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Entangled States, Place Where Simplicity Meets Complexity

Nikola Samardzija
Researcher at globotoroid.com
(nsamardzija44@gmail.com)

Abstract- It is proposed that our universe in reality is the multiverse composed of abstract objects called the globotoroids. Standalone these entities form the world of simplicity, and when intertwined the entangled states form the world of complexity. This organization vastly increases reality choices in the multiverse, where all reality possibilities result from dynamics of the two worlds coexisting under the auspices of dark energy and dark matter. The moment mass enters into this realm, it materializes only one of the reality options available at its entry, and reveals the reality we experience. Investigating how such reality outcome is formed, and what are its components, are the goals of this report.

Keywords- *Simplicity, Complexity, Globotoroid, Entanglement*

I. Introduction

We begin with a brief review of the globotoroid theory. In [1,2] it was reported how a simple 3-dimensional ODE

$$\begin{aligned} dX(t)/dt &= \omega\, Y(t) - AZ(t)\, F(X) \\ dY(t)/dt &= -\omega\, X(t) \\ dZ(t)/dt &= -B + AG(X,Y) \end{aligned} \tag{1}$$

describes globotoroid dynamics. Here, 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 angular frequency with $f>0$ being the frequency of orbit. The spacetime variable Z(t) is the growth variable and is stimulated by the growth parameters A, B>0, and the form

$$G(X,Y) = \begin{cases} (X+1)^2; when\ F(X) = (X+1), Model\ I \\ (X^2+Y^2+1); when\ F(X) = X, Model\ II \end{cases} \tag{2}$$

For A=B, (1) produces spheroid solutions, where the loxodromes in a spiral fashion connect the two spheroid poles. One pole being the source, is the South pole (S), and the other being the sink is the North pole (N). The loxodromes form scrolling paths, always following S->N orientation in the clockwise or the counterclockwise direction, hence, referred to as the spin. By changing the parameters in (1) to B>A, the simple spheroid geometry changes to that of the globotoroid (GT), Figure 1). Here the loxodrome solutions connecting the 2 poles now pierce the S pole and form a wormhole connecting the N pole, hence, the poles are connected in the similar fashion as described by the Einstein-Rosen bridge [3]. By establishing the GT geometry, the three distinct topologies emerge. The innermost topology is that of the ring-torus, which is enclosed by the horn-torus, and the next anticipated spindle-torus degrades into the wormhole that regenerates the outer sphere, or the globe. The wormhole embraces the three topologies, and depending on the model in-use it can have the rotational (Model I), or the linear (Model II), character.

The moment mass particles enter the GT geometry, the particles follow the "bread crumb trails" set by the GT loxodrome solutions, and the Newtonian physics becomes factual [4]. Under the assumption of conservation of momentum, the mass particle speed changes along the bread crumb trails, and becomes inversely related to the phase space angular velocity given by the solutions. It was pointed out that the phase space angular velocity approaches 0 value along the wormhole, but it never reaches 0. This behavior can increase mass velocity rapidly to the speed of light, since the phase space velocity of 0, implies a singularity at which the mass speed unacceptably approaches infinity.

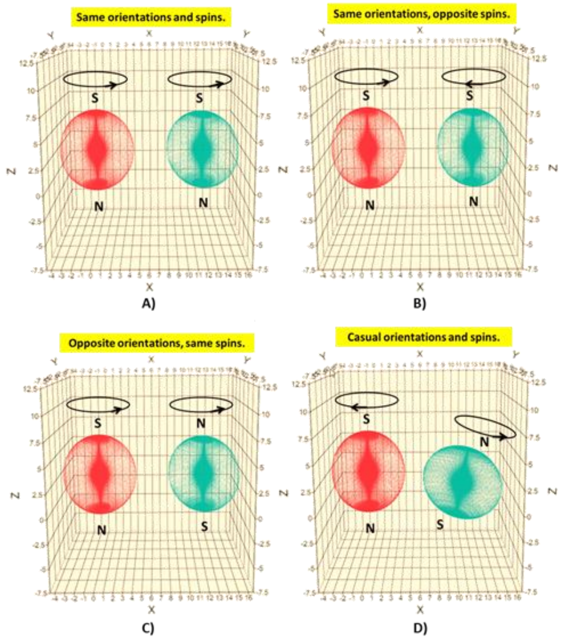

Figure 1. Globotoroid properties for two GT solutions.

With this in mind, the geometry and dynamics of our universe was addressed in [2], where it is argued that dynamic properties of the universe are as important as topology. The argument that the universe can be closed based solely on topology could be misleading due to a wormhole presence. It is possible for a wormhole to pierce through the enclosing globe, allowing for the internal GT content to escape. Nevertheless, the topological arguments are very useful in explaining celestial relations among galaxies, black holes and cosmic (relativistic) jets. It was noted that for these relations, the cyclic nature of the celestial phenomena is far more important than any theoretical assumptions of singularities. However, the hypothesis that at some points in space the phase space velocity approaches 0 remains useful. Without it many natural phenomena could not be explained, and that is why the wormhole concept is fitting.

