Mysteries of Solar System Explained by WUM

Vladimir S. Netchitailo

netchitailov@gmail.com

Abstract

E. Stone in the article *"18 Mysteries and Unanswered Questions About Our Solar System. Little Astronomy"* wrote: *One of the great things about astronomy is that there is still so much out there for us to discover. There are so many unanswered questions and mysteries about the universe. There is always a puzzle to solve and that is part of beauty. Even in our own neighborhood, the Solar System, there are many questions we still have not been able to answer* [1]. In the present paper, we explain the majority of these Mysteries and some other unexplained phenomena in the Solar System (SS) in frames of the developed Hypersphere World-Universe Model (WUM) [2].

1. Introduction

Physics is an Experimental Science. In my opinion, 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 has happened for the last 100 years. I absolutely agree with J. 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".* The value of models is not only describing observed phenomena but making verifiable predictions and setting up targeted experiments based on the obtained experimental results.

Dirac's themes were the unity and beauty of Nature. He identified three revolutions in modern physics – Relativity, Quantum Mechanics and Cosmology. In his opinion: "*The new cosmology will probably turn out to be philosophically even more revolutionary than relativity or quantum theory, perhaps looking forward to the current bonanza in cosmology".* In 1937, P. Dirac proposed: the Large Number Hypothesis and Hypothesis of the variable gravitational "constant"; and later added the notion of continuous creation of Matter in the World. The developed Hypersphere WUM follows these ideas, albeit introducing a different mechanism of Matter creation. Considering the JWST discoveries, successes of WUM, and 86 years of Dirac's proposals, it is high time to make a Paradigm Shift for Cosmology and Classical Physics.

2. Short History of Solar System Formation

The most widely accepted model of SS formation, known as the Nebular hypothesis, was first proposed in 1734 by E. Swedenborg [3], [4] and later elaborated and expanded upon by I. Kant in 1755 in his "Universal Natural History and Theory of the Heavens" [5]. The Nebular hypothesis maintains that 4.57 billion years ago, SS 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 SS formed.

The initial collapse of a solar-mass protostellar nebula takes around 100,000 years. Every nebula begins with a **certain amount of angular momentum**. Gas in the central part of the nebula, with relatively low angular

momentum, undergoes fast compression and forms a hot hydrostatic (not contracting) core containing a small fraction of the mass of the original nebula. This core forms the seed of what will become a star. As the collapse continues, **conservation of angular momentum** means that the rotation of the infalling envelope accelerates [6].

The Nebular hypothesis is not without its critics. In his "*The Wonders of Nature*", V. Ferrell outlined the following counter-arguments [7]:

- It contradicts the obvious physical principle that gas in outer space never coagulates; it always spreads outward;
- Each planet and moon in the 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. Evolutionary theory cannot account for this. 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 SS origin are to be accepted.

The Nebular hypothesis does not solve the most critical Angular Momentum problem. Standard model cannot answer the following questions:

- Where the original nebula has got a **certain amount of angular momentum**;
- Why is the orbital momentum of Jupiter larger than the rotational momentum of the Sun;
- How SS obtained its enormous orbital angular momenta**?**

The present article introduces an Explosive Volcanic Rotational Fission model of creation and evolution of Macrostructures of the World (Superclusters, Galaxies, Extrasolar Systems), based on Dark Matter (DM) Overspinning Cores of the World's Macroobjects. WUM is the only cosmological model in existence that is consistent with this Fundamental Law.

Lunar origin fission hypothesis was proposed by G. Darwin in 1879 to explain the origin of the Moon by rapidly spinning Earth, on which equatorial gravitative attraction was nearly overcome by centrifugal force [8]. D. U. Wise made a detailed analysis of this hypothesis in 1966 and concluded that "*it might seem prudent to include some modified form of rotational fission among our working hypothesis*" [9].

Solar fission theory was proposed by L. Jacot in 1951[10]. He stated that:

- The planets were expelled from the Sun one by one from the equatorial bulge caused by rotation;
- One of these planets shattered to form the asteroid belt;
- Moons and rings of planets were formed from the similar expulsion of material from their parent planets.

T. Van Flandern further extended this theory in 1993. He proposed that planets were expelled from the Sun in pairs at different times. Six original planets exploded to form the rest of the modern planets. It solves several problems the standard model does not [11]:

- If planets fission from the Sun due to overspin while the proto-Sun is still accreting, this more easily explains how 98% of the solar system's angular momentum ended up in the planets;
- It solves the mystery of the dominance of prograde rotation for these original planets since they would have shared in the Sun's prograde rotation at the outset;
- It also explains coplanar and circular orbits;
- It is the only model that explains the twinning of planets (and moons) and difference of planet pairs

because after each planet pair is formed in this way, it will be some time before the Sun and extended cloud reach another overspin condition.

The outstanding issues of the Solar fission are:

- It is usually objected that tidal friction between a proto-planet and a gaseous parent, such as the proto-Sun, ought to be negligible because the gaseous parent can reshape itself so that any tidal bulge has no lag or lead, and therefore transfers no angular momentum to the proto-planet;
- There would exist no energy source to allow for planetary explosions.

Neither L. Jacot nor T. Van Flandern proposed an origin for the Sun itself. It seems that they followed the standard Nebular hypothesis. In our work, we concentrated on furthering the Solar Fission theory [12].

3. Hypersphere World-Universe Model
3.1. Essence of WUM

Main ideas of WUM are as follows [12-20]:

- The Finite World is a 3D Hypersphere of the 4D Nucleus of the World, which is 4D ball expanding in the fourth spatial dimension. All points of the Hypersphere are equivalent; there are no preferred centers or boundaries of the World;
- The Universe is responsible for the creation of Dark Matter (DM) in the 4D Nucleus of the World. Dark Matter Particles (DMPs) carry new DM into the World. Luminous Matter is a byproduct of DMPs self-annihilation. DM plays a central role in creation and evolution of all Macroobjects (MOs);
- WUM introduces Dark Epoch (spanning from the Beginning of the World 14.22 Byr ago for 0.45 Byr) and Luminous Epoch (ever since, 13.77 Byr). Transition from Dark Epoch to Luminous Epoch is due to an Explosive Volcanic Rotational Fission (VRF) of Overspinning DM Supercluster's Cores and self-annihilation of DMPs;
- The Medium of the World, consisting of protons, electrons, photons, neutrinos, and DMPs, is an active agent in all physical phenomena in the World. Time, Space and Gravitation are closely connected with the Impedance, Gravitomagnetic parameter, and Energy density of the Medium, respectively. It follows that neither Time, Space nor Gravitation could be discussed in absence of the Medium. WUM confirms the Supremacy of Matter postulated by A. Einstein: "*When forced to summarize the theory of relativity in one sentence: time and space and gravitation have no separate existence from matter*";
- WUM based on Cosmological Time that marches on at the constant pace from the Beginning of the World up to the present Epoch along with time-varying Principal Cosmological Parameters;
- MOs of the World possess the following properties: their Cores are made up of DMPs; they contain other particles, including DMPs and Ordinary particles, in shells surrounding the Cores. Macroobjects' cores are essentially DM Reactors fueled by DMPs. All chemical elements, compositions, substances, rocks, *etc.* are produced by MOs themselves as the result of DMPs self-annihilation in their Cores;
- WUM is the only cosmological model in existence that is consistent with the Fundamental Law of Conservation of Angular Momentum;
- Thanks to the revealed by WUM Inter-Connectivity of Primary Cosmological Parameters, we show that Gravitational parameter that can be measured directly makes measurable all Cosmological parameters, which cannot be measured directly;
- 3D Finite Boundless World (Hypersphere of 4D Nucleus) presents Patchwork Quilt of various Luminous Superclusters ($\gtrsim 10^3$), which emerged in different places of the World at different Cosmological times. The Medium of the World is Homogeneous and Isotropic. Distribution of MOs is spatially Inhomogeneous and Anisotropic and temporally Non-simultaneous;

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- WUM is based on two parameters only: dimensionless Rydberg constant α (later named Fine-structure constant) and time-varying Quantity Q that is, in fact, the Dirac Large Number and a measure of the Worlds' curvature in the fourth spatial dimension and the Age of the World. In our opinion, constant α and quantity Q should be named "Universe Constant" and "World Parameter" respectively;
- The manuscript "*Review Article: Cosmology and Classical Physics*" [2] is a synthesis of our approach to Cosmology, and the article "*JWST Discoveries—Confirmation of World-Universe Model Predictions*" [20] is a quintessence of WUM.

