About the World

Vladimir S. Netchitailo

netchitailov@gmail.com

Abstract

This article provides a comparison of the Hypersphere World-Universe Model (WUM) with the prevailing Big Bang Model (BBM) of the Standard Cosmology. The performed analysis of BBM shows that the Four Pillars of the Standard Cosmology are model-dependent and not strong enough to support the model. The **angular momentum** problem is one of the most critical problems in BBM. Standard Cosmology cannot explain how Galaxies and Extra Solar systems obtained their enormous orbital and rotational angular momenta. WUM is the only cosmological model in existence that is consistent with the Law of Conservation of Angular Momentum.

1. Introduction

We can't solve problems by using the same kind of thinking we used when we created them.

Albert Einstein

Today, a growing feeling of Physics' stagnation is shared by a large number of researchers. In some respects, the situation today is similar to that at the end of the19th century, when the common consensus held that the body of physics is nearly complete. The time may be ripe to propose new Physical models that will be both simpler than the current state of the art, as well as open up new areas of research [1].

Hypersphere World-Universe Model (WUM) is proposed as an alternative to the prevailing Big Bang Model (BBM) of Standard Cosmology (SC) [2]. WUM is a natural continuation of Classical Physics. The Model makes use of a number of Hypotheses proposed by classical physicists from the 17th until the beginning of the 21st century. The presented Hypotheses are not new, and we don't claim credit for them. In fact, we are developing the existent Hypotheses and proposing new Hypotheses in frames of WUM. The main objective of the Model is to unify and simplify existing results in Classical Physics into a single coherent picture [3].

In our view, there is a principal difference between Physics and Mathematics. I am convinced that Physics cannot exist without Mathematics, but Mathematics must not replace Physics. It is exactly what's happened for the last 100 years. Between 1907 and 1912, Albert Einstein wrote *"Since the mathematicians have invaded the theory of relativity, I do not understand it myself anymore"*.

I absolutely agree with John von Neumann who said: "*The sciences do not try to explain, they hardly even try to interpret, they mainly make models. By a model is meant a mathematical construct, which, with addition of certain verbal interpretations describes observed phenomena. The justification of such a mathematical construct is solely and precisely that it is expected to work".*

WUM is a classical model. It should then be described by classical notions, which define emergent phenomena. By definition, **Emergent Phenomenon** is a property that is a result of simple interactions that work cooperatively to create a more complex interaction. Physically, simple interactions occur at a microscopic level, and the collective result can be observed at a macroscopic level [4].

2. Big Bang Model

Independently deriving Friedmann's equations in 1927, Georges Lemaître, a Belgian physicist and Roman Catholic priest, proposed that the inferred recession of the nebulae was due to the expansion of the universe [5]. In 1931, Lemaître went further and suggested that the evident expansion of the universe, if projected back in time, meant that the further in the past the smaller the universe was, until at some finite time in the past all the mass of the universe was concentrated into a single point, a "primeval atom" where and when the fabric of time and space came into existence [6].

English astronomer Fred Hoyle, who favored an alternative "steady-state" cosmological model, is credited with coining the term "Big Bang" during a talk for a March 1949 BBC Radio broadcast[7], saying: "*These theories were based on the hypothesis that all the matter in the universe was created in one big bang at a particular time in the remote past*".

A Lambda Cold Dark Matter (ΛCDM) model is a parametrization of BBM. It is based on **six parameters**: baryon density, dark matter density, dark energy density, scalar spectral index, curvature fluctuation amplitude, and reionization optical depth. The values of these six parameters are mostly not predicted by current theory; other possible parameters are fixed at "natural" values e.g. total density equals to 1.00, neutrino masses are small enough to be negligible. The ΛCDM model can be extended by adding cosmological inflation. It is frequently referred to as the SC [2].

WMAP team, following the ΛCDM model, found the **best ΛCDM fit parameters** and based on them derived Cosmological parameters including Age of the Universe $A_\tau = 13.772 \pm 0.059\ Gyr$ and Hubble parameter $H_0 = 69.32 \pm 0.8\ km/s\ Mpc$ [8].

