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Godel, Escherian Staircase and Possibility of Quantum Wormhole With Liquid Crystalline Phase of Iced-Water - Part I: Theoretical Underpinning

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ABSTRACT
As a senior physicist colleague and our friend, Robert N. Boyd, wrote in a journal (*JCFA*, Vol. 1,. 2, 2022), Our universe is but one page in a large book [4]. For example, things and Beings can travel between Universes, intentionally or unintentionally. In this short remark, we revisit and offer short remark to Neil's ideas and trying to connect them with geometrization of musical chords as presented by D. Tymoczko and others, then to Escher staircase and then to Jacob's ladder which seems to point to possibility to interpret Jacob's vision as described in the ancient book of Genesis as inter dimensional or heavenly staircase, e.g. an inter dimensional bridge between heaven and earth (see also classic book: Hofstadter, Godel, Escher, Bach). Jacob's vision of angels going down to earth from that staircase has been depicted for instance in William Blake art etc. In our communication with others via physics literature and discussions etc, we came to several conclusions as follows: Firstly, possibility of quantum wormhole effect to mirror particle universe, which sometimes it is termed non-orientable wormhole. While such mirror particles effect have been more than 50 years predicted with the so-called parity violation (cf. Lee & Yang, 1950s), and that is called symmetry breaking. Secondly, a series of extended experiments on laser irradiated cold water may suggest possible transition from a phase of water to be at least partially fourth phase of water, which may be composed of crystalline water (see e.g. Gerald Pollack, and also Harold Aspden on liquid crystalline). If we can imagine laser cooling effect can be done in protracted time, then we can achieve a physical representation of Aspden's liquid crystalline. Therefore, in subsequent article (Part II) we outlined simple model of such an effect of tunneling via quantum liquid crystalline Universe, which may likely be modeled with iced-water. It is interesting to remark here that certain experiments by Stockholm University scientists have shown that X-ray triggered water can exhibit properties just like liquid crystal (cf. *PRL*, 2020). That is why we consider it possible that there can be quantum phase transition where liquid water (comprised of iced cubes and water) can exhibit effects such as tunneling in quantum liquid crystalline Universe. Last but not least, we admit that what we outlined here is just an initial phase; and if you wish, perhaps we can call such experiments as "wormhole-at-lab" experiments (abbreviated: *WHALE*).

Keywords: Universe, Cosmological Physics, Inter dimensional Bridge, Cosmological Experiments, Low Temperature Physics, Quantum Tunneling, Aspden Liquid Crystalline, Jacob's Vision

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1. INTRODUCTION

According to Robert N. Boyd's experience and insights, although there are various perceptive developments on what the Universe is like, which presently known as modern cosmology, from ancient sources such as the book of Genesis (e.g. the story of Jacob's ladder) or ancient Indian Hopi, we can learn that the we live in a *vast Cosmos*, which may require really advanced geometry to comprehend its geometry, topology etc. although in daily life we perceive it as 3D space. [1][3][4]

Among other things, Neil wrote in his article [4]: "For example, things and Beings can travel between Universes, intentionally or unintentionally. The pages of the "book" of Universe are connected at a common point and move outwards in a rotation, overlaid in a spiral manner, related to the *phi* ratio. Each "page" which is "touching" the next page and the previous page, has physical laws and forms of Consciousness that are only slightly different from one another.

The further you go in or out, *along the spiral*, the more unrelated the various Universe's laws and Beings are, so that if you move many "pages" away from your starting page, the features of that Universe will be completely outrageously different from where you are now.

…

Most of gateways allow travels both in and out of the specific portal. Each portal has a specific number, and specific types, of destination locations."

From the above quote from Neil [4], we can interpret geometrically as follows: that we perceive the world in daily experience as 3D space, but the actual reality may be better translated for instance in William Thurston's exploration of 3D space topology, including what he termed as orbifold.Interestingly, Dmitri Tymoczko offers an interesting connection between geometry of musical scale and orbifold geometry. [5][6] In the meantime, others have explored orbifold mathematics [9][10].

2. THEORETICAL UNDERPINNINGS: REMARK ON DMITRI TYMOCZKO'S *GEOMETRY OF MUSICAL SCALE*

With reference to such a Jacob's ladder story from ancient book of Genesis, allow us to offer an interpretation as follows: With the context of this spiritual journey, we can interpret the story of Jacob's dream about angels descending from heaven at Bethel as a spiritual experience, especially in the context of Hopi Indian mysticism. Our universe is just one page in a big book. Each "page" can "touch" the next page and the previous page. Nonetheless, what kind of advanced geometry to be able to describe that interdimensional travel (or perhaps we can call as "*Escher staircase*"), it is still to be explored.

