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A Conjecture of Reality Based on a Meta-Universe Model

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Abstract- It is said that Dark Energy (DE) is a force that expands the universe, while Dark Matter (DM) forces the expansion to contract. From the dynamics point view these two forces appear to be dualistic, and yet collectively they form the life of the universe. A mathematical model describing this behavior is presented and its dynamics are exposed and discussed to clarify the existence of meta-universe which could well be the template for the reality we live in. It is hypothesized that the dynamics of the model define the dark matter regions known as 'cold '(CDM), 'warm' (WDM) and 'hot' (HDM), which are also viewed as harboring the four fundamental forces of nature. It is further shown how the model treats and compares the ordinary matter (conscious state of matter) to that of DM (unconscious state of matter), and why are there appearances of cosmic halos in the universe. Do halos indicate presence of multiverse, and if so, does each halo represent a universe in which the dualistic forces evolve matter into the states of consciousness and unconsciousness? This model offers conjectures on matter and its appearances in our universe.

Keywords- *Dark Energy, Dark Matter, Universal Conciousness, Globotoroid*

I. INTRODUCTION

Whether our universe is mathematical, or not, it is quite debatable. However, according to Max Tegmark's Mathematical Universe Hypothesis [1,2], (MUH), our physical reality is composed of mathematical objects, which makes a physical existence a mathematical one. This existence is further claimed to be categorized by four levels of hierarchical nested multiverse with increasing diversity [3]. The description sounds rather complex, and contains inconsistencies which have been pointed by other scientists [4]. In particular consistency with Gödel's theorem is troubling, as it limits a level of complexity. But, to the Tegmark's point, the universe may not be that complex, and understanding of simplicity may be as important. Stated differently, the universe could be the place where simplicity meets complexity.

How do we capture the idea of universe mathematically? Without a doubt, Einstein's General Relativity (GR) offers the primary model for studying behaviors of large bodies in the observable universe. Although, brilliant, this model exposes some questions. As the spacetime setting for the GR model is 4-dimensional, it is not intuitively obvious how to follow dynamics of large bodies. Consequently, the GR explanation of gravity being a force which bends the fabric of spacetime is conceptually elegant, but not intuitive [5,6]. In our observations of the universe the spacetime fabric is not visible. Instead, more evident are the presence of the dark energy and the dark matter [7,8], although some astrophysicists are lately disputing presence of the dark matter [9,10,11]. The later was first proposed by Milgrom and his Modified Newton's dynamics model (MOND), [12], also referred to as the "Modified Gravity" hypothesis.

In this presentation the Newtonian dynamics is also used in the proposed hypothesis, however, here it is integrated with a concept of the dark matter and energy. It is argued that there exists a meta-universe in which DM is conditioned by DE, and consequently exhibits CDM, WDM and HDM forms of dark matter [13,14]. The DE conditioning may also tease out the ordinary matter from the dark space, in which case the particle spin, or the intrinsic spin, and its momentum, specifically the angular momentum, save mass from crushing. The spin and the momentum are essential for ordinary matter to survive in the universe, and the two are precursors of the universal consciousness. One can theoretically view DM as the unconscious state of matter, which further can be thought off as being a mathematical abstract, or illusion, represented by the 0-mass particles in the 3-dimensional space. At the very instant when these particles acquire mass, no matter how small, and as long as it is >0, momentum and spin are induced and the universal consciousness is initiated. This consciousness forces the ordinary matter to adapt, or the outcome is unfavorable as the newly created particles will crush back to illusion. Mathematically stated, the ordinary matter teases out an additional dimension in the 3-dimensional dark space. Traditionally, we think of this dimension as being the time, hence, the spacetime framework. However, by introduction of the universal consciousness, the new dimension becomes more than the concept of time. With it the universe becomes a dynamical entity which constantly adapts its constituents to the conditions presented. A measure for this adaptation is the speed of occurring events. It is argued that the dark matter dynamics presents the phase velocity, which is inversely related to the speed of ordinary matter. As a result, it is plausible to think of our reality as being inverse of the dark space. The dark universe may be an illusion, but it may contain the information our reality depends on. These topics and more are covered in the sections to follow.