The Four Pillars of the SC are as follows [9]:

- Expansion of the Universe;
- Nucleosynthesis of light elements;
- Formation of galaxies and large-scale structures;
- Origin of cosmic background radiation.

Expansion of the Universe. The fact that galaxies are receding from us in all directions was first discovered by Edwin Hubble. Projecting galaxy trajectories backwards in time means that they converge to the **Initial Singularity** at t=0 that is an infinite energy density state. This uncovers one of the shortcomings of SC – the Horizon problem [10]: *Why does the universe look the same in all directions when it arises out of causally disconnected regions? This problem is most acute for the very smooth cosmic microwave background radiation.*

This problem was resolved by the Cosmological Inflation, which is a theory of an extremely rapid exponential expansion of space in the early universe up to 93 billion light-years in diameter with a speed about 10^{60} m/s.

Jim Peebles, who was awarded half of the Nobel Prize in Physics in 2019 for his theoretical discoveries in physical cosmology, said "*It's a beautiful theory. Many people think it's so beautiful that it's surely right. But the evidence of it is very sparse*" [11].

According to Joseph Silk, *our best theory of the beginning of the universe, inflation, awaits a definitive and falsifiable probe, in order to satisfy most physicists that it is a trustworthy theory. Our basic problem is that we cannot prove the theory of inflation is correct, but we urgently need to understand whether it actually occurred* [12].

The initial singularity is a gravitational singularity predicted by General Relativity to have existed before the Big Bang (BB) and thought to have contained all the energy and spacetime of the Universe. From a physical point of view, existence of a mathematical singularity is a drawback of any theory. It means that the theoretical model didn't consider some significant physical phenomenon, which prevents an occurrence of the singularity.

In our view, there is no way to prevent an occurrence of the initial singularity in BBM. It must be a principally different Beginning of the World – a Fluctuation in the Eternal Universe with a finite size and energy. The size of this fluctuation can increase with a finite speed. Then, there is no need for cosmological inflation [13].

Following the inflationary period, the universe continued to expand, but at a slower rate.

E. Conover outlined the following situation with the measurements of an expansion rate of the universe in "*Debate over the universe's expansion rate may unravel physics. Is it a crisis?*" [14]:

- *Scientists with the Planck experiment have estimated that the universe is expanding at a rate of 67.4 km/s Mpc with an experimental error of 0.5 km/s Mpc;*
- *But supernova measurements have settled on a larger expansion rate of 74.0 km/s Mpc, with an error of 1.4 km/s Mpc. That leaves an inexplicable gap between the two estimates.*

L. Verde, T. Treu, and A. G. Riess gave a brief summary of the "*Workshop at Kavli Institute for Theoretical Physics, July 2019*" [15]. It is not yet clear whether the discrepancy in the observations is due to systematics, or indeed constitutes a major problem for the SC.

The results of the measurements in 2019-2020 of the Hubble's constant H_0, which characterizes the expansion rate of the universe, shows that the values of H_0 vary significantly depending on Methodology. The disagreement in the values of H_0 obtained by the various teams far exceeds the standard uncertainties provided with the values. The average values of H_0 vary from 67.6 to 76.8 $km\ s^{-1}Mpc^{-1}$. This discrepancy is called the **Hubble tension** [16].

In our view, it is a major problem for SC that connected with the principal difference between Cosmological Time along with **Time-varying** Primary Cosmological Parameters (PCPs) in WUM and Solar Time along with **Constant** PCPs in SC [17].

Nucleosynthesis of Light Elements is believed to have taken place in the interval from roughly 10 seconds to 20 minutes after the BB and is calculated to be responsible for the formation of most of the universe's helium as the isotope helium-4, along with small amounts of deuterium, helium-3, and a very small amount of lithium-7. All of the elements that are heavier than lithium were created much later, by stellar nucleosynthesis in evolving and exploding stars [2].

During the 1970s, there were major efforts to find processes that could produce deuterium. While the concentration of deuterium in the universe is consistent with BBM as a whole, it is too high to be consistent with a model that presumes that most of the universe is composed of protons and neutrons. The standard explanation now used for the abundance of deuterium is that the universe does not consist mostly of baryons, but that **non-baryonic dark matter** makes up most of the mass of the universe [2].