With assistance of Max Tagemark's Mathematical Universe Hypothesis (MUH) [5,6], the GT model was applied to form a conjecture of reality, [7]. The presences of both dark energy and dark matter in our universe are modeled using the GT expansion, and it is shown that based on the GT toroidal anatomy the dark matter can be divided into the hot (HDM), worm (WDM), and cold (CDM) components. Furthermore, the dark matter classification was also extended to connect the four fundamental forces of nature. However, this conjecture observes that the MUH approach has limitations in expressing high levels of complexity, and Tagemark's observation was that the universe is perhaps not that complex. Our observations, nevertheless, are different and if a conjecture is simple to start, then when fully applied it should accommodate for a greater complexity, thus making the universe a place where simplicity meets complexity.

One way to increase the surrounding complexity is to treat the 3-dimensional universe as being a multiverse, in which many GT modeled universe entities are free floating, and are subjected to processes of translation and rotation, Figure 7 [7]. Even with this extension, there is still one process missing which keeps multiverse components connected. This is the process of immersion, or entanglement, of two or more GT modeled universes. Through this process multiverse communicates, and creates an information pool which expands the reality possibilities. As it will be apparent soon, the increase of complexity in the entangled multiverse is enormous, and is the subject of the present investigation.

II. Abstract GT Spaces

A. GT-fields:

A globotoroid solution, or a loxodrome, with its anatomy, is illustrated in Figure 2. Here, the time dependent variable Z is the growth variable, and t is the time. Now let GT be covered with all possible loxodromes, and what emerges is a dense spherical blob with its internal structures no longer recognizable from the outside. Here, each GT point belongs to a unique loxodrome path, which is a consequence of the ODE existence and uniqueness theorem. As a result, what appears to be a spherical blob from the outside, inside is a densely organized 3-dimensional mathematical abstract we refer to as the GT-field. This field exhibits the same properties as the solutions do; its wormhole orientation is from S->N, and has the clockwise, or the counterclockwise, spin.

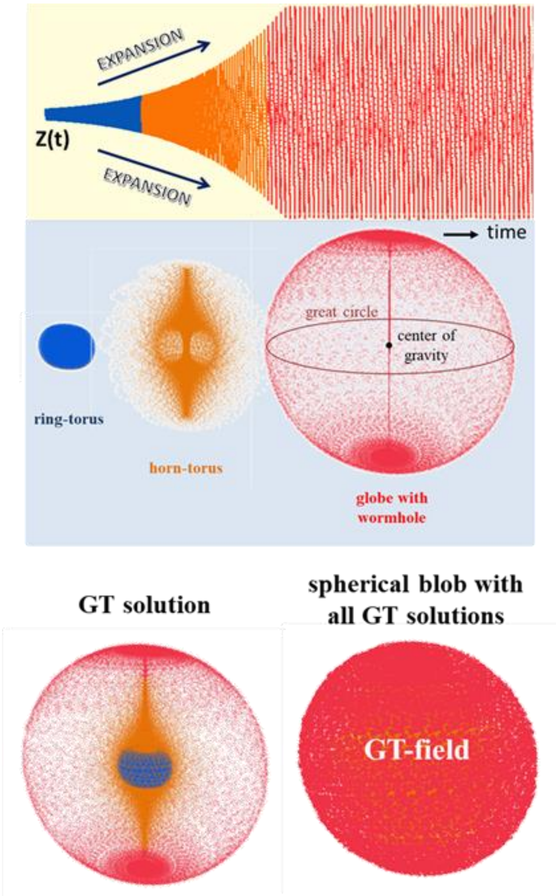

Figure 2. Anatomy of GT-fields.

Recall that the GT solutions contain three distinct toroid topologies, as do the GT-fields. The innermost structure is the field in the shape of the ring-torus, followed by the shape of the horn-torus, and all are contained within the globe. This embodiment is kept together by the wormhole that now appears imperceptible, as are the two tori regions, Figure 2. Based on the properties, two or more GT-fields are said to be compatible when they are comparable in size with the same orientation, and have very similar spin characteristics. The last implies that the angular frequency $\omega=2\pi f$ in (1), for compatible GT-fields cannot be much different. Figure 1A), is the example of the compatible fields, while the remaining figure cases are noncompatible.

B. Entangled GT-fields:

This is a very broad topic, and it is not possible to cover all instances of entangled states in the present investigation. For this reason, the illustrated examples are based on immersions of two compatible GT-fields, while discussions apply to a more general nature of the subject. Thus, the immersion outcome for the two compatible GT-fields, each having the anatomy depicted in Figure 2, is illustrated in Figure 3, and we say the two fields are entangled. However, for this to work we need a rule that allows entangled points to share solutions (loxodromes) of entangled fields.