II. CONJECTURE

A. *Modeling Meta-Universe:*

In this report modeling of meta-universe dynamics is accomplished by the globotoroid ODE model, introduced and studied in [15, 16]. This model in its most native form is given by the set of 3 differential equations,

$$dX(t)/dt=\omega\, Y(t)-AZ(t)\,[X(t)+1]$$

$$dY(t)/dt=-\omega\, X(t) \qquad (1)$$

$$dZ(t)/dt=-B+A\,[X(t)+1]^2\,,$$

where t is the time, X(t) and Y(t) are referred to as the action, or orbital, spacetime variables, the coefficient $\omega=2\pi f$ is the angular frequency with f>0 being the frequency of orbits. The spacetime variable Z(t) is the growth variable and is stimulated by the growth parameters A, B>0. The three spacetime variables form solutions in the $\mathbf{R}^3$ space, also referred to as the 3-dimensional phase space. Note that in 1) the time variable t is implicit, hence it does not add an additional dimension.

The model is evaluated by using the Euler method described in [15], and the 3-dimensional meta-universe (UNVERSE) phase space illustrated in Figure 1 is obtained. Here, a single solution of (1) is computed by using the parameters: $\omega=1$, $A=0.01$, $B=0.125$, and the initial conditions are $X_0=5$, $Y_0=0$, $Z_0=5$. The integration step is $\Delta t=0.05$, and the number of integration steps $N=3.75\text{x}10^6$. Notice, in this particular simulation $\Delta t=0.05$ can be viewed as being the quantum time, and when Δt changes so does the quantum time. For the Euler ODE solver, the quantum time is well defined, while for the ODE solvers with the variable Δt the quantum time is not as apparent.

The quantum time may also have a negative value, in which case the time is running backwards. Figure 1 depicts this instance for $\Delta t=-0.05$ and $Z_0=-5$, while rest of the parameters remain the same. The result obtained is opposite of the meta-universe (ANTI-UNIVERSE). While the two universes resemble each other, in the latter case, the time and the growth run backwards.

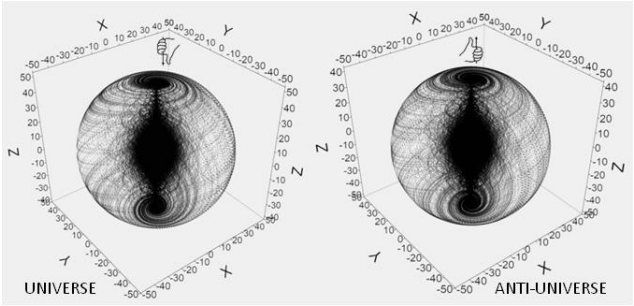

Figure 1. The meta-universe realizations from expression 1

From Figure 1 one can identify all topological and dynamical features of globotoroids (GT) addressed in [15, 16]. Noticeable is the busy toroidal core confined to the globe interior. The core is aligned along the wormhole connecting the antipodal globe vortices, which are the inlet and outlet of the globotoroid form. For the UNIVERSE realization, the anticlockwise left-hand rule indicates the motion around the globotoroid, impaling that the positive hemisphere vortex is the wormhole inlet, with the outlet is at the opposite end. In contrast, for the ANTI-UNIVERSE solution, dynamics flows in the opposite sense. As depicted, Figure 1) may be a template for the dark space of the two universes; dots representing the dark matter particles, with the dark energy expressing the particle location. For instance, all DM particles located on the globe are at the highest energy states these models offer, while particles at the cores are at low energy states. It is also evident that DM particles are nonuniformly dispersed; they congregate in much larger numbers at low energy states. In addition, each phase space portrait in Figure 1 depicts a single solution of (1). Clearly, these portraits will compactify with more solutions.