The details of 3D space topology and its related orbifold are quite involved. Nonetheless, allow us to present here quote from a review on Tymoczkos article in *Science 2006* [5]:

"Familiar relationships between sets of musical notes, such as transposition between chords, directly translate into geometrical structures such as this Möbius strip — where each dot represents a whole class of equivalent two-note chords — or into more complex structures with many dimensions. Composers have an understanding of these geometries without realizing it, says music theorist Dmitri Tymoczko of PrincetonUniversity. "Musicians like Chopin had a very direct, intuitive understanding of these spaces at a time when mathematicians still didn't know much about high-dimensional geometry," he says. Wandering around these spaces, Tymoczko and his collaborators have found subtle relationships between progressions of chords that traditional musical theory would classify as unrelated — for example, between progressions in Mozart's Fantasy in C-minor and in Beethoven's Ninth Symphony."[1]The following illustrations may help readers to imagine what kind Mobius strip involved:

[1]Davide Castelvecchi. Godel, Escher, Chopin. *ScienceNews* May 2008. Url: https://www.sciencenews.org/article/g%C3%B6del-escher-chopin

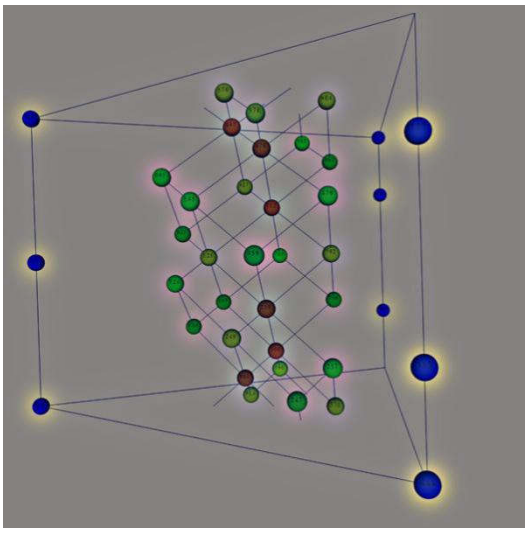

Illustration 1: Trichord prism

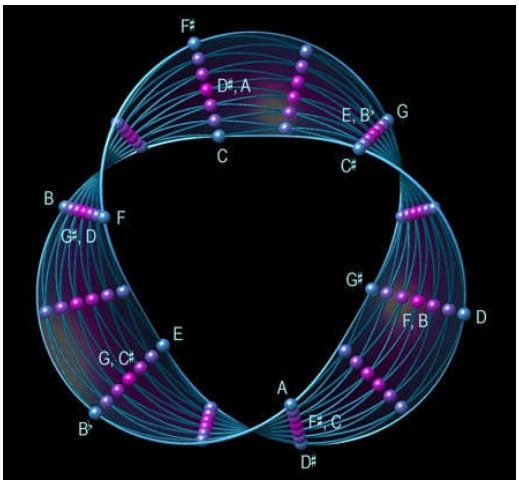

Illustration 2: Möbius strip related to musical scale[2]

While all of these are interesting and worthy to explore further, we shall note that Tymoczko's exploration of math and geometry behind musical scale are mostly based on analysis of more than 300 years of Western music. It is our assertion that exploration of this kind may be extended to *pentatonic scale*, which can be found throughout traditional musics in Asia, and also later on in folk music in the West too. Beside pentatonic scale is found in Chinese folk music, as Sasaki & Masunah note: "In Javanese and Balinese music, only two types of laras are recognized, namely slendro and pelog, while in Sundanese music, there are three types of laras: *salendro, pelog, and sorog*. These three scales are all clearly pentatonic." [11][12]

Therefore, provided we assert that ancient traditional arts such as Indian Hopi and Navajo, may have deep connection with traditional arts in China and also other parts of Asia such as Javanese and Sundanese music etc, then we may suppose that such a pentatonic scale also carry deep geometry insight hidden from modern music, i.e. the trace from ancient beliefs, such as Jacob's vision of heavenly staircase connecting interdimensional spiritual doors between heaven and earth.