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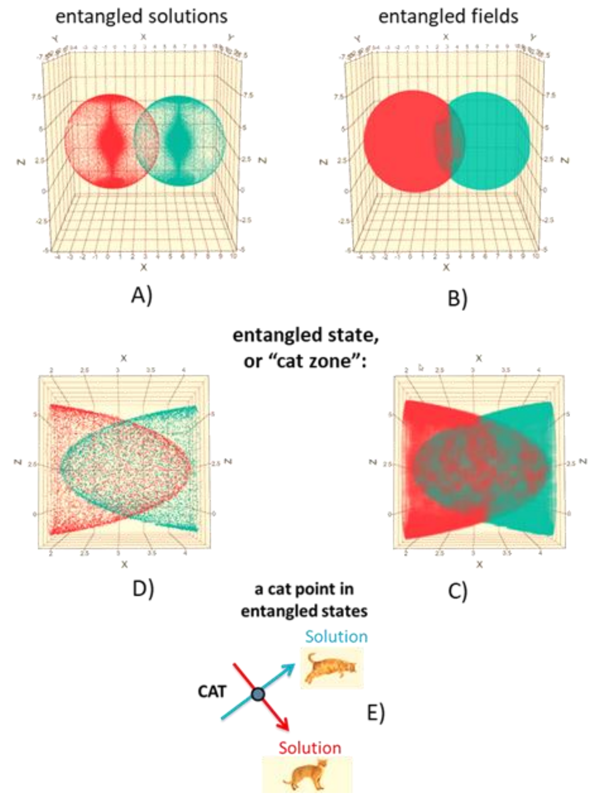


Figure 3. The entangled states formed by two compatible GT-fields.

This way the integrity of each entangled GT-field is preserved. For the case depicted in Figure 3, all points in the entangled zone support two solutions, and with that all distinct properties of the two fields are present at each of these points at the same time. This is beginning to sound a lot like quantum mechanics and the Schrodinger’s cat, as each point in the merger can be viewed as the “cat point”, with one solution representing the cat being alive, and the other the cat being dead.

The GT entanglements may result from more than two fields, in which case the entangled states, or the cat zones, may exhibit more point options concurrently, say a cat point with 9-lives simultaneously. Such cat points are somewhat reminiscent of the quantum superposition, as events in the GT entanglement are collections of solutions belonging to different GT-fields, while at the same time the fields remain independent. This behavior can also be found in waves, in particular solitons.

There are other examples of entanglements. Figure 4) illustrates instances of two noncompatible GT-fields, where the subservient field is immersed into the dominant field. Here, all points of the subservient field are cat points. Then there is also a concept where two identical GT-fields are fully intertwined; their union is equal to their intersection. Last but not least, globotoroids may have regions covered with schools of smaller globotoroids. All these entanglement possibilities, and there are more, illustrate how the complexity folds and unfolds in the abstract 3-dimensional space.

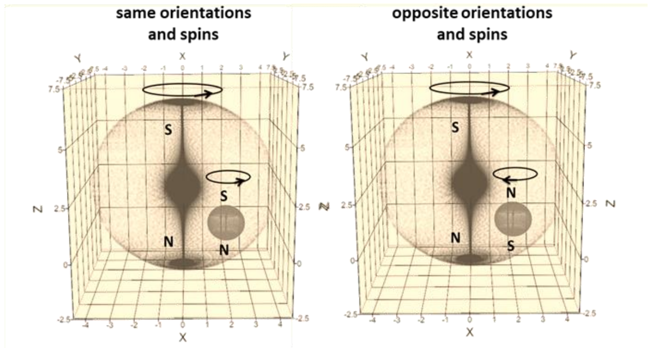


Figure 4. Examples of noncompatible GT-fields.

C. GT universe as a field:

We now move the abstract setting a step closer to reality. This is accomplished by letting dark energy and dark matter, collectively referred to as the dark space, occupy the GT-fields. The consequences of such infusion are the same as discussed in [2,7], where we stipulated that dark matter is massless with HDM, WDM and CDM zones respectfully distributed throughout the globe, horn-torus and ring-torus topologies. Across these regions the dark matter density, defined by the loxodrome crumb trail, varies greatly. The highest density is in the core field, which embodies the field of ring torus surrounding the wormhole. As the field of ring-torus expands, the horn-torus and the globe fields emerge, and the dark matter density progressively decreases while presence of the dark energy increases. It is noted, however, that the possible dark matter warm and cold condensates, like the sterile neutrinos and the axions, may contain small amounts of mass that may contribute to the dark matter mass density variations across the 3 topologies. Such density variations are also highest at the core, and reduce with expansion.