To avoid confusion which universe is addressed, ANTI-UNIVERSE is disregarded for now, and we will come to it latter. As discussed in reference [15], Figure 5, the globotoroids have 3 distinct toroid topologies: the ring, horn and spindle configurations. The spindle configuration is not compatible with the ODE solutions and, therefore, creates the wormhole which connects the antipodal globe vortices. It turns out, these three regions conveniently separate the dark space into the zones of cold, warm and hot DM. The cold DM is confined to the ring torus core, WDM is present in the horn torus region, while HDM exist at the high energy states configuring the globe. These are illustrated in Figure 2, where the cross section portrays densities of dark matter in each of the zone.

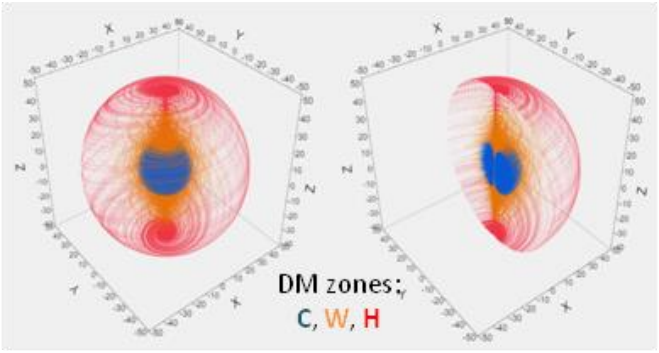

Figure 2. 3-dark matter constituents, and their phase space velocity components, distributed within GT

There are many different realizations of GTs. Some may be distorted while the others could be visually perfect, Figure 3. Independent of how they appear, GTs always share a core with a wormhole. Both are contained within a globe, with surface exhibiting the spherical topology, which intrinsically results from cross mutations of the ring, horn and spindle tori. Note, also, the qualitative differences in vortices for the DISTORTED case. Here, the upper hemisphere vortex is unusually positioned along the wormhole path, while the bottom vortex is as expected. This example illustrates how

presence of the wormhole can distort the globotoroid shape. Such distortions may not be uncommon in the universe, and they do complicate the defining structure of DE and DM. Nevertheless, the 3 toroid regions are always present, and they support C, W and H forms of dark matter.

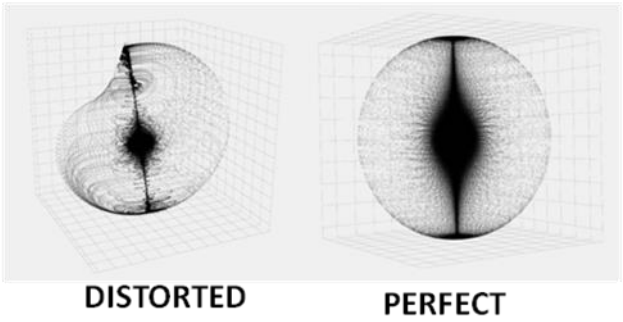

Figure 3. Different globotoroid shapes

B. It is All About the Speed:

How do we address the dark space constituents so it makes sense to the real world? Since DM is distributed throughout the 3-dimensional phase space, it is possible at each DM point to compute the phase space velocity (***v***). In [17] the magnitude of ***v*** is derived and discussed in great detail. It is shown that ***v*** is a vector quantity with components ***v***-perp ($\boldsymbol{v}_\perp$) and ***v***-worm ($\boldsymbol{v}_w$), or

$$v^2 = v_\perp^2 + v_w^2 \quad (2)$$

which respectively represent the phase space velocities in the plane perpendicular to, and along, the wormhole. Generally, it is not easy to compute $\boldsymbol{v}_\perp$ and $\boldsymbol{v}_w$, unless the wormhole geometry is positioned along the Z-axis. In this instance the method described in [17] provides ***v***-perp solutions exclusively in terms of the action variables, while ***v***-worm is derived from the growth Z. For the present model this is not the case, and to establish the alignment the GT solutions need corrections.