3.2. Main Pillars of WUM

3.2.1. Medium

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. Intergalactic voids discussed by astronomers are, in fact, examples of the Medium in its purest. 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 (MW) galaxy and the Sun are moving with the speed of 552 and 370 $km\ s^{-1}$, respectively.

3.2.2. Multicomponent Dark Matter

WUM proposes multicomponent DM system consisting of two couples of co-annihilating DMPs: a heavy Dark Matter Fermion (DMF) – DMF1 (1.3 TeV) and a light spin-0 boson – DIRAC (70 MeV) that is a dipole of Dirac's monopoles with charge $\mu = e/2\alpha$ (e is elementary charge); a heavy fermion – DMF2 (9.6 GeV) and a light spin-0 boson – ELOP (340 keV) that is a dipole of preons with electrical charge e/3; self-annihilating fermions DMF3 (3.7 keV) and DMF4 (0.2 eV). The reason for this multicomponent DM system was to explain:
- The diversity of Very High Energy gamma-ray sources in the World;
- The diversity of DM Cores of MOs of the World (superclusters, galaxies, and extrasolar systems), which are Fermion Compact Objects in WUM.

WUM postulates that rest energies of DMFs and bosons are proportional to a basic energy unit: $E_0 = hc/a$ (h is Planck constant, c is the electrodynamic constant, and a is a basic size unit) multiplied by different exponents of α and can be expressed with following formulae [19]:

DMF1 (fermion): $E_{DMF1} = \alpha^{-2}E_0 = 1.3149950\ TeV$

DMF2 (fermion): $E_{DMF2} = \alpha^{-1}E_0 = 9.5959823\ GeV$

DIRAC (boson): $E_{DIRAC} = \alpha^0 E_0 = 70.025267\ MeV$

ELOP (boson): $E_{ELOP} = 2/3\alpha^1 E_0 = 340.66606\ keV$

DMF3 (fermion): $E_{DMF3} = \alpha^2 E_0 = 3.7289402\ keV$

DMF4 (fermion): $E_{DMF4} = \alpha^4 E_0 = 0.19857111\ eV$

It is worth noting that the rest energy of electron E_e equals to: $E_e = \alpha E_0$ and the Rydberg unit of energy is: $Ry = hcR_\infty = 0.5\alpha^3 E_0 = 13.605693\ eV$.

We still do not have a direct confirmation of DMPs' rest energies, but we do have a number of indirect observations. The signatures of DMPs self-annihilation with expected rest energies of 1.3 TeV; 9.6 GeV; 70 MeV; 340 keV; 3.7 keV are found in spectra of the diffuse gamma-ray background and the emissions of various MOs in the World. We connect observed gamma-ray spectra with the structure of MOs (nuclei and shells

composition). Self-annihilation of those DMPs can give rise to any combination of gamma-ray lines. Thus, the diversity of Very High Energy gamma-ray sources in the World has a clear explanation.

In this regard, it is worth recalling a story about neutrinos: "*The neutrino was postulated first by W. Pauli in 1930 to explain how beta decay could conserve energy, momentum, and angular momentum (spin). But we still don't know the values of neutrino masses*". Although we still cannot measure neutrinos' masses directly, no one doubts their existence.

Neutrons serve as another example. The mass of a neutron cannot be directly determined by mass spectrometry since it has no electric charge. But since the masses of a proton and of a deuteron can be measured with a mass spectrometer, the **mass of a neutron can be deduced** by subtracting proton mass from deuteron mass, with the difference being the mass of the neutron plus the binding energy of deuterium.

DMPs do not possess an electric charge. Their masses cannot be directly measured by mass spectrometry. Hence, they can be observed only indirectly due to their self-annihilation and irradiation of gamma-quants.

3.2.3. Macroobject Shell Model

In WUM, Macrostructures of the World (Superclusters, Galaxies, Extrasolar systems) have Nuclei made up of DMFs, which are surrounded by Shells composed of DM and Baryonic Matter. The shells envelope one another, like a Russian doll. The lighter a particle, the greater the radius and the mass of its shell. Innermost shells are the smallest and are made up of heaviest particles; outer shells are larger and consist of lighter particles. A proposed Weak Interaction of DMPs provides integrity of all shells. **Table 1** describes parameters of MOs' Cores, which are 3D fluid balls with a very high viscosity and function as solid-state objects [20].

Table 1. Parameters of Macroobjects' Cores made up of different Fermions in present Epoch.

Fermion	Fermion Mass m_f, MeV	Macroobject Mass M_{max}, kg	Macroobject Radius R_{min}, m	Macroobject Density $\rho_{max}, kg m^{-3}$
DMF1	1.3×10^6	1.9×10^{30}	8.6×10^3	7.2×10^{17}
DMF2	9.6×10^3	1.9×10^{30}	8.6×10^3	7.2×10^{17}
Electron-Positron	0.51	6.6×10^{36}	2.9×10^{10}	6.3×10^4
DMF3	3.7×10^{-3}	1.2×10^{41}	5.4×10^{14}	1.8×10^{-4}
DMF4	2×10^{-7}	4.2×10^{49}	1.9×10^{23}	1.5×10^{-21}

The calculated parameters of the shells show that:
- Nuclei made up of DMF1 and/or DMF2 compose Cores of stars in Extrasolar Systems (ESS);
- Shells of DMF3 and/or Electron-Positron plasma around Nuclei made up of DMF1 and/or DMF2 make up Cores of Galaxies;
- Nuclei made up of DMF1 and/or DMF2 surrounded by shells of DMF3 and DMF4 compose Cores of Superclusters.

According to WUM, Cores of Galaxies are DM Compact Objects made up of DMF1 and/or DMF2 with shell of DMF3 with the calculated maximum mass of $6 \times 10^{10} \ M_\odot$ (see **Table 1**). This value is in good agreement with the experimentally obtained value of the most massive "black hole" ever found, with a mass of $6.6 \times 10^{10} \ M_\odot$ at the center of TON 618 [21]. It is worth noting that there are no black holes in WUM.

"*The Discovery of a* **Supermassive Compact Object** *at the Centre of Our Galaxy*" (Nobel Prize in Physics 2020) made by 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*" [22].

In WUM, Cores of all MOs possess the following properties [20]:

- Their Nuclei are made up of DMFs and contain other particles, including DM and Baryonic matter, in shells surrounding the Nuclei;
- DMPs are continuously absorbed by Cores of all MOs. Ordinary Matter (about 7.2% of the total Matter) is a byproduct of DMPs self-annihilation. It is re-emitted by Cores of MOs continuously;
- Nuclei and shells are growing in time: size $\propto \tau^{1/2}$; mass $\propto \tau^{3/2}$; and rotational angular momentum $\propto \tau^2$, until they reach the critical point of their stability, at which they detonate. Satellite cores and their orbital L_{orb} and rotational L_{rot} angular momenta released during detonation are produced by Overspinning DM Cores (OCs). The detonation process does not destroy OCs; it is rather gravitational hyper-flares;
- Size, mass, composition, L_{orb} and L_{rot} of satellite DM cores depend on local density fluctuations at the edge of OC and cohesion of the outer shell. Consequently, the diversity of satellite DM cores has a clear explanation. Satellite DM cores are given off by "**Volcanoes**" on prime DM cores erupting repeatedly over millions or billions of years.