The presence of dark matter reveals an important vector parameter, the phase space velocity $\boldsymbol{v}$. This velocity is derived from the loxodrome solutions rooted in GT-fields, and is defined as

$$\boldsymbol{v}^2 = \boldsymbol{v}^2_{ang} + \boldsymbol{v}^2_{lin} \quad (3)$$

where vectors $\boldsymbol{v}_{ang}$ and $\boldsymbol{v}_{lin}$ are the angular and the linear phase space velocity components. To evaluate $\boldsymbol{v}$, at each field point i we use the relations

$$\boldsymbol{v}^2_i = \boldsymbol{v}_i{}^2_{ang} + \boldsymbol{v}_i{}^2_{lin}\,, \quad (4a)$$

or

$$\boldsymbol{v}^2_i = \boldsymbol{v}^2_{ix} + \boldsymbol{v}^2_{iy} + \boldsymbol{v}^2_{iz} = (\Delta X_i^2 + \Delta Y_i^2 + \Delta Z_i^2) / \Delta t^2 \quad (4b)$$

where Δt is the time increment, and $\Delta X_i = (X_{i+1} - X_i)$, $\Delta Y_i = (Y_{i+1} - Y_i)$ and $\Delta Z_i = (Z_{i+1} - Z_i)$ are the forward spatial differences. Although (4b) is easy to compute, the problem occurs when we want to separate $\boldsymbol{v}_{ang}$ from $\boldsymbol{v}_{lin}$. The last expression evaluates both components which cannot be easily separated unless GT-field has a special form [4,7]. When the wormhole is elongated along the Z-axes, like in Figures 1A) and 1B), and the action variables X(t) and Y(t) have no bias, then the special form implies:

$$\boldsymbol{v}_i^2{}_{ang} = \boldsymbol{v}^2_{ix} + \boldsymbol{v}^2_{iy} = (\Delta X_i^2 + \Delta Y_i^2) / \Delta t^2$$

$$= (X_i^2 + Y_i^2)\ \omega \tag{5a}$$

and

$$\boldsymbol{v}_i^2{}_{lin} = \boldsymbol{v}^2_{iz} = \Delta Z_i^2 / \Delta t^2, \tag{5b}$$

where the action variables define $\boldsymbol{v}_{ang}$, and $\boldsymbol{v}_{lin}$ is related to the growth of Z. Whether or not GT-fields have the special form, $|\boldsymbol{v}_{ang}|$ is almost always the dominant component and is inversely related to the dark matter density; $|\boldsymbol{v}_{ang}|$ minimizes at the core, and maximizes at the globe. The $min(|\boldsymbol{v}_{ang}|)$ value is typically found at the midpoint separating the S and N poles, which is imbedded in the wormhole. For the special case given by (5a), $min(|\boldsymbol{v}_{ang}|)\approx 0$ at the midpoint, but the 0 value is never reached. For this reason, the midpoint is often taken as being the gravitational singularity, where in fact it is the center of gravity, Figure 2. In contrast, $max(|\boldsymbol{v}_{ang}|)$ occurs along the great circle on the globe, implying that the two velocity extremes result from density variations of the dark matter. Note, for the compatible GT-fields, (5a) implies that the angular velocities are very similar for the fields involved, and when they are not the fields are incompatible.

Turning our attention to the dark energy, we find it is highest at the globe, and progressively reduces while approaching the ring torus. The weakest dark energy solution occurs through the center of the ring torus, making the energy expansion directly related to the growth variable Z(t), or the velocity $\boldsymbol{v}_{lin}$ (5b). Consequently, the expansion of the universe is always accompanied with increase in both $|\boldsymbol{v}_{lin}|$ and $|\boldsymbol{v}_{ang}|$, while contraction reduces the values. For a non-special case these observations are made in terms of $\boldsymbol{v}$, as the expressions for $\boldsymbol{v}_{lin}$ and $\boldsymbol{v}_{ang}$ are now less manageable. Thus, when $|\boldsymbol{v}|$ increases or decreases, it is understood that its velocity components are doing the same.

D. Multiverse with GT cat zones:

Theoretically speaking, our universe is a conglomerate of a vast number of GT universes, and as such it is really the multiverse. In this space many forms of GT-fields are possible, and they interact with each other through presence of entangled states. This creates an enormous increase in complexity on all scales throughout the multiverse, which predominantly is elevated by information pools present in the cat zones. Recall, a cat zone contains points that are formed from two or more superimposed massless dark matter particles, which in the 3-dimenssional multiverse setting inhabit the same point in the space at the same time. Furthermore, as these particles result from solutions from different GT-fields, the cat point supports different loxodrome paths, except for the exception addressed later. As such, the massless dark matter particles are similar to bosons, and they transport energy. In contrast, the mass particles, such as the hypothetical axions and sterile neutrinos, are excluded from the present setting as they allow only one solution per cat point, meaning they transport mass. In the present context the massless dark multiverse space is MUH alternative of ever-changing complexity space; what condenses in this space, eventually sets-off a reality outcome.

