DMT Experiences and Hyperbolic geometry

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Abstract

This article was inspired by a proposal was that the DMT experience could be characterized by two parameters.

The first parameter characterizes how "hyperbolic" the visual field is and is identifiable as the curvature of the hyperbolic space. The idea is that during a DMT trip the experienced 3-space is not Euclidean but hyperbolic. This kind of geometry has been proposed as an effective statistical geometry of the brain in which functionally similar neurons distant from each other are close to each other.

In the TGD framework, this effective geometry could correspond to a real hyperbolic geometry of 3-D hyperbolic space playing a key role in TGD and assignable naturally to the magnetic body (MB).Besides ordinary visual input also the projection of objects of H^3 to the usual Euclidean space E^3 would be experienced so that the experience would be "multiverse" experience. In the TGD Universe, the space-times are minimal surfaces apart from singularities analogous to frames of soap films and their basic aspect is local saddle point property possessed also by hyperbolic spaces. Maybe DMT experiences make it possible to visually perceive 3-surfaces as objects in H^3. Also the usual vision also corresponds to hyperbolic vision but with a small value of the H^3 curvature.

The second parameter would characterize the complexity of the experience. In TGD it could correspond to the algebraic complexity associated with the extension of rationals determined by the polynomial determining a given space-time region by $M^8 - H$ duality. The value $h_{eff} = nh_0$ of the effective Planck constant, which can be larger than h, would correspond to the dimension n of the extension of rationals and serve as a universal IQ. Dark matter would correspond to phases of ordinary matter with $h_{eff} \neq h$. As the IQ increases, the experience transforms from simple to complex and eventually chaotic since the experiencer is not able to make sense of it. Under some assumptions this would relate to the formation of Julia set type fractals.

The model also leads to a progress in the interpretation of TGD. In particular, a geometric interpretation of p-adic length scale hypothesis suggesting that p-adic length scale is accompanied by much shorter length scale of order CP_2 length scale finds an interpretation: p-adic length scale would correspond to the Euclidian scale defined by a hyperbolic length scale naturally emerging for hyperbolic tessellations.

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1 Introduction

I received a link to a highly inspiring talk about a modelling of DMT induced experiences in terms of 2-D and more generally 3-D hyperbolic geometry. The title of the talk (see `https://zpr.io/7Bzbagjrk7LE`) was "DMT and Hyperbolic Geometry"". The talk was by a person using the name "Algekalipso" and I understand that the person in question is Andres Gomez Emilsson. The organization in question is Qualia Research Institute (`https://cutt.ly/fG05D9W`). There is also article by Emilssson (`https://cutt.ly/YG05Qrk`) with essentially the same content.

1.1 Can one characterize DMT experiences by using temperature like parameters

The question posed in the beginning of the talk was whether there could exist parameters analogous to temperature allowing a general qualitative understanding of the nature of the DMT and more general psychedelic experiences. The proposal was that the DMT experience could be characterized by two parameters.

1. The first parameter characterizes how "hyperbolic" the visual field is and is identifiable as the curvature of the hyperbolic space. The idea is that during a DMT trip the experienced 3-space is not Euclidean but hyperbolic. This kind of geometry has been proposed as an effective statistical geometry of the brain in which functionally similar neurons distant from each other are close to each other [L4].

   In the TGD framework, this effective geometry could correspond to a real hyperbolic geometry of 3-D hyperbolic space playing a key role in TGD and assignable naturally to the magnetic body (MB).Besides ordinary visual input also the projection of objects of H^3 to the usual Euclidean space E^3 would be experienced so that the experience would be "multiverse" experience.

   In the TGD Universe, the space-times are minimal surfaces apart from singularities analogous to frames of soap films [L9] and their basic aspect is local saddle point property possessed also by hyperbolic spaces. Maybe DMT experiences make it possible to visually perceive 3-surfaces as objects in H^3. Also the usual vision corresponds to hyperbolic vision but with a small value of the H^3 curvature.

2. The second parameter would characterize the complexity of the experience and could in the TGD framework correspond to algebraic complexity associated with the extension of rationals determined by the polynomial determining a given space-time region by $M^8 - H$ duality [L2, L3].

   The value $h_{eff} = nh_0$ of the effective Planck constant, which can be larger than h, would correspond to the dimension n of the extension of rationals and serve as a universal IQ. Dark matter would correspond to phases of ordinary matter with $h_{eff} \neq h$.