According to SC, lithium was one of the three elements synthesized in BB. But in case of lithium, we observe a **cosmological lithium discrepancy** in the universe: older stars seem to have less lithium than they should, and some younger stars have much more. M. Anders, *et al.* report on the results of the first measurement of the $^{2}H(\alpha,\gamma)^{6}Li$ cross section at BB energies. The results they obtained have firmly **ruled out BB lithium production** as a possible explanation for the reported ^{6}Li detections[18].

According to WUM, Nucleosynthesis of all elements (including light elements) occurs inside of Dark Matter (DM) Cores of all Macroobjects during their evolution [2].

Formation of Galaxies and Large-Scale Structures. At about 10,000 years after BB, the temperature had fallen to such an extent that the energy density of the Universe began to be dominated by massive particles, rather than the light and other radiation that had predominated earlier. This change in the form of the main matter density meant that the gravitational forces between the massive particles could now begin to take effect, so that any small perturbations in their density would grow. This brings into focus one of the shortcomings of the SC – the **density fluctuation** problem: *The perturbations which gravitationally collapsed to form galaxies must have been primordial in origin; from whence did they arise?* [10].

Origin of Cosmic Background Radiation. According to BBM, about 380,000 years after BB the temperature of the universe fell to the point where nuclei could combine with electrons to create neutral atoms. As a result, photons no longer interacted frequently with matter, the universe became transparent, and the Cosmic Microwave Background (CMB) radiation was created. This cosmic event is usually referred to as Decoupling. The photons present at the time of decoupling have been propagating ever since, though growing fainter and less energetic, since the expansion of space causes their wavelength to increase over time. They are the same photons that we see in the CMB now [2]. But then, why is the **CMB a perfect black-body**?

According to WUM, wavelength is a classical notion. Photons, which are quantum objects, have only four-momenta. They don't have wavelengths. By definition, "*Black-body radiation is the thermal electromagnetic radiation within or surrounding a* ***body in thermodynamic equilibrium*** *with its environment*".

In WUM, the black-body spectrum of CMB is due to a thermodynamic equilibrium of photons with the Intergalactic plasma, the existence of which is experimentally proved. It explains why the CMB is a perfect black-body [2].

As a conclusion, the performed analysis shows that the Four Pillars of the SC are model-dependent and not strong enough to support the BBM.

Black Holes. In 1916, the first **mathematical solution** of Einstein's field equations that would characterize a Black Hole (BH) was published by Karl Schwarzschild in the paper "*On the*

Gravitational Field of a ***Mass Point*** *according to Einstein's Theory*" [19]. The simplest BH solution is the Schwarzschild solution, which describes the gravitational field in the spherically symmetric, **static, vacuum** case. The **BH singularity** is a gravitational singularity predicted by General Relativity.

The existence of supermassive objects in galactic centers is now commonly accepted. It is commonly believed that the central mass is a supermassive BH. There exists, however, evidences to the contrary [4]. For example, in 2013, N. Hurley-Walker spotted a previously unknown radio galaxy NGC1534 that is quite close to Earth but is much fainter than it should be if the central BH was accelerating the electrons in the jets: *"The discovery is also intriguing because at some point in its history the central black hole switched off but the radio jets have persisted"*. It's also possible there was never a BH there at all [20].

Sir Roger Penrose, who is a mathematical physicist, mathematician, philosopher of science, has got Nobel Prize in Physics in 2020 for "*The discovery that black hole formation is a robust prediction of the general theory of relativity".* At the same time, Prof. Reinhard Genzel and Andrea M. Ghez have got their Nobel Prize for "*The Discovery of a Supermassive Compact Object at the Centre of Our Galaxy*".

According to the Nobel Prize in Physics 2020, there are the astronomical observations of the **Supermassive Compact Object** and the mathematical theory of **Black Hole Formation** that is **a Robust Prediction** of the General Theory of Relativity**.** There is no experimental confirmation of the Black Hole's existence!