We recall that [15,18] describe how the wormhole evolves from the singular manifold when the criticality A=B is applied. For the present case A=B=0.01, defines the singular manifold solutions X=0, and Y=0.01Z. Thus, both Y and Z solutions require corrections by rotating the Y and Z axes counterclockwise for the angle Θ=arctan(Y/Z)= arctan(0.01), or 0.01 radians. The corrected axes are now Yc and Zc, where Zc is aligned with the wormhole.

The final step in completing the alignment process is to check if the solution X(t) is biased, which is the X(t) convergence value (ξ) inside the wormhole. Ideally, this value should be 0, impaling 0-bias. In practice, however, if $\xi < 10^{-6}$, the 0-bias is achieved. In the present case X(t) converges to ξ=0.00135155…>>10^{-6}, and the solution is corrected as Xc=X-ξ. Why is the bias adjustment required? Remember, the wormhole follows the singular manifold path, and when Y and Z solutions are corrected X may have to be tweaked in order to compensate for full alignment of the wormhole in the new coordinates.

In the new frame of axes, Xc, Yc and Zc, one can now apply the GT analysis method proposed in [17]. These tiny rotation and tweak alternations, change visually nothing in Figure 2, but they simplify further analysis immensely. In general, the alignment procedure can have more steps, as all 3 axes may have to be rotated and tweaked.

Now that we have our meta-universe model in the form ready for analysis, we infuse it with the ordinary matter. In doing so, the mass of ordinary matter dynamizes the phase space, and "reality" sets in; the universe comes to "life" and becomes detectable, and not just mathematical. The matter, whether in the form of tiniest particles or large objects, begins its motion [17]. The only limitation to such motion is the speed. While the tiniest of the mass particles may have a luxury to travel near the speed of light (**c**), the speeds of large objects are much reduced. Therefore, for the present context, existence of reality is limited by the speed of light, after which, theoretically, all ordinary matter reverts to DM, or illusion of the meta-universe. Showing this is our next goal.

With X, Y and Z corrected, one can compute phase space velocity ***v***-perp from the action variables Xc and Yc, as

$\boldsymbol{v}_\perp(t)=\omega R(t)$ with

$$R(t)= (Xc(t)^2+Yc(t)^2)^{1/2} \quad (3)$$

which was derived in [17]. Next, let L and M represent the angular momentum and the mass of an ordinary matter, then from expression (11b) in [17], it follows that at each point in the phase space, the mass particle velocity is,

$\mathbf{V}_\perp= L\omega /(M\boldsymbol{v}_\perp)$, or

$$\mathbf{V}_\perp(t)= L\omega /(M\boldsymbol{v}_\perp(t)), \quad (4)$$

where the $\mathbf{V}_\perp(t)$ is the angular velocity V-perp. Thus, $\mathbf{V}_\perp(t)$ and $\boldsymbol{v}_\perp(t)$ are inversely related, and for L M and w all set at 1, Figure 4 depicts the relationships. As can be seen, there is a huge difference in magnitudes of ***v***-perp and **V**-perp, which results from mass passing through the wormhole. When the growth picks up in the WDM zone, so does the difference. By the time DM becomes hot the mass angular velocity excides the phase space velocity by many orders of magnitude. These values are correct only if expressions (3) and (4) work, which depends on alignment accuracy of the wormhole along the Z-axis.