   As the IQ increases, the experience transforms from simple to complex and eventually chaotic since the experiencer is not able to make sense of it. Under some assumptions this would relate to the formation of Julia set type fractals.

The model also leads to a progress in the interpretation of TGD. In particular, a geometric interpretation of p-adic length scale hypothesis [K2, K1] suggesting that p-adic length scale is

accompanied by much shorter length scale of order CP_2 length scale finds an interpretation: p-adic length scale would correspond to the Euclidian scale defined by a hyperbolic length scale naturally emerging for hyperbolic tessellations.

2 TGD based model for DMT experiences

I have already earlier developed a TGD based model [L4] for the finding that the brain seems to obey an effective statistical geometry which is hyperbolic in the sense that neurons which are functionally near to each other have a short distance in this geometry. In the sequel a TGD based model for DMT experiences relying on hyperbolic geometry and based on the ideas already outlined is developed.

2.1 About hyperbolic spaces

First some mathematical background.

1. Hyperbolic 3-space H^3 is a generalization of 1-D hyperbola of 2-D space-time as a curve defined by condition $t^2 - x^2 = a^2$ but with its metric being induced from the 2-D Minkowski metric $ds^2 = dt^2 - dx^2$. By performing all possible rotations of this 1-D hyperbola one obtains H^3.

2. In particle physics H^3 corresponds to mass shell $E^2 - p^2 = m^2$ and in cosmology to cosmic time identifiable as $a^2 = t^r - r^2$ in $M^4 \subset M^4 \times CP_2$. a defines Lorentz invariant cosmic time and is therefore analogous to absolute time invariant under Lorentz boosts which do not affect the tip of the light-cone. It is not invariant under translations however.

   In the TGD framework H^3 has a central role and plays a key role also in the model of the brain involving the notion of magnetic body (MB). One could say that cognitive and sensory representations are realized at the intersection of MB with H^3.

3. The value of cosmic time a characterizes the curvature of H^3. The curvature is proportional to $1/a^2$ and the smaller the value of a, the larger the curvature and "hyperbolicity". As a decreases, one approaches the analog of the Big Bang with infinite curvature. As a increases, one approaches flat E^3 in an infinite future. Cosmic evolution proceeds from the Big Bang to the future whereas DMT trip would be a travel towards the moment of Big Bang. One can of course ask whether trips could also be in the opposite time direction.

4. The lecture (see also the written version) contains a nice description of hyperbolic geometry. In particular, the volume of a ball in H^3 increases exponentially as a function of its radius and this means that H^3 has a lot of volume. This might be very relevant for memory storage. This can be easily understood from the visualization in terms of real hyperboloid.

5. The counterpart of plane E^2 of E^3 in H^3 is 2-D hyperbolic space H^2 and Poincare sphere gives a good view about what the projections of the tesselations of H^2 look like when projected to E^2. The radial size for the basic unit of tessellations decreases with the distance from the origin whereas the region around the origin looks like E^2.

   Note that one particular tessellation, known as icosa-tetrahedral tessellation, plays a key role in the TGD based view about genetic code implied by the notion of bioharmony [L6], which relies on icosahedral and tetrahedral Hamiltonian cycles [L7].

6. The hyperbolic geometry H^2 embedded locally in E^3 has the saddle property meaning that in one direction the observer is at the bottom of the valley and in another direction at the top of the hill. This property has analog also at the level of abstract geometry: geodesic lines diverge very rapidly since the curvature scalar is negative: for spheres they converge.

7. By their negative curvature, H^3 and H^2 allow tessellations (analogs of lattices in E^3 and E^2) which are not possible in E^3. For instance. 7-polygons are possible. The number of tessellations is infinite whereas in E^2 only 17 wall papers are possible.

8. Hyperbolic analogs of plants are mentioned as fractals.

2.2   A possible interpretation of DMT experiences

DMT experiences could reflect both the relationship between the geometries of hyperbolic 3-space and Euclidian 3-space represented as 3-surfaces of Minkowski space and the algebraic complexity assignable to the tesselations of H^3.