WUM refers to OC detonation process as Gravitational Burst (GB), analogous to Gamma Ray Burst. In frames of WUM, the repeating GBs can be explained the following way:

- As the result of GB, the OCs lose a small fraction of their mass and a large part of their rotational angular momentum;
- After GB, DM Cores of Prime Objects (superclusters, galaxies, stars, and planets) absorb new DMPs. Their masses increase $\propto \tau^{3/2}$, and their angular momenta L_{rot} increase much faster $\propto \tau^2$, until they detonate again at the next critical point of their stability. That is why DM cores of Satellites (galaxies, stars, planets, and moons, respectively) are rotating around their own axes and DM Cores of Prime Objects;
- Afterglow of GB is a result of processes developing in the Nuclei and shells after detonation;
- In case of ESS, a star wind is the afterglow of star detonation: Star's DM Core absorbs new DMPs, increases its mass $\propto \tau^{3/2}$ and gets rid of extra L_{rot} by star wind particles;
- Solar wind is the afterglow of Solar Core detonation 4.57 Byr ago. It creates the SS bubble continuously;
- In case of Galaxies, a galactic wind is the afterglow of repeating galactic DM Core detonations. In MW it continuously creates two DM Fermi Bubbles.

3.2.4. Angular Momentum

Angular Momentum Problem is one of the most critical problems in Standard model that must be solved. Standard model does not explain how Galaxies and ESS obtained their enormous orbital angular momenta.

In our opinion, there is only one mechanism that can supply angular momenta to MOs – **Rotational Fission** of Overspinning 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 rotational 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". To be consistent with the Law of Conservation of Angular Momentum, we developed a New Cosmology [12]:

- WUM introduces Dark Epoch (spanning for Laniakea Supercluster (LSC) from the Beginning 14.22 Byr ago for 0.45 Byr) when only DM MOs existed, and Luminous Epoch (ever since for 13.77 Byr for LSC) when Luminous MOs emerged due to the VRF of Overspinning DM Superclusters' Cores and self-annihilation of DMPs;
- Proposed **Weak Interaction** of DMPs (see Section 3.2.6) provides the integrity of DM Cores, which are **3D fluid balls with a very high viscosity** and act as solid-state objects;

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- The principal objects 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 VRF. Experimental observations of galaxies in the universe showed that most of them are disk galaxies. These results speak in favor of the developed VRF.

3.2.5. Formation of Macrostructures

Laniakea Supercluster (LSC) is a galaxy supercluster that is home to MW and approximately 10^5 other nearby galaxies. It is known as one of the largest superclusters with estimated binding mass $10^{17}\ M_\odot$. Neighboring superclusters are Shapley Supercluster, Hercules Supercluster, Coma Supercluster, and Perseus-Pisces Supercluster. The mass-to-light ratio of Virgo Supercluster is ~ 300 times larger than that of the Solar ratio. Similar ratios are obtained for other superclusters [23]. In 1933, F. Zwicky investigated the velocity dispersion of Coma cluster and found a surprisingly high mass-to-light ratio (~500). He concluded: "*If this would be confirmed, we would get the surprising result that dark matter is present in much greater amount than luminous matter*" [24].

We emphasize that $\sim 10^5$ nearby galaxies are moving around Centre of LSC. All these galaxies did not start their movement from the "Initial Singularity". The neighboring superclusters have the same structures. It means that the World is, in fact, a Patchwork Quilt of different Luminous Superclusters ($\gtrsim 10^3$).

In frames of WUM:
- LSC emerged 13.77 billion years ago due to VRF of the Supercluster Overspinning DM Core and self-annihilation of DMPs. Core was created during Dark Epoch when only DM MOs existed;
- DM Core of MW was born 13.77 billion years ago as the result of VRF of Virgo Supercluster DM Core;
- DM Cores of ESS, planets and moons were born as a result of the repeating VRFs of MW DM Core in different times (4.57 billion years ago for SS);
- Macrostructures of the World form from the top (superclusters) down to galaxies, ESS, planets, moons.

3.2.6. Multiworld

According to A. G. Oreshko, "*P. L. Kapitsa supposed that a ball lightning is a window in another world*" [25]. We analyzed the possibility of the existence of other Worlds: Micro-World, Small-World, and Large-World based on the proposed Weak, Super-Weak and Extremely-Weak interaction respectively [38]. It was suggested that Ball Lightning is an object of the Small-World. Below we discuss main characteristics of the proposed new Worlds in the Multiworld [26].

Macro-World. According to WUM, strength of gravity is characterized by gravitational parameter G:

$$G = G_0 \times Q^{-1}$$

where $G_0 = \frac{a^2 c^4}{8\pi hc}$ is an extrapolated value of G at the Beginning of the World ($Q = 1$). Q in the present Epoch equals to: $Q = 0.759972 \times 10^{40}$. The range of gravity equals to the size of the World R :

$$R = a \times Q = 1.34558 \times 10^{26}\ m$$

The total mass of the Macro-World M_{tot} is:

$$M_{tot} = 6\pi^2 m_0 \times Q^2 = 4.26943 \times 10^{53}\ kg$$

where m_0 is a basic mass unit: $m_0 = h/ac$, and average density ρ_{tot} :

$$\rho_{MW} = 3\rho_0 \times Q^{-1} = 8.87794 \times 10^{-27} \ kg/m^3$$

which equals the critical density. WUM foresees three additional types of interactions: Weak, Super-Weak, and Extremely-Weak, characterized by the following parameters respectively:

$$G_W = G_O \times Q^{-1/4}$$

$$G_{SW} = G_O \times Q^{-1/2}$$

$$G_{EW} = G_O \times Q^{-3/4}$$

In our view, each type of interaction provides integrity of the corresponding World (see **Table 2**).

Table 2. Parameters of Multiworld (ρ_0 is a basic density unit: $\rho_0 = h/ca^4$).

Type of World	Type of Interaction	Rel. Interaction Parameter, G/G_0	Rel. Range of Interact, R_{max}/a	Rel. Mass, $M_{max}/4\pi m_0$	Rel. Density, $\rho/3\rho_0$
Macro-World	Gravity	Q^{-1}	Q	$1.5\pi \times Q^2$	Q^{-1}
Large-World	Extremely-Weak	$Q^{-3/4}$	$Q^{3/4}$	$Q^{3/2}$	$Q^{-3/4}$
Small-World	Super-Weak	$Q^{-1/2}$	$Q^{1/2}$	Q	$Q^{-1/2}$
Micro-World	Weak	$Q^{-1/4}$	$Q^{1/4}$	$Q^{1/2}$	$Q^{-1/4}$

Large-World is characterized by a parameter G_{EW}, which is about 10 orders of magnitude greater than G. The range of the extremely-weak interaction R_{EW} in the present epoch equals to:

$$R_{EW} = a \times Q^{3/4} = 1.44115 \times 10^{16} \ m = 1.5233 \ ly = 96,335 \ AU$$

In our view, ESS are Large-World objects with spherical boundary between ESS and Intergalactic Medium. This boundary has a surface energy density $\sigma_0 = \frac{hc}{a^3}$. Maximum total mass of ESS equals to:

$$M_{EW} = M_{ESS} = \frac{4\pi\sigma_0 R_{EW}^2}{c^2} = 4\pi m_0 \times Q^{3/2} = 1.03928 \times 10^{33} \ kg = 522.645 \ M_\odot$$

and maximum mass of Star M_{Star} that is one third of M_{ESS} :

$$M_{Star} = 3.46427 \times 10^{32} \ kg = 174.215 \ M_\odot$$

Average density ρ_{EW} equals to:

$$\rho_{EW} = 3\rho_0 \times Q^{-3/4} = 8.28918 \times 10^{-17} \ kg/m^3$$

which is about 10 orders of magnitude greater than the critical density. Extremely-weak interaction between DM Cores and all particles around them provide integrity of ESSs.