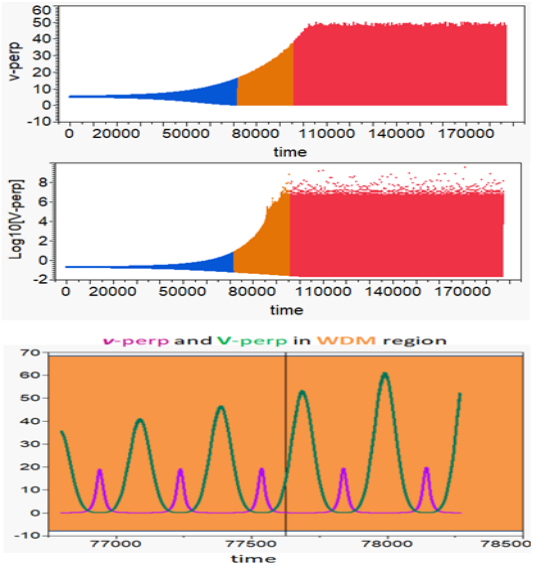

Figure 4. Relationship between the perpendicular phase velocity, v-perp, and the angular velocity of ordinary matter, V-perp

Because of inverted behavior of the two velocities, the following distinctions are noted. While DM ***v***-perp is almost at the stand still within the wormhole, it exhibits highest values around the great circle on the globe, [17]. In contrast, mass matter moves fastest through the wormhole, while it slows down where ***v***-perp is high, Figure 4. Also, the huge difference in the dynamic range of ***v***-perp and **V**-perp, implies reality has no constant values other than **c**, which is as to be expected. Recall, reality vanishes when **V**-perp>**c**.

What happened to ***v***-worm? Well, it is of no interest. The analog of ***v***-worm in the real world is **V**-worm, but they are not related. For a system with conserved momentum, **V**-worm is a constant determined by the body mass and its linear momentum, and as such is << **V**-perp, [16]. Therefore, the angular velocity **V**-perp is primarily responsible for regulating mass velocity throughout the conjectured reality.

For instance, if one unit of **V**-perp is 1m/s, the entire GT in Figure 2 represents the conjectured reality: exceptions are the few outliers noted in the Figure 4. If now, one unit of **V**-perp is 30km/s, which is about the speed of Earth orbiting Sun, the conjectured reality shrinks as depicted in Figure 5. Thus, any mass matter caught in the energy states having **V**-perp>**c** while passing through the wormhole, Figure 5C, is destined to crush back into DM: these are all the energy states with velocities above the green zone in Figure 5A. As is, the conjectured reality seems to be significantly limited by the presence of mass matter, or is it?

C. Spinning and Univrsal Consstiounsness:

Until now the meta-universe is explored by analysis based on the Newtonian mechanics. When momentum is conserved, and in particular the angular momentum, mass objects can wonder around GT until reaching the speed limit **c**, which for the expanding meta-universe is an inevitable event. This results in a much-condensed reality that is interesting, but not exciting. By this we mean, most of the GT space, and with it matter possibilities, are not accessible for reality. So, there has to be a better way to manage matter in the universe.

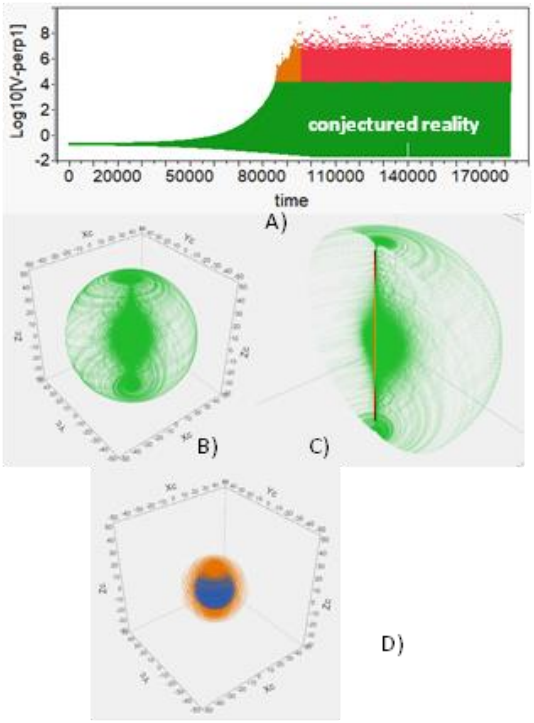

Figure 5. With V-perp unit being 30km/s, the conjectured reality is illustrated in green A, which covers entire GT in B. In C the wormhole speed exceeds c, eliminating all associated energy states, and reducing the GT reality, exhibited in D.