On the contrary, the astronomical observation of the **Supermassive Compact Object** is a confirmation of one of the most important predictions of WUM in 2013: "*Macroobjects of the World have cores made up of the discussed DM particles. Other particles, including DM and baryonic matter, form shells surrounding the cores*" [21]. The discovery of the fastest hyper-velocity star S5-HVS1 that was kicked away from Sgr A*, made by S. E. Koposov, *et al.* [22], speaks in favor of WUM.

Nebular Hypothesis maintains that 4.57 billion years ago, the Solar system formed from the gravitational collapse of a giant molecular cloud, which was light years across. Most of the mass collected in the Centre, forming the Sun; the rest of the mass flattened into a protoplanetary disc, out of which the planets and other bodies in the Solar system formed [23].

The Nebular hypothesis is not without its critics. In his "*The Wonders of Nature*", Vance Ferrell outlined the following counter-arguments [24]:

- *It contradicts the obvious physical principle that gas in outer space never coagulates; it always spreads outward;*
- *Each planet and moon in solar system has unique structures and properties. How could each one be different if all of them came from the same nebula;*
- *A full 98 percent of all the angular momentum in the solar system is concentrated in the planets, yet a staggering 99.8 percent of all the mass in our Solar system is in our Sun;*
- *Jupiter itself has 60 percent of the planetary angular motion. This strange distribution was the primary cause of the downfall of the Nebular hypothesis;*

- *There is no possible means by which the angular momentum from the Sun could be transferred to the planets. Yet this is what would have to be done if any of the evolutionary theories of Solar system origin are to be accepted.*

There is another principal problem in the SC – **Angular Momentum** problem. BBM cannot answer the following question: how did the Solar system obtain a substantial orbital angular momentum calculated based on the distance from the galactic center of 26.4 kly and orbital speed of 220 km/s ?

A detailed analysis of the Solar system [23] shows that the overspinning DM Core of the Sun can give birth to DM planetary cores, and they can generate DM cores of moons through the Rotational Fission mechanism (see Section 3PCP).

3. Hypersphere World-Universe Model

It is the main goal of WUM to develop a Model based on **two parameters** only: a dimensionless Rydberg constant α and time-varying parameter Q, which is a measure of the Size and Age of the World. In WUM, we often use well-known physical parameters, keeping in mind that all of them can be expressed through the Basic Units. Taking the relative values of physical parameters in terms of the Basic Units we can express all dimensionless parameters of the World through two parameters α and Q in various rational exponents, as well as small integer numbers and π [25].

Key concepts and observations of WUM are the following [25]:

- The Beginning of the World;
- Expansion and Creation of Matter;
- The Medium of the World;
- Gravity, Space and Time are all emergent phenomena;
- Inter-Connectivity of Primary Cosmological Parameters;
- Law of Conservation of Angular Momentum;
- Evolution of the World.

WUM makes reasonable assumptions in each of these areas. The remarkable agreement of the calculated values of the PCPs with the observational data gives us considerable confidence in the Model.

The Beginning of the World. Before the Beginning of the World there was nothing but an Eternal Universe. About 14.22 billion years ago the World was started by a fluctuation in the Eternal Universe, and the **Nucleus of the World**, which is a four-dimensional ball, was born. An extrapolated Nucleus radius at the Beginning was equal to a basic unit of size $a = \alpha^3/2R_\infty$, where R_∞ is Rydberg constant. The 3D World is a hypersphere that is the surface of a 4-ball Nucleus. All points of the hypersphere are equivalent; there are no preferred centers or boundary of the World [25]. Hypersphere World as a model of a finite universe was proposed by Georg Riemann in 1854 [26].

Expansion and Creation of Matter. The Nucleus is expanding in the Universe, and its surface, the hypersphere, is likewise expanding. The radius of the Nucleus R is increasing with speed c (gravitodynamic constant) for the absolute cosmological time τ from the Beginning and equals to $R = c\tau$. The expansion of the Hypersphere World can be understood through the analogy with an expanding 3D balloon: imagine an ant residing on a seemingly two-dimensional surface of a balloon.

As the balloon is blown up, its radius increases, and its surface grows. The distance between any two points on the surface increases. The ant sees her world expand but does not observe a preferred center.

According to WUM, the surface of the Nucleus is created in a process **analogous to sublimation**. Continuous creation of matter is the result of such process. Sublimation is a well-known endothermic 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.