III. MASS INCLUSION

A massless dynamic cat zone can represent a reality with many, if not endless, possibilities. The moment mass condenses, or infuses, all the possibilities reduce to one, and we say “a reality has materialized”. A materialized reality does not support a cat that is both dead and alive at the same time; the cat is either dead or alive! As there can be many cat zones in the dynamic multiverse, the materialized reality is relativistic. What materializes in two similar entangled states, can finalize two entirely different reality outcomes. One can argue, that this is similar to how our brain works, which is capable of unleashing virtual reality into the real world [8,9]. Often, we refer to this practice as exercising the power of mind over matter.

Clearly, when the multiverse has no cat zones, the reality outcomes are inclusive to GT-fields. In this case, each GT-field materializes the only reality available, which is offered by the globotoroid solutions. However, when the cat zone appears, like the one in Figure 3, a cat point can support only one mass particle at the time, implying only one reality solution is possible. Note, there cannot be two or more mass particles occupying the same cat point at the same time, and the mass particle has to have a clear understanding in selecting the right solution (path).

The solution outcome can be statistically determined. For instance, for the cat point in Figure 3E) with an equal probability of cat being alive/dead, there is a 50/50% chance for either outcome. The probability weights for the events don’t have to be the same, in which case one outcome is more favored. Now, by establishing the upshot of the cat point the mass particle moves along the path defined by the outcome to the next cat point, where the voting is repeated. The process of voting continues as long as the mass particle is in the cat zone. When the mass particle exits the entangled state, it continues to follow the loxodrome determined by the last voting event. This selection process remains the same even for more general cases where the cat points are presented with more than two reality options, and the only difference being is in a number of assigned probabilities addressing the outcomes.

Through this process it is easy to see how a mass particle originating in the GT_{Red}-field can end up in the GT_{Blue}-field, or return back to the red field. The third possibility is that the particle remains trapped in the cat zone. As the number of entangled GT-fields increases, so does the complexity of the state, and with it the complexity of mass particle dynamics.

Albert Einstein once commented, “God does not play dice with the universe”, and perhaps the statistical rule is not real. This could violate the reality claim, and we look for alternative rules. Keep in mind, the superposition property of cat points must always remain unaltered.

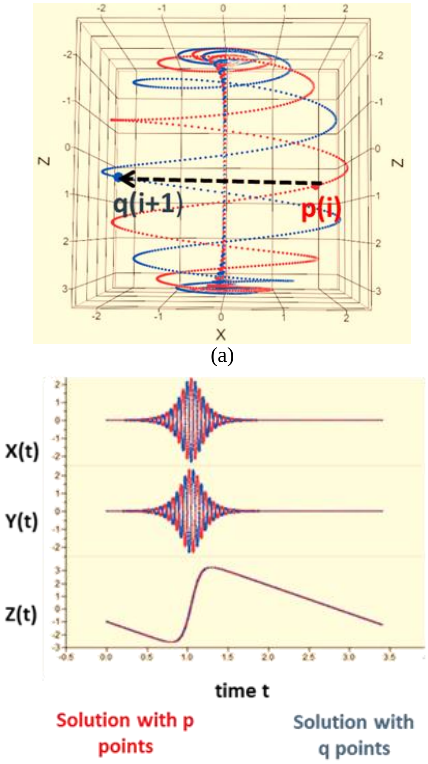
Dynamic patterns of mass particles in the cat zones can be more predictable buy selecting outcomes based on maximizing/minimizing the forward step increment $\Delta_i = (\Delta X_i^2 + \Delta Y_i^2 + \Delta Z_i^2)^{1/2}$ for all solutions available at a cat point.

By minimizing the step increment the path of least resistance is formed, and when the step is maximized the path of most resistance emerges. From (4b), the two options are also identical to the rule max($|\boldsymbol{v}_i|$), and min($|\boldsymbol{v}_i|$). In either case, the rules will make a particle motion more deterministic like, but depending on entanglement complexity the paths may be choppy.

There is one case in a need of attention, Einstein would refer to it as "spooky", and was mentioned earlier. The case occurs when the two identical GT-fields are fully intertwined, hence, referred to as the spooky entanglement. Here, all the field points are cat points and, generally, there is no problem with such a blend except that in this case every point supports the same 2 solutions, thus, the cat being dead/alive can never be resolved. No matter which entanglement rule is applied, a choice for a mass particle remains undetermined. This may "spook" the mass particles as they have no idea what to do next, or perhaps not. It appears that the mass particles demonstrate ability of spatial consciousness more than it appears.