Yes, the answer is spin! When mass particles/objects spin, they have a chance to fight-off the expanding forces in the universe. For instance, when a mass particle without spin emerges at the great circle on the globe, it is safe. However, in the short time it accelerates, reaching the wormhole where it will quickly be crushed. Now, if this particle is spinning, it is presented with a possibility to spin its way out of the high energy states into a lower energy state where its decay is not as rapid. An analogy of this phenomenon is found in interactions between the Higgs boson and the weak bosons (W and Z). The Higgs boson has no spin, and as such is rapidly crushed. In doing so, it passes its mass to the weak bosons which spin, and are more stable.

The spinning particles/objects can be present anywhere in the GT phase space, and their spinning action produces various outcomes. As noted, they spin out of the high energy states into the low energy states, but this process may also be reversed. Furthermore, the spin can form orbits which can keep mass matter safe for the long periods of time. What action is executed depends on the DM zone, which in terms of the four fundamental forces can also be identified as; CDM or the gravitational zone, WDM or the strong force zone, and HDM or the electromagnetic/weak force zone. Thus, the CDM zone will favor orbits as the large objects seek long time

preservation. The WDM zone may have the most diverse spinning activities as it occurs in the accelerated growth zone, where mass particles tend to consolidate into larger chunks before reaching the CDM zone. Finally, the HDM zone will favor mass particles spinning into the lower energy states. Note, how mass tends to gravitate towards the CDM zone, and opposes the growth pattern Z(t). This is because the least variations in **V**-perp are present in this zone, Figure 4. As a result, the CDM zone allows mass to accumulate, and forms the strong gravitational force, attracting more mass. The mass processes are typically slow in the CDM zone, but they accelerate as the energy states increase, and culminate within the HDM zone where processes are very fast. More can be said about this subject as it sheds a new light on the GUT theme, but this is not within the scope of this paper.

Clearly there is a lot going on here, and which action ordinary matter chooses depends on many factors, among which are the energy state it occupies and the confrontational elements. One thing is certain, the ordinary matter will do anything to preserve its mass, and this is what defines the universal consciousness. Figure 6 illustrates basic outcomes of the consciousness. The only place where the consciousness principle is violated is in the cosmic jet, or through the wormhole. Here the ordinary matter is pulverized into oblivion, and what emerges reseeds the universe. This cycle repeats, and matter is recirculated. The ordinary matter is recreated, and galaxies are formed wherever combinations of the fundamental forces permit. An example of this is given by the theory of toroidal universe [19, 20]. Each galaxy in the toroidal universe spins to secure its mass and forms a universe, or a sub-universe. Due to spinning, a sub-universe will have their own core, which infused by mass will produce its gravity and the accretion disc, with the black hole surrounding its wormhole. The sub-universes may also manifest their halos, which expose the multiverse cluster, Figure 7. These are some examples of how universal consciousness works.