Matter arises from the fourth spatial dimension of the Nucleus. Dark Matter Particles (DMPs) carry new Matter into the World. By analogy with three-dimensional ball, which has two-dimensional sphere surface (that has surface energy), we can imagine that our three-dimensional World (Hypersphere) has a "Surface energy" of the four-dimensional Nucleus [25].

It is important to emphasize that

- Creation of Matter is a direct consequence of expansion;
- Creation of DM occurs homogeneously in all points of the hypersphere World;
- Ordinary Matter (about 7.2%) is a byproduct of DM self-annihilation. Consequently, the matter-antimatter asymmetry problem discussed in literature does not arise (since antimatter does not get created by DM self-annihilation).

The Medium of the World. The existence of the Medium is a principal point of WUM. It follows from the observations of Intergalactic Plasma; Cosmic Microwave Background Radiation (MBR); Far-Infrared Background Radiation. Inter-galactic voids discussed by astronomers are in fact examples of the Medium in its purest. Cosmic MBR is part of the Medium; it then follows that the Medium is the absolute frame of reference. Relative to MBR rest frame, Milky Way galaxy and Sun are moving with the speed of 552 and 370 km/s respectively [25].

The Medium consists of stable elementary particles with lifetimes longer than the age of the World: protons, electrons, photons, neutrinos, and DMPs. The total energy density of the Medium is 2/3 of the overall energy density of the World. Superclusters, Galaxies, Extrasolar systems, planets, moons, etc. are made of the same particles. The energy density of Macroobjects adds up to 1/3 of the total energy density of the World throughout the World's evolution [25].

In WUM, Time and Space are closely connected with Mediums' impedance and gravitomagnetic parameter. It follows that neither Time nor Space could be discussed in absence of the Medium. The gravitational parameter G that is proportional to the Mediums' energy density can be introduced only for the Medium filled with Matter.

As the conclusion, **Gravity, Space and Time** are all emergent phenomena [25]. In this regard, it is worth to recall the Albert Einstein quote: "*When forced to summarize the theory of relativity in one sentence: time and space and gravitation have no separate existence from matter*".

Inter-Connectivity of Primary Cosmological Parameters. The constancy of the universe fundamental constants, including Newtonian constant of gravitation and Planck mass, is now commonly accepted, although has never been firmly established as a fact. All conclusions on the (almost) constancy of the Newtonian parameter of gravitation are model-dependent.

A commonly held opinion states that gravity has no established relation to other fundamental forces, so it does not appear possible to calculate it from other constants that can be measured more accurately, as is done in some other areas of physics. WUM holds that there indeed exist relations between all PCPs that depend on dimensionless time-varying quantity Q: Newtonian parameter of gravitation; Hubble's parameter; Age of the World; Critical energy density; Concentration of Intergalactic Plasma; Minimum Energy of Photons; Temperature of the Microwave Background Radiation; Temperature of the Far-Infrared Background Radiation peak; Fermi Coupling constant.

The very first manuscript "*World-Universe Model*" was published on viXra in March 2013 [21]. At that time great results in Cosmology were achieved:

- The cosmic Far-Infrared Background was announced in 1999 [27];
- Microwave Background Radiation temperature was measured in 2009 [28];
- Nine-Year Wilkinson Microwave Anisotropy Probe Observations were published in 2012 [29].

At the same time, the most important for the Cosmology, Newtonian constant of gravitation G, proved too difficult to measure [30]. Its measurement precision was the worst among all Fundamental physical constants. To resolve the problem T. Quinn, C. Speake, and J. Luo organized the Royal Society meeting titled "*The Newtonian constant of gravitation, a constant too difficult to measure?*" in London on Feb. 2014 [31]. According to Jun Luo:

"*The Newtonian gravitational constant G holds an important place in physics. Though there have been about 300 measurements of G since the first laboratory measurement by Cavendish over 200 years ago, its measurement precision is the worst among all the fundamental physics constants*".