Small-World is characterized by the parameter G_{SW} , which is about 20 orders of magnitude greater than G . The range of the super-weak interaction R_{SW} in the present epoch equals to:

$$R_{SW} = a \times Q^{1/2} = 1.54351 \times 10^6 \ m$$

A maximum total mass of Small-World M_{SW} is:

$$M_{SW} = 4\pi m_0 \times Q = 1.19215 \times 10^{13} \ kg$$

and average density ρ_{SW} equals to:

$$\rho_{SW} = 3\rho_0 \times Q^{-1/2} = 7.73947 \times 10^{-7} \; kg/m^3$$

which is about 20 orders of magnitude greater than the critical density. According to WUM, Ball Lightning is an object of the Small-World.

Micro-World is characterized by the parameter G_W, which is about 30 orders of magnitude greater than G. The range of the weak interaction R_W in the present epoch equals to:

$$R_W = a \times Q^{1/4} = 1.65314 \times 10^{-4} \; m$$

that is much greater than the range of the weak nuclear force $(\sim 10^{-16} - 10^{-17} \; m)$. Calculated concentration of DMF4 n_{DMF4} in the largest shell of Superclusters (see **Table 1**): $n_{DMF4} \cong 4.2 \times 10^{15} \; m^{-3}$ shows that a distance between particles is around $\sim 10^{-5} \; m$, which is much smaller than R_W. Thus, the introduced weak interaction between DMPs will provide integrity of all DM shells. In our view, weak interaction between particles DMF3 provides integrity of DM Fermi Bubbles.

With Nikola Tesla's principle at heart – *There is no energy in matter other than that received from the environment* – we apply to the Micro-World the following equation for a maximum total mass M_W :

$$M_W = \frac{4\pi\sigma_0 R_W^2}{c^2} = 4\pi m_0 \times Q^{1/2} = 1.36752 \times 10^{-7} \; kg = 6.28331 \; M_{Pl}$$

where M_{Pl} is the Planck mass. The average density of the Micro-World ρ_W is:

$$\rho_W = 3\rho_0 \times Q^{-1/4} = 7.22621 \times 10^3 \; kg/m^3$$

In our opinion, Micro-World objects with mass about Planck mass are the building blocks of all Macroobjects.

Two particles or microobjects will not exert gravity on one another when both of their masses are smaller than the Planck mass. **Planck mass** can then be viewed as the mass of the smallest macroobject capable of generating a gravitomagnetic field and serves as a natural borderline between classical and quantum physics. Incidentally, in his "Interpreting the Planck mass" paper, B. Hammel showed that the Plank mass is *a lower bound on the regime of validity of General Relativity* [27].

4. Structure of Solar System

According to Wikipedia [28]:

- **Solar System** (SS) is the gravitationally bound system of the Sun and the objects that orbit it. It formed 4.6 billion years. The vast majority (99.86%) of SS mass is in the Sun, with most of the remaining mass contained in the Jupiter. The four inner system planets—Mercury, Venus, Earth, and Mars—are terrestrial planets, composed primarily of rock and metal. The four giant planets of the outer system – Jupiter, Saturn, Uranus, and Neptune – are substantially larger than the terrestrials. **All eight planets have nearly circular orbits that lie near the plane of Earth's orbit, called the ecliptic;**
- There are an unknown number of smaller **dwarf planets** and innumerable small SS bodies orbiting the Sun. Six of the major planets, the six largest possible dwarf planets, and many of the smaller bodies are orbited by natural satellites, commonly called "moons" after Earth's Moon. Each of the giant planets and some smaller bodies are encircled by planetary rings of ice, dust, and moonlets;
- The **Asteroid belt**, which lies between the orbits of Mars and Jupiter, contains objects composed of rock, metal, and ice. About 60% of the main belt mass is contained in the four largest asteroids: Ceres, Vesta, Pallas, and Hygiea. The total mass of the asteroid belt is calculated to be 3% that of the Moon;

- Beyond Neptune's orbit lie the **Kuiper belt** that is a **circumstellar disc** in the outer SS, extending from the orbit of Neptune at 30 AU to approximately 50 AU from the Sun. Most Kuiper belt objects are composed largely of frozen volatiles (termed ices), such as methane, ammonia, and water. The Kuiper belt is home to most of the objects that astronomers generally accept as dwarf planets: Orcus, Pluto, Haumea, Quaoar, and Makemake. The total mass of the Kuiper belt is $(1.97 \pm 0.30) \times 10^{-2}$ Earth masses;
- A **trans-Neptunian object** (TNO) is any minor planet in the SS that orbits the Sun at a greater average distance than Neptune, which has a semi-major axis of 30.1 AU. The first discovered in 1930 trans-Neptunian object was Pluto. It took until 1992 to discover a second trans-Neptunian object orbiting the Sun directly, 15760 Albion. The most massive TNO known is Eris, followed by Pluto, Haumea, Makemake, and Gonggong. More than 80 satellites have been discovered in orbit of trans-Neptunian objects. Twelve minor planets with a semi-major axis greater than 150 AU and perihelion greater than 30 AU are known, which are called extreme trans-Neptunian objects;
- The **Oort cloud** is a theoretical concept of a cloud of predominantly icy planetesimals proposed to surround the Sun at distances ranging from 1,000 to 100,000 AU. It is divided into two regions: a **disc-shaped inner Oort cloud** and a **spherical outer Oort cloud**. Both regions lie beyond the heliosphere and are in **Interstellar space**. The **Inner cloud** is a vast **theoretical circumstellar disc**, whose outer border would be located at around 20,000 AU from the Sun, and inner border, less well defined, is hypothetically located at 250–1500 AU. The outer edge of the **Outer cloud** might be about 100,000 AU from the Sun. Its total mass is not known, but, assuming that Halley's Comet is a suitable prototype for comets within the outer Oort cloud, roughly the combined mass is five times that of Earth. No known estimates of the mass of the inner Oort cloud have been published. Astronomers conjecture that the matter composing the Oort cloud formed closer to the Sun and was scattered far into space by the gravitational effects of the giant planets early in SS evolution;
- There are two main classes of comets: short-period comets (also called ecliptic comets) and long-period comets (also called nearly isotropic comets). Ecliptic comets have relatively small orbits, below 10 AU, and follow the ecliptic plane, the same plane in which the planets lie. All long-period comets have very large orbits, on the order of thousands of AU, and appear from every direction in the sky.

5. Mysteries of Solar System

According to E. Stone, these Mysteries are [1]:

5.1. Why does Venus spin backwards?

All the planets in SS rotate in the same direction except one: Venus. If you could look at all the planets from a point at the top of the North Pole, you would see all of them rotating counter-clockwise. But not Venus that is spinning clockwise. Astronomers have two theories to explain why that happens. One of them is Venus could have suffered a huge impact with another object. That collision would have been so powerful it changed the direction of Venus rotational movement. The second theory is Venus is so close to the Sun and its atmosphere is so dense, the gravitational pull from the Sun created tides that flipped the planet's axis 180º.

5.2. Why is Uranus tilted sideways?

Something very curious happens with Uranus rotation. It seems like the planet is on its side if you compare it to the other planets in the Solar System. While the rotational axis of the other planets is mostly perpendicular to the direction of the Sun, Uranus' axis is tilted and almost pointing to the star, making the planet look like it is rotating on its side. It is possible at some point in its history a huge object impacted

Uranus and changed the direction of its axis. Some theories suggest that very same impact created most or all of its 27 moons.