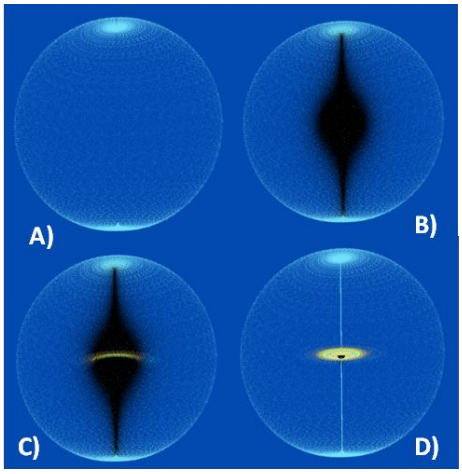

Figure 6. Different universal consciousness outcomes: A) the halo resulting from dispersed mass particles, for example neutrinos, B) the halo with the DM core, C) the accretion disc inside the CDM core, D) the accretion disc with the black hole projecting the cosmic jet line.

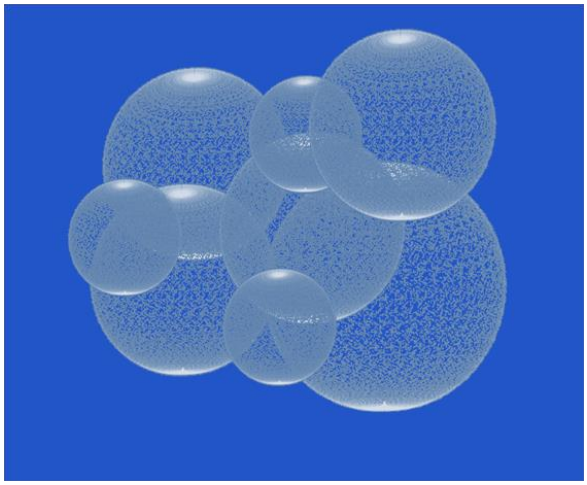

Figure 7. An example of multiverse cluster. With time, clusters move and halos, with their content, can merge

III. DISCUSSION

Everything that was said about the universe in Figure1, applies equally to anti-universe, except now dynamics is reversed. This is very important since all the vector quantities are now pointing in the opposite direction, and when anti-universe meets universe, these quantities will tend to cancel. Consequently, as the phase velocity ***v***, and all its components ***v***-perp and ***v***-worm, are the vector quantities, they will in the combined universe tend to the value 0. This creates a very hostile environment for matter and its counterpart, anti-matter. As (4) implies the **V**-perp value will go through the roof, which is not permitted, and both matters must annihilate. More precisely, all mass matter and anti-matter will explode and fade into oblivion. This is a common knowledge, however, what happens to the dark universe and its constituents? The effect may not be catastrophic, but it will take time for DM and DE to regroup and rebuild UNIVERSE and ANTI-UNIVERSE.

So much for destroying the universe. The GT model teaches us about other interesting and useful observations. From a bird's-eye view GT appears spherical with a thin skin layer, supporting high energy states. In contrast, a worm's-eye view offers a perspective from the dense core, containing the low energy states. These observations are analogous to relations between the quantum physics and GR, which currently are not reconciled for the lack of the unifying method. The GT theory offers an approach to the reconciliation in the similar fashion as it does for GUT. The globotoroids also expose the deficiency of Newtonian mechanics, and importance of particle spin, which is the cornerstone of the quantum mechanics.

This begs a question: At what scales does the universe exist? We are so much used to looking at the macro, or micro, scales, and we have a difficulty connecting the two. This is the conundrum not only for the quantum physics and GR, but many forms of matter, and its universal consciousness. Either we have knowledge of appearance (form), but have little, or no, knowledge of its substance (core); or knowledge of the

substance, and no knowledge of the form. In any event, globotoroids teach us that universe appears on all scales, filling the dark space with a very complex and delicate multiverse structure.

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His professional calling led him to various research and data sciences positions at DuPont Co. and Emerson Electric Co. He published numerous papers and gave presentations at national and international conferences, primarily on the subject of nonlinear systems. He is also an inventor and has 10 patents.

In 2010 Dr. Samardzija founded an independent research initiative on exploring the subject of globotoroids. In 2011 this effort was named globotoroid.com after his web site www.globotoroid.com. Presently he is an independent researcher and manages all activities for globotoroid.com.

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