Terry Quinn in the paper "*Outcome of the Royal Society meeting on G held at Chicheley Hall on 27 and 28 February 2014 to discuss 'The Newtonian constant of gravitation, a constant too difficult to measure?'*" concluded [32]:

"*The problem of arriving at a reliable value for G in the face of the wide dispersion of recent results (some 450 ppm, more than ten times the sigma of the individual results) is unlikely to be resolved by one or two additional results obtained, as in the past, by teams working independently. There is nevertheless an urgent need to resolve this situation, unprecedented in the determination of one of the fundamental constants of physics*".

In 2013, WUM proposed a principally different way to solve the problem of G measurement precision. Considering a more precise value of Fermi Coupling constant, we calculate the predicted value of gravitational constant, which was x8 more accurate than the accepted one [33].

WUM recommended the predicted value of Newtonian Constant of Gravitation to be considered in CODATA Recommend Values of the Fundamental Physical Constants. Between 2013 and 2018, the relative standard uncertainty of G measurements decreased x6. It seems that CODATA considered the WUM recommendation of the predicted value of G and used it for G(2014) and G(2018) without any reference or explanation of their methodology [34].

Angular Momentum Problem is one of the most critical problem in the Standard Cosmology that must be solved. Any theory of evolution of the Universe that is not consistent with the Law of Conservation of Angular Momentum should be promptly ruled out. To the best of our knowledge, the

Hypersphere World-Universe Model is the only cosmological model in existence that is consistent with this Fundamental Law.

Milky Way (MW) galaxy is gravitationally bounded with Local Supercluster (LS) and has a huge orbital momentum calculated based on the distance of 65 million light-years from LS and orbital speed of about 400 km/s [25]. The beginning of MW galaxy was about 13.77 billion years. The age of MW is about the Age of the World. How did MW obtain its enormous orbital and rotational angular momenta?

In our opinion, there is the only one mechanism that can provide angular momenta to Macroobjects – Rotational Fission of overspinning (surface speed at equator exceeding escape velocity that is the second cosmic velocity) Prime Objects. From the point of view of Fission model, 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 momentum of its satellite**. In frames of WUM, Prime Objects are DM Cores of Superclusters, which must accumulate tremendous angular momenta before the Birth of the Luminous World. It means that it must be some long enough time in the history of the World, which we named "Dark Epoch" [25].

Evolution of the World. To be consistent with the Law of Conservation of Angular Momentum we develop New Physics of the World:

- The Model introduces Dark Epoch (spanning from the Beginning of the World for 0.45 billion years) when only Dark Matter Macroobjects existed, and Luminous Epoch (ever since for 13.77 billion years) when Luminous Macroobjects (MOs) emerged;
- The main players of the World are overspinning DM Cores of Superclusters, which accumulated tremendous rotational angular momenta during Dark Epoch and transferred it to DM Cores of Galaxies during their Rotational Fission;
- Big Bang discussed in SC is a transition from Dark Epoch to Luminous Epoch due to Rotational Fission of Overspinning DM Supercluster's Cores;
- Dark Matter Core of Milky Way galaxy was born 13.77 billion years ago as the result of the Rotational Fission of the Local Supercluster DM Core;
- DM Cores of Extrasolar systems, planets and moons were born as the result of the Rotational Fissions of the Milky Way DM Core in different times (4.57 billion years ago for the Solar system);
- Macrostructures of the World form from the top (superclusters) down to galaxies, extrasolar systems, planets, and moons;
- Gravitational waves can be a product of Rotational Fission of overspinning Macroobject Cores.

Dark Matter Reactors. Macroobjects' cores are essentially Dark Matter Reactors fueled by DMPs. All chemical elements, compositions, substances, rocks, etc. are produced by MOs themselves as the result of DMPs self-annihilation. The diversity of all gravitationally-rounded objects of the Solar system is explained by the differences in their cores (mass, size, composition). The DM Reactors at their cores (including Earth) are very efficient and provide enough energy for the internal heating of all gravitationally-rounded objects and all their geological processes like volcanos, quakes, mountains' formation through tectonic forces or volcanism, tectonic plates' movements, etc.