WUM. In our opinion, the explanations of SS Mysteries (Venus spin backwards; Uranus tilted sideways; Moon creation; Mars hit by a giant cosmic lightning bolt; Planets difference in composition) based on the Impact theory are unrealistic and were proposed from hopelessness in frames of the Standard model. To the best of our knowledge, in literature it was never discussed and explained a real picture of planets angular momenta (see **Figure 1** and **Table 3**). Why do the Sun and all planets have different orientations of their motion being created from the same nebula with a **certain amount of angular momentum**?
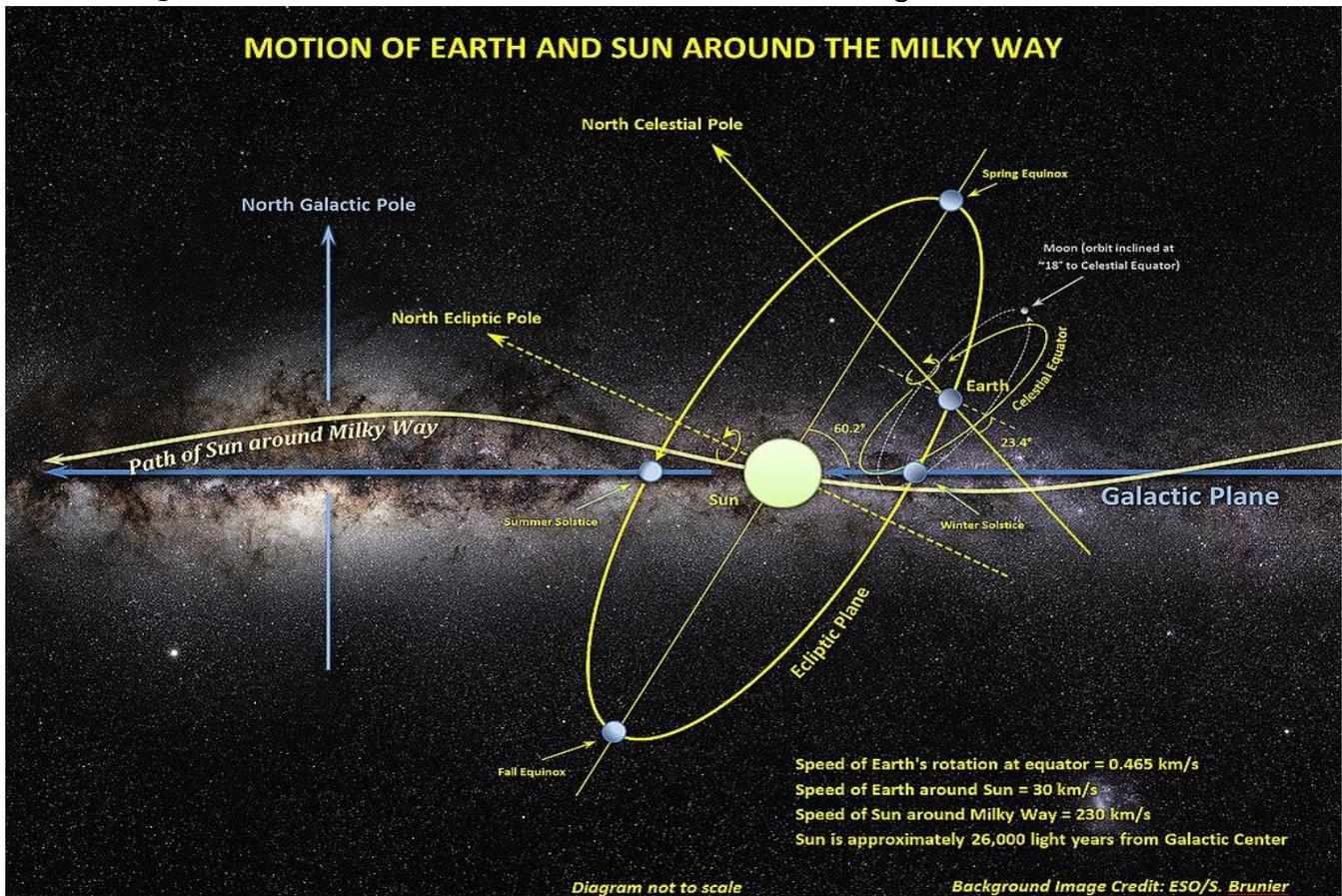

Figure 1. Orientation of the motion of SS Objects. Adapted from [28].

Table 3. Angular momentum of gravitationally rounded objects of SS. Adapted from [29].

Object	Value	Sun	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
Inclination	deg.		7.00	3.39	0	1.85	1.31	2.48	0.76	1.77
Axial tilt	deg.	7.25	0.0	177.3	23.44	25.19	3.12	26.73	97.86	28.32

In astronomy, **axial tilt** is the angle between an object's rotational axis and its orbital axis, which is the line perpendicular to its orbital plane; equivalently, it is the angle between its equatorial plane and orbital plane. It differs from **orbital inclination** that is the tilt of an object's orbit around a celestial body. It is expressed as the angle between a reference plane and the orbital plane or axis of direction of the orbiting

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object. The **ecliptic** or ecliptic plane is the **orbital plane of Earth around the Sun**. The **galactic plane** is the plane on which the majority of a disk-shaped galaxy's mass lies. The directions perpendicular to the galactic plane point to the galactic poles. In actual usage, the terms galactic plane and galactic poles usually refer specifically to the plane and poles of MW, in which planet Earth is located.

To be consistent with the Law of Conservation of Angular Momentum, we developed a New Cosmology (see Section 3.2.4). Big angle between Galactic Pole and Ecliptic Pole is due to the random VRF of MW Galaxy DM Core of many ESS DM cores at the same time, so that the direction of the sum of all ESS angular momentum coincides with the direction of galactic poles. The same explanation is valid for the Sun's DM Core and DM cores of the planets with moons considering that they were created at the same time 4.57 billion years ago.

5.3. Why is the Sun's atmosphere hotter than its surface?

One of the bigger and most counterintuitive mysteries of the Solar System for which we haven't been able to find answers is why is the outer layer of the Sun's atmosphere hotter than the surface of the star. The Sun is composed of multiple layers. The visible surface or the part we can see is called the photosphere and burns at a temperature of about 5,700 K. On top of that, the Sun also has an atmosphere and the outermost part of it is called the corona. One would think that being separated from the surface, the heat would start to dissipate, and the temperature of the corona would be lower than on the surface. Well, that's not the case. In fact, it is the extreme opposite as the temperatures in the corona can reach 1,000,000 K. Some theories have been formed as to why this happens that have to do with the ionization of Helium in the atmosphere, but we don't know for sure.

WUM. Solar Corona is an aura of plasma that surrounds the Sun and extends at least $8 \times 10^6 \; km$ into outer space (compare with Sun's radius $7 \times 10^5 \; km$). Spectroscopy measurements indicate strong ionization and plasma temperature in excess of $10^6 \; K$ [30]. The corona emits radiation mainly in X-rays, observable only from space. Plasma is transparent to its own radiation and to solar radiation passing through it.

In WUM, Solar corona made up of DMPs resembles a honeycomb filled with plasma. The following experimental results speak in favor of this model [13]:
- The corona emits radiation mainly in X-rays due to the self-annihilation of DMF3 particles;
- The plasma is transparent to its own radiation and to the radiation coming from below;
- The elemental composition of the Solar corona and the Solar photosphere are known to differ;
- During the impulsive stage of Solar flares, radio waves, hard x-rays, and gamma rays with energy above 100 GeV are emitted [31] (one photon had an energy as high as 467.7 GeV [13]). In our view, it is the result of enormous density fluctuations of DMPs in the Solar corona and their self-annihilation.

Coronal Heating problem in solar physics relates to the question of why the temperature of the Solar corona is millions of degrees higher than that of the photosphere. The high temperatures require energy to be carried from the solar interior to the corona by non-thermal processes. In our opinion, the origin of the Solar corona plasma is not coronal heating. Plasma particles (electrons, protons, multicharged ions) are so far apart that plasma temperature in the usual sense is not very meaningful. Plasma is the result of self-annihilation of DMPs. In WUM, Geocorona and Planetary Coronas possess features like those of Solar Corona.

5.4. How many unknown dwarf planets are out there?

Our telescopes have been getting better really fast in the last few decades. With all these advancements, we started to find a lot of objects in SS we did not know about. This lead to the creation of the Dwarf Planet category to label all these objects that did not really meet the criteria to be called a planet but were pretty close. The International Astronomical Union has officially recognized 5 dwarf planets so far, including Pluto,

but there are at least 30 other objects that have been proposed by multiple astronomers and that will be studied further in the coming years to see if they meet the criteria. Most of these dwarf planets would be located in the area known as the Kuiper belt, beyond the orbit of Neptune. Some astronomers believe there might be up to 200 dwarf planets out there waiting to be found.