2.2.1   DMT trip as travel backwards in cosmic time

It was already mentioned that the proper time parameter a and algebraic complexity characterized by extension of rationals could characterize DMT experience. The increased complexity in turn means approach to apparent chaos since it is not possible to comprehend too high complexity. The following description is what I understood from the representation of Emilsson. I have not personally made DMT trips except spontaneously decades ago. This experience was so impressive that I got a passion to understand conscious experience from a quantum physics point of view.

1. For small DMT does, the visual experiences correspond to patterns in plane $E^2 \subset E^3$, which can be regarded as plane $H^2 \subset H^3$ for large value of a and thus small curvature.

   The lattives of E^2 (17) called wallpapers serve as a background for the visual field. As if one would be perceiving two different worlds simultaneously. The lattices can be dynamical and pulsate. This kind of experience was part of the "Great Experience" decades ago.

2. As the DMT dose increases, the value of a decreases and one moves towards the Big Bang, so to say. In TGD and TGD inspired theory of consciousness, causal diamonds (CDs), identified as intersections of future and past directed light-cones, could be seen as correlates of perceptive fields [L1, L8] which in TGD are 4-D so that also memories could be seen as analogs of sensory perceptions. CD is analogous to a Big Bang followed by a Big crunch. The CDs form a fractal hierarchy.

   The visual field becomes more and more hyperbolic. What we would see is the projection of the patterns of $H_a^2 \subset H_a^3 \subset M_+^4$ to $E_t^2 \subset E_t^3 \subset M_+^4$, where a is cosmic time and t is the linear Minkowski time.

3. At the next step the 2-D patterns in H^3 are replaced by patterns in H^3 as hyperbolic analogous of curved surfaces in E^3 and one can say that the dimension of the visual field becomes 3.

4. In TGD Universe space-time surfaces are minimal surfaces [L9] and analogous to 4-D soap films spanned by frames appearing as singularities where minimal surface property and also the determinism of field equations fail so that the frames are space-time correlates as seats of non-determinism. The saddle property of minimal surface could explain the appearance of the "hyperbolic plants" which Emilsson lists as part of DMT experience.

Do we really see a hyperbolic world or does the visual perception reflect only the statistical geometry of the brain? The TGD proposal is that these two views reflect real space-time surfaces. One can of course argue that since conscious experience itself is associated with quantum jumps in the TGD framework so that the experience is about becoming rather than about being in the physical sense.

2.2.2   Algebraic complexity of the experience as a second parameter

The second parameter discussed in the talk was meant to characterize what was called valence as a measure for the "degree of bliss" of the experience. TGD counterpart would be algebraic complexity associated with the extension of rationals defined by the polynomial defining the space-time region. The value of $h_{eff}/h_0 = n$ as dimension of extension would serve as the parameter [L2, ?] For large values of n the situation becomes too complex to comprehend or remember and the bliss is lost.

In the TGD framework more complex systems can be engineered as functional composites of polynomials and this leads to the increase of h_{eff}. One can interpret this also as a construction of many-particle states with each polynomial, which represents a particle-like entity. When a fixed polynomial is iterated functionally, one obtains a fractal known as Julia set so that the connection with fractals is quite concrete [L5, L10, L11].

To sum up, the reports of Emilsson suggest a very concrete connection between DMT experience and TGD based views of space-time and number theoretical vision about quantum theory explaining dark matter as $h_{eff} = nh_0$ phases. DMT perception would be perceptions of both ordinary and dark matter simultaneously.

3 Possible implications for the interpretation of TGD

The proposed picture involving in an essential manner both H^3 and E^3 suggests some highly non-trivial implications concerning the physical interpretation of TGD.

3.1 H^3 is ideal for information storage and holography

The hyperbolic radial distance r_H in H^3 from origin is given by $r_H = a\, arsinh(r_E/a) \simeq alog(r_E/a)$, where r_E is the Euclidean distance in E^3. r_H depends logarithmically of r_E slowly. The area $S = 4\pi a^2 r^2$ of the hyperbolic sphere of radius u projected to Euclidean sphere with r increases as function of u as $S \simeq 4\pi a^2 exp(2u/a)$. One can imbed a tree graph (say) m ranches in the node much more effectively than in the Euclidean case. One can think of the tree graphs a simple model for a neural network consisting of layers such that n:th layer has m^n nodes for

If a given node requires fixed area ΔS, the solid angle $\Delta \Omega$ required by a node decreases as $1/r^2$ whereas in E^3 it remains constant, the number of these areas at sphere increases as $S/\Delta S = 4\pi exp(2u/a)/\Delta S$. In the Euclidean case it increases as $S/ = 4\pi r^2/\Delta S$. This means that the geometric information storage capacity of H^3 is exponentially larger. Therefore the idea that the 3 surfaces associated with H_a^3 could serve as information storage is very attractive.

