From the desk of Pierre Beaudry

TIMEREVERSAL
IN
THE SIMULTANEITY OF ETERNITY

(To my brother, Guy)

by Pierre Beaudry, 5/19/2010.

"The future ain't what it used to be."

Yogi Berra.

“The most important characteristic of numbers is reciprocity.”

Dehors Debonneheure.

“The issue of the functional role of “time-reversal,” is the most important of the fundamental issues confronting mathematical physics today.”

Lyndon LaRouche.

INTRODUCTION

The central idea of this report lies in discovering that true time is not a one-dimensional reality that positivist mathematicians and existentialists have concocted as the fallacy of composition they call "now." Time is not the linear sequence that identifies the irreversible direction of unique and unchangeable instantaneous events that come either before or after one another, and never simultaneously. As Lyn demonstrated, creative time in the universe is timereversal in the simultaneity of eternity.

In opposition to the reductionist linear view, consider timereversal as a memory function that moves in cycles and is modulated by universal principles, as does a solar system in the physical space-time motions of its planets. For the same reason that the earth is the best natural clock you can get to measure physical space-time within our solar system, memory is the best clock that your mind has to measure the creative process with recourse to discoveries of universal physical principles. From that vantage point, time is truly the creative time of a universe conceived as a psychophysical parallelism between matter and mind.

This raises many questions, of course, but I will try to discuss at least three important ones, here. First: "How does timereversal work in the simultaneity of eternity?" Secondly: "Why are biquadratic residues proportional to a timereversal memory function?" And, thirdly: "How is timereversal in the simultaneity of eternity congruent with Einstein's relativity of physical spacetime and with Vernadsky's three phase spaces of the Abiotic, Biotic, and Cognitive domains?"

1. IS TIMEREVERSAL ALSO A THEOLOGICAL ISSUE?

Endurance is one of the most extraordinary qualities the human mind has in manifesting its resiliency for generating big axiomatic changes through small forces. Anyone who has noticed the current failure of the powerful British world financial system, and the weak forces of the LaRouche movement acting worldwide to replace that corrupt system, will recognize that our planet is currently going through one of the most ironic axiomatic changes in history, which has not been seen since the Golden Renaissance. Therefore, viewed from the strategic staging ground of the LaRouche movement, at this timely moment of history, endurance seems to be a characteristic of physical spacetime that is essential to consider with respect to the concept of simultaneity of eternity, because it explains the dedication of the human mind in exploring the unknown future for solutions to the errors of the past. As Lyn demonstrated, whenever religions fail in establishing a proper sense of immortality for mankind, reason must succeed in a timely fashion.

The irony of this simultaneity of eternity, however, reflects a theological subject that the main official religions are not able to communicate to their believers, but which is essential to be recaptured in a cognitive manner since it had already served as a bridge in going from the dark age of the Middle Ages to the Italian Renaissance and the founding principle of the United States discovered by Nicholas of Cusa. The point is that the future cannot be explored without including the enduring memorable singular transforming of mankind through that Renaissance and without its moral companion, hope. The process of timereversal requires that we relive that crucial moment of history, because that singularity was the *sine qua non* condition for securing its immortality into today's society. Lyn made the crucial point on this question recently:

> "Is mankind just another species, or does mankind have a significant future in the universe? And can we prove that, now? Can we prove that that 's *true*, now? Well, how do you prove that? You show we can go to the next step. And the next step is really Mars. And all the problems that involves of putting man in an artificial environment, suitable to human condition, in places other than Earth, other than our particular Solar System, at some time in the future *in a timely fashion*! Hmm? That has to be your belief in immortality, because that's a true belief in human immortality. Not in the flesh, but in the spirit. In the continuation of what you represent and embody, for future generations. If you believe in that, you've got it. If you don't believe that, you've come up with some kooky theory in trying to explain something for which you have no proof." (Lyndon LaRouche, *WHY NOT TO TRUST AN ACCOUNTANT*, Leadership Meeting, Saturday, may 15, 2010.)