WUM. From physical point of view, all gravitationally-rounded objects in SS, from Mimas, a small moon of Saturn ($R_M = 198 \ km$, $M_M = 3.75 \times 10^{19} \ kg$) to the Sun itself ($R_S = 7 \times 10^5 \ km$, $M_S = 2 \times 10^{30} \ kg$) are MOs with DM cores inside of them that are DM Reactors. It includes stars, planets, dwarf planets, and moons that are bigger than Mimas. Considering the total mass of the Kuiper belt $\sim 2 \times 10^{-2} M_{Earth}$ we can evaluate a number of MOs: $N_{MO} \lesssim 10^3$. So, there might be up to 200 dwarf planets in the Kuiper belt.

5.5. Does the Oort Cloud exist?

Have you ever wondered where do comets come from? To solve that question, astronomers have theorized that a group of millions and maybe billions of small, icy, rocky objects exists on the outer limits of the Solar System. These objects form a huge "cloud" named the Oort Cloud after one of the astronomers who proposed it. Sometimes these objects will change be shot out of the Oort Cloud due to collisions or gravitational forces and become wandering comets. The objects in the Oort Cloud are too small and far away to reflect any light from the Sun so their existence is still not confirmed.

WUM. In our opinion, observations of short-period ecliptic comets and long-period isotropic comets are experimental confirmation of Oort Cloud existence. In WUM, Ecliptic comets were produced by the Sun itself as the result of VRF of the Sun's DM Core. Nearly isotropic comets were produced by Giant Planets, which are, in fact, "Failed stars" with different directions of rotational axis as the result of VRF of their DM cores (see **Table 3**). **Oort Cloud belongs to Solar System!**

5.6. How was the Moon created?

One of the things that says a lot about how little we still know about our universe is the fact we don't even know for sure how our own Moon was formed. The current theory most astronomers agree on is that at some point early in the Solar System's life, a planet around the size of Mars crashed against Earth. This collision left a lot of debris and pieces of both planets hanging around but still trapped by Earth's gravity and were left orbiting it. After millions of years, all these pieces came together thanks to gravity and formed the Moon. While the theory is widely accepted, it leaves some questions up in the air, like why wasn't Earth taken out of its orbit by this impact? and what happened to the other hypothetical planet?

WUM. The Moon is a differentiated body, being composed of a geochemically distinct crust, mantle, and planetary core. Moonquakes have been found to occur deep within the mantle of the Moon about 1,000 km below the surface. The size of the lunar core is only about 20% the size of the Moon itself, in contrast to about 50% as is the case for most other terrestrial bodies. In February 2022, astronomers used NASA's SOFIA telescope to scan an immense region near the south pole of the Moon and revealed an abundance of water trapped on the shady sides of mountains and in the shadowed parts of craters [32].

In WUM, the internal structure of the Moon can be explained the same way as it was done for the Earth and Mars. It is worth noting that the DM core of the Moon is much less than DM core of the Earth. This result is in good agreement with the proposed in our Model mechanism of the Moon creation: DM Core of the Moon was born as the result of VRF of the Earth DM Core 4.57 billion years ago.

5.7. Did Mars have oceans in the past?

For years astronomers have found evidence of erosion, channels, and canyons on Mars. As far as we know, all of those are caused by liquid water slowly forming them. From that data, we can hypothesize that at some

point in the past Mars has liquid water running on the planet. Some astronomers think even one-third of the Martian surface could have been covered in water. Some scientists believe even today it would be possible for water to exist under Mars' surface where it is safe from many of the effects that would have caused the surface water to disappear. The more we explore and study Mars, the more this theory seems correct, but that opens other questions. What happened to Mars that made all that water evaporate or freeze? Could there have been life on the red planet at some point?

WUM. The proposed concept of **DM Reactors** in Cores of all gravitationally-rounded MOs successfully explains all contemporary hypothesis and results for the Early Earth:

- In the paper "*Uncovering Mysteries of Earth's Primeval Atmosphere 4.5 Billion Years Ago and the Emergence of Life*" ETH Zurich (a leading scientist P. Sossi) wrote [33]: *Four-and-a-half billion years ago, Earth would have been hard to recognize. Instead of the forests, mountains, and oceans that we know today, the surface of our planet was covered entirely by* **magma** *– the molten rocky material that emerges when* **volcanoes erupt**. *This much the scientific community agrees on. What is less clear is what the atmosphere at the time was like.*

  In WUM, the Upper mantle with Crust are due to the DM core volcanic activity of the "homemade" compositions (including magma), which produced as the result of the self-annihilation of DMPs in the DM core. It explains the result that continental crust had formed by $4.4 - 4.5$ Byr".

- According to "Lumen Learning. Earth Science" [34]: *Scientists have developed a number of hypotheses about how the oceans formed. Though these hypotheses have changed over time, one idea now has the wide support of Earth scientists, called the volcanic outgassing theory. This means that water vapor given off by volcanoes erupting over millions or billions of years, cooled and condensed to form Earth's oceans.*

  In WUM, Earth's Atmosphere and Oceans were formed by the volcanic activity and outgassing of DM core.

In our opinion, analogous processes happened on early Mars too. But because of much less size of the DM core and mass of Mars ($R_{Mars}^{core} = 1.83 \times 10^3 \ km$ and $M_{Mars} = 6.42 \times 10^{23} \ kg$) in comparison with Earth ($R_{Earth}^{core} = 3.52 \times 10^3 \ km$ and $M_{Earth} = 5.97 \times 10^{24} \ kg$), the rate of creation of Mars's Atmosphere and Oceans and the forces of gravity preventing the water from leaving the planet are much less than it is for Earth. So, water evaporated from the surface of Mars. We believe that there is underground water on Mars.

5.8. Was Mars hit by a giant cosmic lightning bolt?

There is a huge, strange canyon on Mars called Valles Marineris. Just to give you an idea of how big it is, it is about 4 times deeper and 5 times longer than the Grand Canyon in Arizona. But its weirdness only starts there. Some scientists believe this canyon wasn't formed in a traditional way (water slowly eroding the land over the course of millions of years) but in a much cooler manner. They believe Valles Marineris is a scar. For years scientists have theorized the existence of cosmic lightning bolts. Imagine a lightning bolt, but on a cosmic scale, traveling across the cosmos with unimaginable amounts of energy. Then imagine this bolt hits a planet, let's say, Mars. The impact would be big enough to leave a mark forever on the planet and create a valley the size of Valles Marineris. One more piece of evidence that could support the lightning bolt theory is that Mars also has a hole in its atmosphere that is leaking hydrogen into space. Could this hole have been created by that very same impact? Is that the reason why Mars lost its ocean?

WUM. In our view, a giant cosmic lightning bolt is unimaginable, and *Valles Marineris* is a scar on the Mars surface. Some of the most notable surface features on Mars include *Olympus Mons*, the largest volcano and highest-known mountain in SS, and *Valles Marineris*, one of the largest canyons in SS. Mars is seismically active. In 2019, it was reported that InSight had detected and recorded over 450 marsquakes and related events. In 2021 it was reported that the core of Mars was indeed liquid and had a radius of about 1830±40

km and a temperature around 1900–2000 K [35]. In WUM, the Martian core is a liquid DM core with very high viscosity that functions as solid-state object. It is a DM Reactor that provides enough energy for volcanic and plate-tectonic activities. As the result, there were created *Olympus Mons* and *Valles Marineris.*

5.9. Why are the planets so different in composition?

Most astronomers agree on the origin of SS. They believed a disk of rocks and pebbles formed around the Sun and they started fusing impacting one another and fusing together to form the planets. But this creates a problem. If all the planets formed from the same disk and grew together at the same time, how come they ended up being so different from one another? Some of the differences between planets can be attributed to variables like how close they are to the Sun. This explains for example why some planets could hold liquid water like Earth and (maybe) Mars while others can't because they are too cold, but it doesn't explain other things like the vast differences in size and composition. Some theories suggest solar winds "blew away" the lighter materials, allowing for the outer planets to have a different composition. Another study found a correlation between the calcium isotope and the size of the planets, suggesting planets grew at the same rate, but then stopped growing at different times.