3.2 H^3 and the origin of p-adic length scale hypothesis

p-Adic prime assignable to a region of the space-time surface is identified as the largests ramified prime associated with the polynomial defining the region of the space-time surface. p-Adic length scale hypothesis states that the physical preferred p-adic primes correspond to p-adic primes $p \simeq m^k$, where m is a small integer: $m = 2$ is the most important case.

I have proposed that there are two scales involved. The small p-adic length scale associated with m and the exponentially larger p-adic length scale proportional to $\sqrt{p}$. The origin of these scales has remained a mystery.

Could the small scales correspond to the radial scales r_H and large scales to radial scales r_E?

1. H_3 allows tessellations playing a key role in TGD framework and the size scale of the cell of the tesselation defines a natural length scale unit $\Delta r_H = aX$, which could define the small scale and scales would be expressible in terms of this unit.

2. In E^3 the natural scale would correspond to Euclidean lattices with constant cell size Δr_E. For $r_H = \Delta r_H$, $r_E = a\, sinh(r_H/a) \simeq aexp(r_H/a)$ would give $r_E \simeq aexp(nX = am^{\Delta X/log(m)}$.

3. $r_E = L_p = \sqrt{p}R$ would give $\sqrt{p}R = am^{\Delta r_H log(a)/alog(m)}$. p-Adic length scale hypothesis $p \simeq m^k$ requires $X = klog(m)/2log(a/R)$.

   Note that there would be a logarithmic dependence of the p-adic length scale on the a, which would have an interpretation as a renormalization of the p-adic length- and mass scales.

REFERENCES

Books related to TGD

[K1] Pitkänen M. Massless states and particle massivation. In *p-Adic Physics*. Available at: `https:/tgdtheory.fi/pdfpool/mless.pdf`, 2006.

[K2] Pitkänen M. *p-Adic length Scale Hypothesis*. Online book. Available at: `https://www.tgdtheory.fi/tgdhtml/padphys.html.`, 2013.

Articles about TGD

[L1] Pitkänen M. Some comments related to Zero Energy Ontology (ZEO). Available at: `https:/tgdtheory.fi/public_html/articles/zeoquestions.pdf.`, 2019.

[L2] Pitkänen M. A critical re-examination of $M^8 - H$ duality hypothesis: part I. Available at: `https:/tgdtheory.fi/public_html/articles/M8H1.pdf.`, 2020.

[L3] Pitkänen M. A critical re-examination of $M^8 - H$ duality hypothesis: part II. Available at: `https:/tgdtheory.fi/public_html/articles/M8H2.pdf.`, 2020.

[L4] Pitkänen M. Could brain be represented as a hyperbolic geometry? Available at: `https:/tgdtheory.fi/public_html/articles/hyperbolicbrain.pdf.`, 2020.

[L5] Pitkänen M. Could quantum randomness have something to do with classical chaos? Available at: `https:/tgdtheory.fi/public_html/articles/chaostgd.pdf.`, 2020.

[L6] Pitkänen M. How to compose beautiful music of light in bio-harmony? `https://tgdtheory.fi/public_html/articles/bioharmony2020.pdf.`, 2020.

[L7] Pitkänen M. Is genetic code part of fundamental physics in TGD framework? Available at: `https://tgdtheory.fi/public_html/articles/TIH.pdf.`, 2021.

[L8] Pitkänen M. TGD as it is towards the end of 2021. `https://tgdtheory.fi/public_html/articles/TGD2021.pdf.`, 2021.

[L9] Pitkänen M. What could 2-D minimal surfaces teach about TGD? `https://tgdtheory.fi/public_html/articles/minimal.pdf.`, 2021.

[L10] Pitkänen M. About TGD counterparts of twistor amplitudes: part I. `https://tgdtheory.fi/public_html/articles/twisttgd1.pdf.`, 2022.

[L11] Pitkänen M. About TGD counterparts of twistor amplitudes: part II. `https://tgdtheory.fi/public_html/articles/twisttgd2.pdf.`, 2022.