E_0 is a basic energy unit, α is a dimensionless Rydberg constant: $\alpha = (2aR_\infty)^{1/3}$ and R_∞ is the Rydberg constant). Considering these two well-known equations and the main goal of WUC – two dimensionless parameters only (α and Q), we proposed for UCPs the values of rest energies, which must be constant (created by the Universe) and therefore are proportional to rational exponents of α .

Two kinds of Matter have different origin of radiations: Ordinary Matter radiates **Electromagnetic waves** from Radio waves up to X-rays by electrons outside nuclei; UC Matter radiates **Gamma rays**, which are emitted by nuclei, due to self-annihilation of UCPs with rest energies, covering eighteen orders of magnitude.

The signatures of UCPs self-annihilation with predicted rest energies of 1.3 TeV; 9.6 GeV; 70 MeV; 340 keV; 3.7 keV; 0.2 eV; $5.3 \mu eV$ are found in spectra of diffuse gamma-ray background and the emissions of various MOs in the World.

The reason for this multicomponent UCM system was to explain: the diversity of Very High Energy gamma-ray sources in the World and the diversity of UCM Cores of Macroobjects (Superclusters, Galaxies, and ESS), which are Fermion Compact Objects and UCM Reactors in WUC.

3.4. Principal Points

Beginning. The World was started by a Fluctuation in the Eternal Universe, and the Nucleus of the World, which is the 4D ball, was born. An extrapolated Nucleus radius at the Beginning was equal to the basic size unit of $a = 1.7705641 \times 10^{-14} m$. All points of the Hypersphere are equivalent; there are no preferred centers or boundaries of the World.

Stretching of the World. The 4D Nucleus is expanding along Its imperceptible fourth spatial dimension so that the radius of the Nucleus R is increasing with speed c . Its surface, the Hypersphere, is evenly stretched.

Creation of Matter. The surface of the Nucleus is created in a process analogous to sublimation. Continuous creation of matter is the result of this process. Sublimation is a well-known process that

happens when surfaces are intrinsically more energetically favorable than the bulk of a material, and hence there is a driving force for surfaces to be created.

The Universe creates UCM in 4D Nucleus. UCPs carry new UCM into the World. Ordinary Matter is a byproduct of UCPs self-annihilation. The proposed 4D process is responsible for 4D Nucleus Expansion, the World Stretching, Creation of Matter, and Arrow of Time, which does not depend on any physical phenomenon in the World. It is the result of the Nucleus expansion due to the driving force for surfaces to be created. It constitutes the prime hypothesis of WUC. Creation of UCM occurs homogeneously in all points of the World.

Content of the World. The World consists of CM and MOs. Total energy density of the World equals to the critical energy density throughout the World's evolution. The energy density of CM is two-thirds of the total energy density and MOs – one-third in all cosmological times. The relative energy density of UCPs is about 92.8% and ordinary particles about 4.8% in CM and 2.4% in MOs.

Homogeneous and Isotropic Cosmic Medium, consisting of protons, electrons, photons, neutrinos, and UCPs, is an active agent in all physical phenomena in the World. WUC belongs to Classical Physics. In WUC, classical notions can be introduced only when the very first ensemble of particles was created at a cosmological time $\tau \cong 10^{-18} s$ and the notion "Cosmic Medium" can be introduced. **Classical Physics deals with ensembles of quantum objects!**

Time, Space and Gravitation relate to the Impedance, Gravitomagnetic parameter, and Energy density of CM, respectively. It follows that neither Time, Space nor Gravitation could be discussed in absence of CM. **There is no Cosmic Medium – there is Nothing!**

WUC is based on **Cosmological Time** τ that marches on at the constant pace from the Beginning of the World up to the present Epoch along with time-varying Cosmological Parameters, including Hubble's parameter H , which are inversely proportional to τ ($H = \tau^{-1}$). The value of H should be measured based on the Cosmic Microwave Background Radiation data only.

Rotational Fission. The mechanism that can provide Angular Momenta to MOs is the Rotational Fission of overspinning (surface speed at equator exceeding escape velocity) Prime Objects. From the point of view of Fission theory, the prime object is transferring some of its rotational angular momentum to orbital and rotational momenta of satellites. It follows that the rotational momentum of the prime object should exceed the orbital momenta of its satellites. In WUC, prime objects are UCM Cores of Superclusters, which must accumulate tremendous rotational angular momenta before the Birth of a Luminous World. It means that it must be some long enough time in the history of the World, which we named "Dark (invisible) Epoch."

Dark (invisible) Epoch spans from the Beginning of the World 14.22 Byr ago to 0.45 Byr (for Laniakea Supercluster that is a home to Milky Way (MW) galaxy) when only UCM Macroobjects existed.