WUM. According to the developed model of MOs, all chemical elements, compositions, substances, rocks are produced by MOs themselves as the result of DMPs self-annihilation. The diversity of all gravitationally-rounded objects of SS is explained by their distance from the Sun, and the differences in their DM Cores (mass, size, composition). DM Reactors inside of gravitationally-rounded objects in hydrostatic equilibrium provide sufficient energy for all geological processes on planets and satellites.

5.10. Do Jupiter and Saturn even have a core?

When we have lived only on one planet, it is hard to imagine how a different one might be so different and weird and in the case of Jupiter, Saturn, and others, so not-solid. While these two giants of our Solar System look just like a planet, they are mostly just gas as far as we can tell. If you were to take a guess without knowing, it would be easy to think behind all those storms, clouds and gas we see on top of those planets there would be a surface we might be able to land on some day and explore. Well, there isn't. If you were to drop something on Jupiter, it wouldn't hit the surface. It would just drop down into the center of the planet until it was crushed by the pressure. Scientists believe both planets might have a core with a thin, rocky or icy layer in the middle because it fits with our current model for how planets are formed. The problem is, we have never actually seen or confirmed such core exists and data found by the Juno spacecraft on Jupiter left us with more questions than answers as it suggests Jupiter's core might be dissolved.

WUM. All planets (including Jupiter and Saturn) have DM cores.

5.11. Why does Pluto have mountains?

The dwarf planet Pluto has some of the most unique features of any other object in the Solar System. It has huge mountains made almost entirely out of ice. The question that puzzles scientists is where did they come from? For a mountain to be created there needs to be geological activity. That means tectonic plates moving because of volcanic activity or some other form of heat release. And that's where the big mystery lies, where are the heat and energy coming from?. As far as we can tell, Pluto is too far away from the Sun to receive much energy from it and its core is just ice and rock so there's no lava flowing. One theory suggests Pluto might have some sort of system of cryovolcanoes, which are basically volcanoes that spit water or gases, but the reality still remains a question to be answered.

WUM. Pluto have mountains due to the volcanic activity of DM Reactor inside of it.

5.12. How big is the Solar System really?

*As we mentioned above when we talked about the Oort Cloud, we still don't know much about the outer edges of the Solar System. So much we don't even know where it ends. Some astronomers mark the end of SS at the **Heliopause**, the imaginary line where the solar winds stop. That would make SS about 79 AU wide in diameter; but the Oort cloud would be located way beyond that. If we take the Oort Cloud as the line for the SS's end, it is estimated it could be up to 200,000 AU away or a little more than 3 light years.*

WUM. According to Multiworld model, the radius of SS is about 96,335 AU (see Section 3.2.6) that is in good agreement with the size of the **spherical outer Oort Cloud** 100,000 AU (see Section 4). It was created as a result of VRF of the overspinning DM Cores of Giant planets (Jupiter, Saturn, Uranus, and Neptune), which are, in fact, "Failed stars", and have significantly different **Inclinations** and **Axial tilts** (see **Table 3**). All **long-period nearly isotropic comets** have very large orbits and appear from every direction in the sky.

5.13. Conclusion

As you can tell from our list, there are still many questions about our SS that need to be answered. We only picked the most interesting ones for this list but there are many more that didn't make the cut like the crater shaped like a spider in Mercury or why is Titan the only moon with an atmosphere. With all the advances in equipment and new techniques we will hopefully get some answers to a lot of these questions in the coming decades so stay tuned and keep learning. Maybe you will be the one who figures them out.

6. Explained Problems

WUM solves a number of physical problems in contemporary Cosmology and Astrophysics through DMPs and their interactions (see [2] and references therein):

- **Angular Momentum problem** in birth and subsequent evolution of Galaxies and ESS explained by VRF of Overspinning DM Supercluster's Cores;
- **Hubble Tension** explained by observations of Galaxies, which belong to different Superclusters. The value of H should be measured based on Cosmic Microwave Background Radiation only;
- **Missing Baryon problem,** related to the fact that the observed amount of baryonic matter did not match theoretical predictions, solved by the calculation of the concentration of Intergalactic plasma;
- **Fermi Bubbles** – two large structures in gamma-rays and X-rays above and below Galactic center – are stable clouds of DMPs (DMF1, DMF2, and DMF3) containing uniformly distributed DM Objects, in which DMPs self-annihilate and radiate X-rays and gamma rays;
- **Galaxies are ellipticals and spirals** due to VRF of their Overspinning DM Cores;
- **Coronal Heating Problem** relates to a question of why the temperature of the Solar corona is millions of degrees higher than that of the photosphere. According to WUM, the origin of the Solar corona plasma is not coronal heating. Plasma particles (electrons, protons, multicharged ions) are so far apart that plasma temperature in the usual sense is not very meaningful. Plasma is the result of the self-annihilation of DMPs. The Solar corona made up of DMPs resembles a honeycomb filled with plasma;
- **Cores of Sun and Earth** rotate faster than their surfaces despite high viscosity of the internal medium. WUM explains the phenomenon through absorption of DMPs by Cores. DMPs supply not only additional mass ($\propto \tau^{3/2}$), but also additional angular momentum ($\propto \tau^2$). Cores irradiate products of self-annihilation, which carry away excessive angular momentum. Solar wind is the result of this mechanism;
- **Internal Heating of Gravitationally-Rounded Objects** in SS is explained by DM Reactors inside of all MOs fueled by DMPs. Internal Heating is due to DMPs self-annihilation;

- **Diversity of Gravitationally-Rounded Objects** in SS is explained by DM Reactors inside of MOs fueled by DMPs. All chemical elements, compositions, radiations are produced by MOs themselves as the result of DMPs self-annihilation in their different DM cores;
- **Plutonium-244** with half-life of 80 million years exists in Nature. It is not produced by the nuclear fuel cycle, because it needs very high neutron flux environments. Any Pu-244 present in the Earth's crust should have decayed by now. In WUM, all chemical products of the Earth including isotopes K-40, U-238, Th-232, and Pu-244, are produced within the Earth as the result of DMF1 self-annihilation. They arrive in the Crust of the Earth due to convection currents in the mantle carrying heat and isotopes from the interior to the planet's surface;
- **Expanding Earth** hypothesis asserts that the position and relative movement of continents is at least partially due to the volume of Earth increasing. In WUM, the Earth's DM core absorbs new DMPs, and its size is increasing in time $\propto \tau^{1/2}$. Hence, there is an expansion of DM core, and its surface (the Upper mantle with Crust) is likewise expanding. Due to DMPs self-annihilation, new chemical elements are created inside of the Upper mantle with Crust. As the result, the relative movement of continents is happening;
- **Faint young Sun paradox** describes the apparent contradiction between observations of liquid water early in Earth's history and the astrophysical expectation that the Sun's output would be only 70% as intense during that epoch as it is during the modern epoch. In WUM, all MOs of the World were fainter in the past. As their cores absorb new DMPs, the sizes of MOs and thus their luminosity are increasing in time $\propto \tau$. Considering the age of the World $\cong 14.2$ Byr and the age of SS $\cong 4.6$ Byr, it is easy to find that the young Sun's output was only 67.6% of what it is today;
- **Matter-Antimatter Asymmetry problem.** Ordinary Matter is a byproduct of DMPs self-annihilation. This problem does not arise, since antimatter does not get created by DMPs self-annihilation;
- **Black-body spectrum of Microwave Background Radiation** is due to thermodynamic equilibrium of photons with Intergalactic plasma;
- **Unidentified Infrared Discrete Emission Bands** with peaks 3.3, 6.2, 7.7, 8.6, 11.2, and 12.7 μm explained by self-annihilation of DM particles DMF4 (0.2 eV);
- **Solar Corona, Geocorona and Planetary Coronas** made up of DMPs resemble honeycombs filled with plasma particles (electrons, protons, multicharged ions), which are the result of DMPs self-annihilation;
- **Lightning Initiation problem** and **Terrestrial Gamma-Ray Flashes** are explained by the self-annihilation of DMPs in Geocorona;
- **Ball Lightnings** are objects that have cores made up of DMPs surrounded by the electron-positron plasma shells contaminated by chemical elements of soil and air as the result of Terrestrial Gamma-Ray Flash strikes of the ground. WUM predicts a **new phenomenon** – a generation of Ball Lightnings (BLs) according to the proposed model of them. Once we master the creation of BLs in a controlled environment, we can concentrate our efforts on harvesting that energy from a practically infinite Source – the Medium of the World with DMPs.