In the "spooky" case, a mass particle transitioning from any cat point, say p(i), to a point p(i+1), is trapped on the same bread crumb trail representing 2 solutions, and has no ability to make a choice. Thus, before it makes an incremental leap of fate from the point p(i) to its next scheduled location p(i+1), the mass particle projects the forward action variable values, X_{i+1} and Y_{i+1}, to create a new rule that forces its way out of the predicament. This rule is accomplished by multiplying X_{i+1} and Y_{i+1} values with -1, which projects the mass particle not incrementally to the scheduled point p(i+1), but to the symmetrically opposite globotoroid end where it creates a new location q(i+1), Figure 5A), hence, "Spooky action at a distance". At the new location the same is repeated; the action variable values for the point q(i+2) are multiplied by -1, which brings the mass particle back to the point p(i+2). By repetitively applying this process, 2 distinct entangled bread crumb trails are formed, and a mass particle has resolved its dilemma. One bread crumb trail is composed of p-points, and the other of q-points, Figure 5B). It should be noted, however, that the spatial consciousness occurs every time the cat points encounter the same loxodrome path, which is a more general statement than the spooky entanglement, (i.e., the entangled GT-fields do not have to be identical).

All the entangled rules presented so far work fine. However, is there a better way for mixing properties of all entangled GT-fields with mass particles? The answer is yes, and the rule accomplishing this is referred here as the Newton's rule. For this rule the approach is to apply vector addition of all forward Δ_i increments at i-th cat point, and divide the sum by the number of entangled GT-fields to create the path for the next cat point (i+1). At the point (i+1) evaluate all forward increments and repeat the rule to reach the point (i+2). The Newton's rule is applied whenever a point is in the cat zone, and it terminates once a mass particle leaves the zone. When the particle reenters, or enters a different cat zone, the rule is restarted.



(a)

(b)

Figure 5. Illustrations of spooky entanglement show one period of entangled variables X,Y and Z.

This rule forces mass particles to blend at each cat point with properties of all GT-fields superimposed in the entanglement. It offers a natural dynamics alternative, and it establishes predictable Newtonian paths throughout the entangled multiverse. The resulting paths seem more intuitive, but computations are quite intense, especially when more than two GT-fields are involved. The last is also true for the min./max. rules. Computing paths through the entangled multiverse is a challenging process, as in this space complexity rapidly increases.

IV. TAKE AWAY

It is very difficult to imagine an active multiverse without entangled events. These events create information from which reality materializes on all scales around us. Is this an important knowledge? It is if we are looking for a deeper understanding of our surroundings. On the cosmic level it may offer better clues on how galaxies, stars and blackholes are formed, whereas on the opposite end of scale, how the subatomic particles create greater masses of matter, such as molecules and cells. We know a lot about these processes already, but what is hypothesized here is that all these realizations represent a materialized reality resulting from complexity of the dark space.

When examining immersion processes, different entanglement scenarios emerge. For instance, Figure 3 can describe three levels of the entangled states. In Level I the two field globes are entangled, Level II adds on the horn-torus, and Level III includes all three field topologies illustrated in Figure 2. The higher the level, the more complex are the entangled states.

The field properties illustrated in Figure 1 play important roles in the entangled processes. When the S->N orientations of GT-fields constituting the cat zone are in the same directions, the entangled region is oriented, otherwise, the orientations have to be clarified for each entangled field. For instance, all compatible GT-fields always produce orientated cat zones. Nevertheless, unless materialized, the properties of entangled dark space fields are not that important. Recall that the dark space fields do not mix and they are superimposed in the entangled zones.

Spin is another important property, and for the immersion example given in Figure 3 the results are illustrated in Figure 6. To determine the spin direction, or the spin sense, the GT solutions in the plane of the action variables are examined. In this plane the solutions spin either in the clockwise or counterclockwise sense, and the entangled region can support all the combinations of the two. For example, the clockwise sense appears only in the blue field of Figure 6B), while other fields in the figure have counterclockwise sense. The roles can be reversed by considering different parameters in (1).