Luminous Epoch has lasted ever since 13.77 Byr when Luminous MOs emerged due to the Explosive Volcanic Rotational Fission of Overspinning UCM Supercluster's Cores. It looks like a Firework of UCM cores of satellites at the same time, so that the direction of the sum of satellites angular momentum coincides with the angular momentum of the Prime Object. There are no

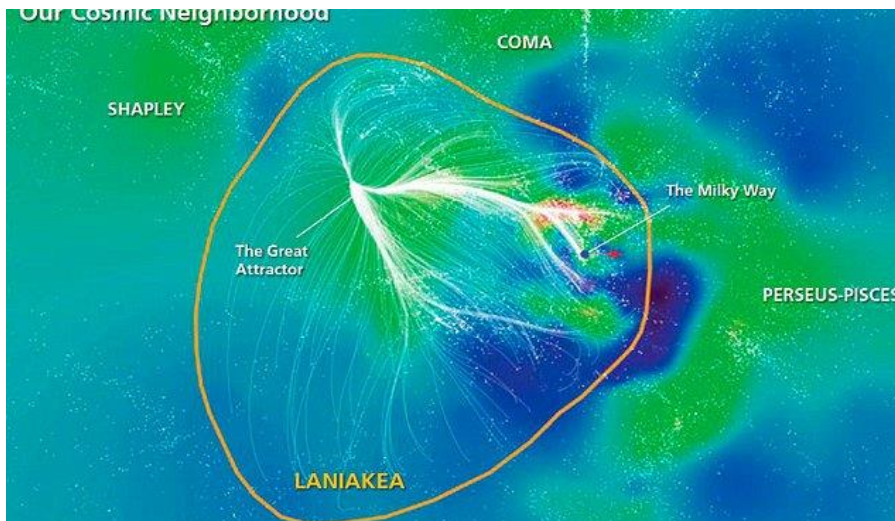
preferences of directions of satellites rotations at any level: galaxy, extrasolar system (ESS) vs random rotation direction. UCM Cores of Prime Objects detonate at critical points of their stability.

Macroobjects Shell Structure. MOs of the World possess following properties: their Cores are made up of UCPs; they contain other particles, including UCPs and ordinary particles, in shells surrounding the Cores. Introduced **Weak Interaction** between UCPs and ordinary particles provides integrity of all shells.

UC Matter Reactors. MOs' cores are UCM Reactors fueled by UCPs. All chemical elements, compositions, radiation are produced by MOs themselves as the result of UCPs self-annihilation in their UCM cores. **Nucleosynthesis of all elements** occurs inside of MOs during their evolution.

Macroobjects Formation. Superclusters are principal objects of the World. MOs (Superclusters, Galaxies, and ESS) form in parallel around different Cores made up of different UCPs. The Finite Boundless World presents a Patchwork Quilt of different main Luminous Superclusters in CM, which emerged in various regions of the World at different Cosmological times. The distribution of MOs is spatially inhomogeneous and anisotropic and temporally non-simultaneous. Macrostructures of the World form from the top (superclusters) down to galaxies and ESS.

Laniakea Supercluster (LS) with binding mass $\sim 10^{17} M_{\odot}$ is home to MW and about one hundred thousand other nearby galaxies, which did not start their movement from "Initial Singularity." All these galaxies are moving around the Center of LS according to Gravitational Laws for masses and mass-currents with the **time-varying parameter G** . Neighboring superclusters Shapley, Coma, and Perseus-Pisces have the same structure.



The stretching of the Hypersphere World can be explained in the following way: the radius of the 4D Nucleus of the World increases along an imperceptible fourth spatial dimension; Its surface area grows; the distance between Centers of main Superclusters increases. **There is no need for Dark Energy!**

Macroobjects Evolution. The formation of galaxies and stars is not a process that concluded ages ago; instead, it is ongoing. Assuming the Eternal Universe, numbers of cosmological structures on all levels will increase; new superclusters will form; existing clusters will obtain new galaxies; new stars will be born inside existing galaxies; sizes of individual stars will increase.

A supernova is a powerful and extremely bright explosion that occurs at the end of a massive star's life cycle, releasing vast amounts of energy and matter into space. The temperature of CM will asymptotically approach absolute zero.

Thanks to the revealed by **WUC Inter-Connectivity of Primary Cosmological Parameters**, we show that the Gravitational parameter G that can be measured directly makes measurable all Cosmological parameters (including the absolute Age of the World), which cannot be measured directly.

3.5. Most Direct Observational Evidence of Validity of WUC

Cosmic Microwave Background Radiation, Far-Infrared Background Radiation, Intergalactic Plasma, speak in favor of existence of the **Cosmic Medium**.

MW is gravitationally bounded with the Virgo Supercluster and has an orbital Angular Momentum, which far exceeds rotational Angular Momentum of MW. WUC is the only cosmological theory that aligns with the **Law of Creation and Conservation of Angular Momentum**.

Galaxy clusters are particularly important for UCM studies. Mass-to-light ratio of the Virgo Supercluster is ~ 300 times larger than that of Solar ratio. Similar ratios are obtained for other superclusters. These ratios are main arguments in favor of presence of significant amounts of **Universe-Created Matter** in the World.

Masses of superclusters can be estimated in two independent ways: from the scatter in radial velocities of galaxies within clusters and by Gravitational lensing that can measure cluster masses without relying on observations of dynamics.

The existence of "Dark Matter" is accepted by astronomers and orthodoxies of BBT, but WUC is the only theory, which proposes the **Composition** of it.

Cosmic Medium, Universe-Created Matter, and Angular Momentum are three main Pillars of WUC.

4. Conclusion

The Hypersphere World-Universe Cosmology presents a new paradigm and a fresh approach to understanding the Universe and the science of Cosmology. It builds on the foundations of Classical Physics and has the potential to challenge core assumptions in both Cosmology and Classical Physics. Rather than claiming to explain all existing cosmological data or presenting a fully developed theory, WUC serves as a starting point for a New Cosmology envisioned by Paul Dirac in 1937. While further refinement by the global physics community is essential, World-Universe Cosmology's insights, combined with the groundbreaking discoveries of the JWST and the legacy of Dirac's ideas over 87 years, underscore the need for a Paradigm Shift in Astronomy, Cosmology, and Classical Physics.

Hypersphere World-Universe Cosmology invites recognition.