7. Conclusion

Hypersphere World-Universe Model is consistent with all Concepts of the World. The Model successfully describes primary cosmological parameters and their relationships. WUM allows for precise calculation of values that were only measured experimentally earlier and makes verifiable predictions. The remarkable agreement of calculated values with the observational data gives us considerable confidence in the Model.

Great experimental results and observations achieved by Astronomy in the last decades should be analyzed through the prism of WUM. Considering the JWST discoveries, successes of WUM, and 86 years of Dirac's proposals, it is high time to make a Paradigm Shift for Cosmology and Classical Physics.

Astronomers have great achievements in investigations of the Solar System that became an Experimental laboratory for astrophysicists to check their theories. We are at the Beginning of a New Era of Astronomy, Cosmology, and Astrophysics! Young physicists should be a part of It. They should concentrate their efforts on the development of a New Cosmology and Classical Physics. I am very excited about the Future of Physics!

Acknowledgements

References

[1] Stone E. (2022) 18 Mysteries and Unanswered Questions About Our Solar System. Little Astronomy. https://littleastronomy.com/18-mysteries-and-unanswered-questions-about-our-solar-system/.

[2] Netchitailo, V. (2022) Review Article: Cosmology and Classical Physics. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 1037-1072. doi: 10.4236/jhepgc.2022.84074.

[3] Swedenborg, E. (1734) Latin: Opera Philosophica et Mineralia (English: Philosophical and Mineralogical Works). Principia, 1. http://www.swedenborg.org.uk/bookshop/swedenborg_a-z/the_principia_2_vols .

[4] Baker, G. L. (1983) Emanuel Swedenborg–An 18th century cosmologist. The Physics Teacher, October, 441. http://www.newchurchhistory.org/articles/glb2007/baker.pdf.

[5] Brush, S. G. (2014) A History of Modern Planetary Physics: Nebulous Earth. p. 7. ISBN 0521441714.

[6] Nebular hypothesis (2023) Wikipedia. https://en.wikipedia.org/wiki/Nebular_hypothesis.

[7] Ferrell, V. (1996) The Wonders of Nature. Harvestime Books. Altamont, TN 37301 U.S.A.

[68 Darwin, G. H. (1879) On the Bodily Tides of Viscous and Semi-Elastic Spheroids, and on the Ocean Tides upon a Yielding Nucleus. Phil. Trans. Roy. Soc., 170, 1.

[9] Wise, D. U. (1966) Origin of the Moon by Fission. http://adsabs.harvard.edu/full/1966ems..conf..213W .

[10] Jacot, L. (1986) Heretical Cosmology (transl. of Science et bon sense, 1981). Exposition-Banner.

[11] Van Flandern, T. (1999) Dark Matter, Missing Planets, and New Comets. North Atlantic.

[12] 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.

[13] 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.

[14] Netchitailo, V. (2020) World-Universe Model—Alternative to Big Bang Model. *Journal of High Energy Physics, Gravitation and Cosmology*, **6**, 133-158. doi: 10.4236/jhepgc.2020.61012.

[15] Netchitailo, V. (2021) Hypersphere World-Universe Model. *Journal of High Energy Physics, Gravitation and Cosmology*, **7**, 915-941. doi: 10.4236/jhepgc.2021.72042.

[16] Netchitailo, V. (2021) Solar System. Angular Momentum. Dark Matter Reactors. *Journal of High Energy Physics, Gravitation and Cosmology*, **7**, 1353-1372. doi: 10.4236/jhepgc.2021.74084.

[17] Netchitailo, V. (2022) Decisive Role of Dark Matter in Cosmology. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 115-142. doi: 10.4236/jhepgc.2022.81009.

[18] Netchitailo, V. (2022) Hubble Tension. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 392-401. doi: 10.4236/jhepgc.2022.82030.

[19] Netchitailo, V. (2022) Center of Milky Way Galaxy. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 657-676. doi: 10.4236/jhepgc.2022.83048.

[20] Netchitailo, V. (2022) JWST Discoveries—Confirmation of World-Universe Model Predictions. *Journal of High Energy Physics, Gravitation and Cosmology*, **8**, 1134-1154. doi: 10.4236/jhepgc.2022.84080.

[21] Shemmer, O., *et al.* (2004) Near Infrared Spectroscopy of High Redshift Active Galactic Nuclei. I. A Metallicity-Accretion Rate Relationship. arXiv:0406559.

[22] Netchitailo V. S. (2013) Word-Universe Model. viXra:1303.0077v7. https://vixra.org/abs/1303.0077.

[23] Heymans, C., *et al.* (2008) The dark matter environment of the Abell 901/902 supercluster: a weak lensing analysis of the HST STAGES survey. arXiv:0801.1156.

[24] Zwicky, F. (1933) Die Rotverschiebung von extragalaktischen Nebeln. Helvetica Physica Acta, **6**, 110.

[25] Oreshko, A. G. (2012) Observation of Dark Spherical Area after Passage of Ball Lightning through Thick Absorbers. https://www.researchgate.net/profile/Alexander_Oreshko/publication/312218738_Observation_of_Dark_Spherical_Area_After_Passage_of_Ball_Lightning_Through_Thick_Absorbers/links/5877307808ae329d6226e786/Observation-of-Dark-Spherical-Area-After-Passage-of-Ball-Lightning-Through-Thick-Absorbers.pdf.

[26] Netchitailo, V. (2019) High-Energy Atmospheric Physics: Ball Lightning. *Journal of High Energy Physics, Gravitation and Cosmology*, **5**, 360-374. doi: 10.4236/jhepgc.2019.52020.

[27] Hammel, B. (2011) Interpreting the Planck Mass. http://graham.main.nc.us/~bhammel/PHYS/planckmass.html.

[28] Solar System (2023) Wikipedia. https://en.wikipedia.org/wiki/Solar_System.

[29] List of gravitationally rounded objects of the Solar System (2023) Wikipedia. https://en.wikipedia.org/wiki/List_of_gravitationally_rounded_objects_of_the_Solar_System.

[30] Aschwanden, M. (2004) Physics of the Solar Corona. An Introduction. Praxis Publishing. ISBN 978-3-540-22321-4.

[31] Grossman, L. (2018) Strange gamma rays from the sun may help decipher its magnetic fields. Science News, **194,** 9. https://www.sciencenews.org/article/strange-gamma-rays-sun-magnetic-fields.

[32] Reach W. T., *et al.* (2023) The Distribution of Molecular Water in the Lunar South Polar Region Based upon 6 μm Spectroscopic Imaging. The Planetary Science Journal, **4**, 45. https://doi.org/10.3847/PSJ/acbdf2.

[33] ETH ZURICH (2020) Uncovering Mysteries of Earth's Primeval Atmosphere 4.5 Billion Years Ago and the Emergence of Life. https://scitechdaily.com/uncovering-mysteries-of-earths-primeval-atmosphere-4-5-billion-years-ago-and-the-emergence-of-life/.

[34] Earth Science (2021) Introduction to the Oceans. Lumen Learning. https://courses.lumenlearning.com/earthscience/chapter/introduction-to-the-oceans/.

[35] Mars (2023) Wikipedia. https://en.wikipedia.org/wiki/Mars.