All in all, although our knowledge is very limited for know, allow us to conclude that Tymoczko's exploration along with Thurston's geometry of 3D space may point to further exploration to deep geometry of spirally heavenly staircase as Jacob envisioned in the book of Genesis

3. DISCUSSION

Possibility of non-orientable wormhole to mirror world, or else, of quantum wormhole-like effect via liquid crystal simulation with iced-water

Provided we accept that Möbius strip geometry may hold an answer to the aforementioned problems, it seems instructive to consider how parity symmetry and its violation can play certain role here. Physicists usually regard the study of CP violation addresses as a very fundamental question: are the laws of physics the same for matter and anti-matter and *possibly* un-matter, or are matter and anti-matter intrinsically different? In other words, mirror symmetry can be restored if mirror particles can be observed. That is a premise that V.I. Dokuchaev & Y.N. Eroshenkov arguing in ref. [13], and they put forward this notion to suggest

[2]https://www.sciencenews.org/article/g%C3%B6del-escher-chopin

that even a non-orientable wormhole is possible. In particular, it is stated that the mirror particles are transformed into the ordinary ones and vice versa while traversing through the non-orientable wormhole. This statement was previously applied only to the universe with a non-orientable topology [13]. This can be quite interesting, provided it is assumed that we live in a Universe with non-orientable topology [cf. 24], and this matter can still be considered in the context of duality of electric-magnetic theories. For instance, such a duality of electric-magnetic theories can be explored in variety of quaternionic Maxwell theory or quaternionic Dirac theory (cf. our articles at *Octogon Mathematical Magazine*, 2022, [17]).

Nonetheless, more recent findings seem to suggest that such mirror symmetry may not hold the true symmetry of Nature. The discussion has been started since Lee & Yang's seminal paper and so on.[14] Therefore, another alternative is to find possibility of quantum wormhole or quantum tunneling effect in liquid crystal, for instance see an article on optical wormhole [15]. In this regards, it is interesting to remark that a series of extended experiments on laser irradiated cold water suggest possible transition from liquid phase of water to be at least partially fourth phase of water, which may be composed of crystalline water (see e.g. Gerald Pollack, and also Harold Aspden on liquid crystalline). If we can imagine laser cooling effect can be done in protracted time, then we can achieve a physical representation of Aspden's liquid crystalline. Therefore, in subsequent article we outlined a simple model of such an effect of tunneling via quantum liquid crystalline Universe, which may likely be modeled with iced-water. It is interesting to remark here that certain experiments by Stockholm University scientists have shown that X-ray triggered water can exhibit properties just like liquid crystal. That is why we consider it possible that there can be quantum phase transition where liquid water (comprised of iced cubes and water) can exhibit effects such as tunneling in quantum liquid crystalline Universe.

Moreover, it is interesting to remark that according to Eugene Terentjev, in a uniformly aligned liquid crystal, colloidal particles having a number of holes give rise to arrays of topological defects that are associated with the particles' topology, and that these concepts then quickly expanded from the analysis of liquid crystals to cosmology and particle physics. [20] Tkalec and Musevic also concluded in their paper, that interplay between particle and defect topologies in liquid crystals provides an exciting journey to the burgeoning area of applied topology [21].

Therefore, we can summarize here that liquid crystals and also liquid crystalline phase of water are exciting topics to explore whether it is possible to do wormhole experiments at lab (perhaps we can call it as WHALE.) See also [22][23].

4. CONCLUDING REMARKS

Referring back to Neil's article as cited above, in the present article we tried to argue from recent geometry of music to support Neil's ideas from ancient sources such as ancient Indian tribe's experiences and also in the book of Genesis (e.g. the story of Jacob's ladder) that the we live in a vast Cosmos, which may require really advanced geometry to comprehend its geometry, topology etc. although in daily life we perceive it as 3D space. [7]. Interestingly, Dmitri Tymoczko offers an interesting connection between geometry of musical scale and orbifold geometry. [5][6]

All in all, although our knowledge is very limited for know, allow us to conclude that Tymoczko's exploration along with Thurston's geometry of 3D space may point to further exploration to deep geometry of spirally heavenly staircase as Jacob envisioned in the book of Genesis. In subsequent Part II of this article series, allow us to describe a series of table top small scale experiments on how iced-water with certain effects such as low-intensity laser cooling effect and also along with certain geometric configuration of a glass container, can be expected to exhibit properties similar of liquid crystal. In effect, there is slight

expectation that we can do small-scale cosmological experiments at lab, i.e. by introducing a number of starting assumptions that the Universe at large can be modeled in low-temperature physics, especially it is interesting to remark here that certain experiments by Stockholm University scientists have shown that X-ray triggered water can exhibit properties just like liquid crystal (cf. *PRL*, 2020). That is why we consider it possible that there can be quantum phase transition where liquid water (comprised of iced cubes and water) can exhibit effects such as tunneling in quantum liquid crystalline Universe.

Quote for the day:
"*God is here, helping directly, and things are moving along very nicely.*"

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