Predictions. In 2013, WUM predicted the values of the following Cosmological parameters: gravitational, concentration of intergalactic plasma, and the minimum energy of photons, which were experimentally confirmed in 2015 – 2018. "*The Discovery of a Supermassive Compact Object at the Centre of Our Galaxy*" (Nobel Prize in Physics 2020) made by Prof. R. Genzel and A. Ghez is a confirmation of one of the most important predictions of WUM in 2013: "*Macroobjects of the World have cores made up of the discussed DM particles. Other particles, including DM and baryonic matter, form shells surrounding the cores*" [21].

4. Conclusion

The Hypersphere World-Universe Model successfully describes PCPs and their relationships, ranging in scale from cosmological structures to elementary particles. WUM allows for precise calculation of their values that were only measured experimentally earlier and makes verifiable predictions.

WUM does not attempt to explain all available cosmological data, as that is an impossible feat for any one manuscript. Nor does WUM pretend to have built an all-encompassing theory that can be accepted as is. The Model needs significant further elaboration, but in its present shape, it can already serve as a basis for a new Physics proposed by Paul Dirac in 1937. The Model should be developed into the well-elaborated theory by whole physical community.

Acknowledgements

I am grateful to my friend Ilya Bystryak, whom I know for 29 years, for inviting me to present results of my work in Cosmology in "Curious Club" (Boston) and gave a title of our conversation "About the World" ("О Мироздании").

Many thanks to all members of "Curious Club" for inspiring discussions of my Model and valuable suggestions.

References

[1] Netchitailo, V. (2016) Overview of Hypersphere World-Universe Model. *Journal of High Energy Physics, Gravitation and Cosmology*, **2**, 593-632. https://doi.org/10.4236/jhepgc.2016.24052.
[2] Netchitailo, V. (2020) World-Universe Model—Alternative to Big Bang Model. *Journal of High Energy Physics, Gravitation and Cosmology*, **6**, 133-258.
https://doi.org/10.4236/jhepgc.2020.61012.
[3] Netchitailo, V. (2018) Hypersphere World-Universe Model. Tribute to Classical Physics. *Journal of High Energy Physics, Gravitation and Cosmology*, **4**, 441-470.
[4] Netchitailo, V. (2020) Hypersphere World-Universe Model: Basic Ideas. *Journal of High Energy Physics, Gravitation and Cosmology*, **6**, 710-752. https://doi.org/10.4236/jhepgc.2020.64049.
[5] Lemaître, G. (1927) Un Univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extra-galactiques. Annales de la Société scientifique de Bruxelles (in French), **47**, 49. Bibcode:1927ASSB...47...49L. Lemaître, G. (1931) A Homogeneous Universe of Constant Mass and Increasing Radius accounting for the Radial Velocity of Extra-galactic Nebulæ. Monthly Notices of the Royal Astronomical Society **91**, 483. Bibcode:1931MNRAS..91..483L. doi:10.1093/mnras/91.5.483.