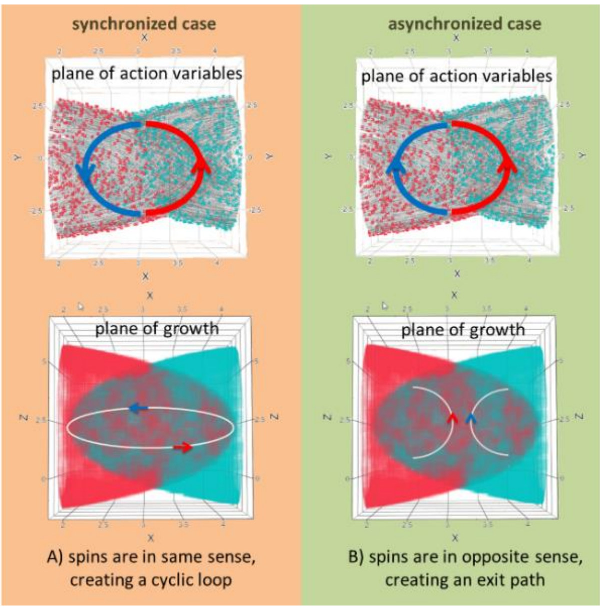


Figure 6. Examples of field rotations and dominant paths in entangled regions

The spin directions of GT-fields in cat zones support paths which can create regional cycles, Figure 6A), or exit pathways as in Figure 6B). When the regional cycle exists, we say that the entanglement is synchronized, otherwise it is asynchronized. Thus, the spooky entanglement has the same orientations and is synchronized, while immersions of the universe and its anti-universe, Figure (1) in [7], are always asynchronized and have the opposite orientations.

When mass particles are present in immersions, one would expect dynamics in the cat regions to be every which way, and particles smashing into each other. The outcome fortunately is different. As there are many more cat points in the multiverse than the mass particles, the reality outcomes are more likely to be orderly. In the multiverse there is only 5% of mass matter, or the baryonic matter, while 27% is the dark matter and the remaining 68% constitutes the dark energy. In addition, the baryonic matter flocks to the core field, (i.e., the ring-torus with the wormhole), while sparsely populates the rest of the GT field structure. The globe is mostly occupied by the dark energy with some dark matter and its condensates that may show up in form of halos [3].

As hypothesized in [7], the core is also home of CDM and is a region where the gravitational force dominates, while the strong force is present in the horn-torus field containing WDM. The weak and electromagnetic (EM) forces are present in the globe field, which hosts HDM and embodies the first level of immersion processes, hence, Level I. This level is dimensionally large and contains almost no mass, it is mainly dark energy. As a result, one can hypothesize that the reality of Level I is more like a plasma wave which is guided by the presence of electromagnetic and weak forces. Level I supports many forms of entanglement outcomes, and at this stage GT fields can easily entangle and untangle.

Level I is also an information gathering region where the data about orientations, spins and phase space velocities of entangled GT-fields are screened. If for, some or all immersed GT-fields, this information passes the screening, the entanglement proceeds to materialize a reality, while the GT-fields that fail the screening are excluded from it. However, for a brief moment all entangled GT-fields may have an opportunity to share their small amounts of matter. Once shared, the excluded GT-fields cannot take back their shared contents, or return the inherited foreign ones. As a result, the excluded GT-fields are seeded, and as such they untangle from the existing reality option.

Moving onto Level II, or the HDM and WDM cat zone, the materialized reality options increase immensely. The primary reason is that this is the field of horn-torus region, which exhibits the highest growth rate in the expanding universe, see Figure 2. This is the region where mass matter consolidates and forms real objects. The more GT-fields are present at Level II, the more fertile are the entanglement outcomes. For instance, in the synchronized Level II celestial cat zone the presence of cyclic paths encircles mass matter which under the rules discussed may give birth to a new star, or some other celestial object. Hypothetically, this is the case of a cloud of gas and dust in the outer space, also known as nebula. We know that nebulae present fertile grounds for young stars to be formed. In contrast, the asynchronous Level II cat regions may provide means for mixing and crosslinking contents of two or more fields, thereby creating a more blended multiverse. This seems to be particularly useful for creating molecules, and compounds in chemistry and biology. Figure 7 illustrates linking of three hypothetical atoms, or molecules, which are here referred as the GT-units.

The Level III entanglement is a most difficult reality state to sustain as it requires fusion of GT-fields. For instance, the spooky entanglement represents a complete fusion of two identical GT-fields. However, the Level III fusion does not have to be complete, but it requires field cores to be part of the cat zones, either way this is not easily accomplished. Recall that dark energy makes most of the globe field, while on the opposite end, the core consists mainly of a densely packed dark matter and relatively small amounts of the baryonic matter, making the core center the center of gravity. Thus, by entangling the two compatible core fields, matter and the centers of gravity have to fuse. This is not an easy process since the number of densely packed cat points is exceedingly large. In this space the materialized reality is likely to be challenged by adverse impacts, as the two GT-fields merge into a bigger and more stable field with its own center of gravity. Such is the case of the binary blackholes, where two blackholes, spinning about a newly formed center of gravity, eventually consume each other and form the larger one. This event offers a great source for the gravitational waves, while at the same time a lot is going on topologically and dynamically. As a result, the binaries generate excess energy which is released in the form of powerful gravitational radiation. When the two spinning binaries are not compatible, like the ones depicted in Figure 4, the spins may not be aligned and may induce precession and nutation in circular orbits [10]. Note, however, when the cores are noncompatible, there is also a possibility that the Level III entanglement may not be allowed, an example is to follow.