[6] Lemaître, G. (1931) Contributions to a British Association Discussion on the Evolution of the Universe. Nature, **128**, 704. Bibcode:1931Natur.128..704L. doi:10.1038/128704a0. S2CID 4028196.
[7] Hoyle, F. (1949) Hoyle on the Radio: Creating the 'Big Bang'. An Online Exhibition. Cambridge, UK: St John's College. Archived from the original on 26 May 2014. Retrieved 2 December 2019.
[8] C. L. Bennett, *et al.* (2013) Nine-Year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Final Maps and Results. arXiv:1212.5225v3.
[9] The Four Pillars of the Standard Cosmology.
http://www.damtp.cam.ac.uk/research/gr/public/bb_pillars.html
[10] Shortcomings of the Standard Cosmology.
http://www.damtp.cam.ac.uk/research/gr/public/bb_problems.html.
[11] Couronne, I. and Ahmed, I. (2019) Top cosmologist's lonely battle against 'Big Bang' theory. https://phys.org/news/2019-11-cosmologist-lonely-big-theory.html.
[12] Silk, J. (2018) Towards the Limits of Cosmology. Foundations of Physics, **48**, 1305.
[13] Netchitailo, V. (2020) World-Universe Model Predictions. *Journal of High Energy Physics, Gravitation and Cosmology*, **6**, 282-297. doi: 10.4236/jhepgc.2020.62022.
[14] Conover, E. (2019) Debate over the universe's expansion rate may unravel physics. Is it a crisis? ScienceNews. https://www.sciencenews.org/article/debate-universe-expansion-rate-hubble-constant-physics-crisis
[15] Verde, L., Treu, T., and Riess, A. G. (2019) Tensions between the Early and the Late Universe. arXiv:1907.10625.
[16] Hubble's law (2020) Wikipedia. https://en.wikipedia.org/wiki/Hubble%27s_law.
[17] Netchitailo, V. (2020) Hypersphere World-Universe Model: Evolution of the World.
https://vixra.org/pdf/2011.0209v2.pdf.
[18] M. Anders, *et al.* (2014) First Direct Measurement of the $^{2}H(\alpha,\gamma)^{6}Li$ Cross Section at Big Bang Energies and the Primordial Lithium Problem. Physical Review Letters, **113**, 042501.
[19] Schwarzschild, K. (translation and foreword by S. Antoci and A. Loinger) (1999) On the Gravitational Field of a Mass Point according to Einstein's Theory. arXiv:9905030.
[20] Cahill, D. (2014) Radio galaxy discovery near Earth spurs more questions. https://phys.org/news/2014-05-radio-galaxy-discovery-earth-spurs.html.
[21] Netchitailo, V. S. (2013) Word-Universe Model. viXra:1303.0077.
https://vixra.org/pdf/1303.0077v7.pdf.
[22] Koposov, S. E., *et al.* (2019) The Great Escape: Discovery of a nearby 1700 km/s star ejected from the Milky Way by Sgr A*. arXiv:1907.11725.
[23] Netchitailo, V. (2019) Solar System. Angular Momentum. New Physics. *Journal of High Energy Physics, Gravitation and Cosmology*, **5**, 112-139. doi: 10.4236/jhepgc.2019.51005.
[24] Ferrell, V. (1996) The Wonders of Nature. Harvestime Books. Altamont, TN 37301 U.S.A.
[25] Netchitailo, V. (2019) Dark Matter Cosmology and Astrophysics. *Journal of High Energy Physics, Gravitation and Cosmology*, **5**, 999-1050. doi: 10.4236/jhepgc.2019.54056.
[26] Riemann, B. (1854) On the Hypotheses which lie at the Bases of Geometry. Translated by William Kingdon Clifford .Nature, Vol. VIII. Nos. 183, 184, pp. 14–17, 36, 37.
[27] Lagache, G., et al. (1999) First detection of the WIM dust emission. Implication for the Cosmic Far Infrared Background. arXiv:9901059.
[28] Fixsen, D. J. (2009) The Temperature of the Cosmic Microwave Background. arXiv:0911.1955.
[29] Bennett, C. L., et al. (2012) Nine-Year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Final Maps and Results. arXiv:1212.5225v3.

[30] Mohr, P. J., Taylor, B. N., and Newell, D. B. (2012) CODATA Recommended Values of the Fundamental Physical Constants: 2010. arXiv:1203.5425.
[31] Quinn, T., Speake, C., and Luo, J. (2014) The Newtonian constant of gravitation, a constant too difficult to measure? The Royal Society Meeting. London, Feb. 27-28. https://royalsociety.org/science-events-and-lectures/2014/gravitation/.
[32] Quinn, T. (2014) Outcome of the Royal Society meeting on G held at Chicheley Hall on 27 and 28 February 2014 to discuss 'The Newtonian constant of gravitation, a constant too difficult to measure?". Phil. Trans. R. Soc. A 372. https://doi.org/10.1098/rsta.2014.0286 .
[33] Netchitailo, V. S. (2013) Fundamental Parameter Q. Recommended Values of the Newtonian Parameter of Gravitation, Hubble's Parameter, Age of the World, and Temperature of the Microwave Background Radiation. viXra:1312.0179v2. https://vixra.org/pdf/1312.0179v2.pdf.
[34] Netchitailo, V. (2020) World-Universe Model. Self-Consistency of Fundamental Physical Constants. viXra:2006.0057v2. https://vixra.org/pdf/2006.0057v2.pdf.