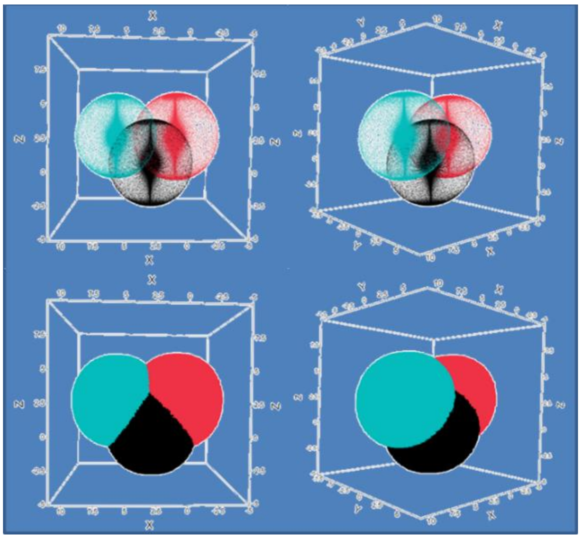


Figure 7. Linking three GT-units together.

The similar phenomenon, but on the opposite end of the scale, occurs in the nuclear fusion which powers the Sun. In this case, the two hydrogen atoms are entangled to form the helium atom, or more precisely, the two light hydrogen nuclei merge together to form the single heavier helium nucleus. As a result of this fusion, excess energy is released into the solar system.

The spin is inherent in GT field solutions, and plays an important role in all entangled states. It uses reality outcomes to consolidate and release mass and energy in many different forms throughout the multiverse. What about the field orientation, how does it affect reality outcomes? First, it orientates the electromagnetic field, which together with the weak force, provide screening forces for the Level I reality. This also holds for the Level II and Level III entangled states, where the EM position can stimulate or prevent the reality outcomes. For instance, the entangled Level III with compatible binaries leads to a core fusion. However, when the same binaries have opposite EM orientations, the new center of gravity cannot be formed and the core fusion will never happen. The two cores may bounce off of each other, making Level II the most likely reality destination.

Finally, it is important to note that all three levels of entanglements produce energetic outcomes. The Level I state is the least energetic, followed by the Level II where just about all of the matter we experience is formed. The Level III state is most energetic, and when fueled with mass it produces the events of creation and destruction across the multiverse. The energy released in Level III events can be enormous, and is chiefly responsible for keeping many multiverse processes moving. Without it, much of our surroundings would be stagnant.

V. DISCUSSION

Other than cosmology and similarities with quantum mechanics, the present investigation also applies to topics in biology, chemistry, information sciences, as well as social behavior, economics and finances. In the section "Abstract GT Spaces", it was demonstrated that like the Schrodinger's wave equation, which is the back bone of the quantum mechanics, the globotoroid equations guide mass particles in the 3-dimensional multiverse. The concepts presented can extend into quantum chemistry where the entangled GT-fields may describe molecular dynamics of atoms and molecules. In particular, dynamics of valance and free electrons can be expressed within the Level II entangled states. Here, the asynchronous and synchronous GT-field settings can produce energetic transients, which are often accompanied by chaotic dynamics referred to as the dozy chaos [11,12]. Similarly in the fields of panpsychism and consciousness, GT-fields and their properties play important roles [13,14]. It was argued that the mass matter can exhibit spatial consciousness which may result in "spooky phenomena". These phenomena produce some unexpected results, such as the DNA scaffolds with the protein clamps, or it can be used as a model for quantum computing [15]. In biology one can use the present modelling approach to increase interaction complexity of the species in competition, as well as to study dynamics of biomolecules [16,17,18,19]. Materializing reality is also an interesting topic for business and economics. The Lotka-Voltera models for species in competition are applied to study dynamical behavior of business and economic systems [20,21,22]. Similarly, behavioral sciences offer themes through which materialization of reality is reflected in our daily lives. Examples are anthropology, art, architecture, politics [23,24,25].

In this investigation the goal was to show how entangled processes increase complexity in our multiverse. It is conjectured that without entangled states the multiverse is composed of isolated GT-fields with limited reality content. By intertwining these isolated entities, the hypothesis indicates large increase in reality possibilities. Although, the examples presented illustrate complexity formations for the specific case of entangled GT-fields, the results can be extended for more general instances. This extension, however, is not trivial since more globotoroid parameters need considerations, and the computation demands increases dramatically. Whatever the reality outcome is, it is important to keep in perspective that it always results from the mass and energy stimulations.

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Nikola (Nick) Samardzija obtained his bachelor's degree in electrical engineering from University of Bradford, and subsequently a master's degree in electrical engineering from University of Illinois. He also completed his PhD degree in chemical engineering at University of Leeds.

In 2010 Dr. Samardzija founded an independent research initiative on exploring the subject of globotoroids and the universe. Since 2011 this research is accessible on the webpage www.globotoroid.com. Presently he researches and manages all activities for globotoroid.com.

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