In our present case, this characteristic endurance of physical spacetime is born of a principle of inferential knowledge that is built into the very self-developing fabric of the universe as a whole, and was reflected in what Einstein understood to be a universe that

is both uniquely finite and unbounded. It is also through such processes of small changes and big results, that the universe progresses proportionately, in the manner that Leibniz had conceived of in his dynamic proportionality between power and reason, for the purpose of bringing about human happiness. Therefore, I propose the following inferential higher hypothesis for this next step in the pursuit of happiness:

If timereversal is to simultaneity of eternity as change is to the universe, then change must be to the human mind as happiness is to perfection.

What would happen if you were to discover that this Archytas type of biquadratic double mean proportional were not only true for the human mind, but also true for the universe as a whole, simultaneously? Universal physical spacetime would probably become infinitely more intelligent and man might even become more passionate about living in the universal time of simultaneity of eternity as Lyn proposed. However, because the system of the universe is finite and open ended, there cannot exist any suitable geometry of physical spacetime to express the inferential function of simultaneity of eternity.

On the other hand, there have been important poetic forms of memory functions that did fulfill that required need at the end of the Middle Ages. For instance, Dante's *Divine Comedy*, and Ramon Llull's *Ars Magna* were two of the best heuristic devices of modular forms of poetical memory functions expressing what Lyn has been developing on the subject of simultaneity of eternity with respect to music. They both generated in your mind's eye, the sort of powerful patterns of transmutations that a memory function is required to generate for the benefit of future generations. Here is how Lyn expressed this idea of memory function a few decades ago for the case of Spanish poet-philosopher, Ramon Llull, as may be applied to the concept of simultaneity of eternity:

> "The Substantial reference to be stressed, as by the celebrated medieval composer Ramon Llull's *Ars Magna*, is that the power of individual reason is located within the active functions we associate with memory.
>
> That is to say, we are conscious of perceptions by means of the agency of memory. Or, we should say, that human memory is not an analog of the "memory" of a digital computer. Human memory functions according to the principle of hypothesis: memory is the seat of individual cognitive judgment. Memory is governed by the functions ontologically associated with the usage of Analysis Situs as we have defined it here." (Lyndon LaRouche, *Russia's Relation to Universal History,* EIR, November 29, 1996, p. 22.)

What Llull had discovered was that if motion were to express change within an interval of space in the universe, then, time had to be the endurance of that changing interval, and simultaneity of eternity had to be the moment of closure of all changing relative intervals of motion in the universe. It was as if Llull had found a method of securing the sort of discrete distinctness and effectiveness that a Platonic idea required to be functional. Leibniz saw that light in Llull's system and used it as a lantern to guide his

own investigations in the very effective principle of proportionality of change between understanding and power. Thus, the memory function required for experimenting the simultaneity of eternity was transformed historically through Plato, Llull, Dante, and Leibniz as a modular memory function that became understood as the most joyful characteristic of the enduring process of change in the universe.

This memory function also implied the cosmic conception of time that Heraclites was speaking from when he advocated that the only permanent thing in the universe is change. This is also why in one of his self-portraits taken with Heraclites Rembrandt is smiling. Leibniz encapsulated the idea in this way: "And if the dominant principle in the existence of the physical world is the decree to give it the greatest possible perfection, the primary purpose in the moral world or in the city of God, which constitutes the noblest part of the universe, ought to be to extend the greatest happiness possible." (Leibniz, *Discourse on Metaphysics*, PDF copy, p. 26) Therefore, the question is: How can mankind achieve happiness?

Leibniz further emphasized in his *Metaphysical Foundation of Mathematics*: "If a plurality of states of things is assumed to exist which involve no opposition to each other, they are said to exist simultaneously." (Leibniz, *Philosophical Papers and Letters*, Kluwer Academic Publishers, The Netherlands, 1989, p. 666.) If this were the case, then it would stand to reason that since everything in the universe changes all the time, it were appropriate to assume that everything would change simultaneously without opposition, and that the form of spacetime the universe would have to take, would be considered as being of timereversal in the simultaneity of eternity for any human observer. Thus, simultaneity of eternity is the only form of simultaneity of time that transcends and subsumes Einstein's theory of relativity. The simultaneity of eternity is the kind of time in which human creativity is expressed, and within which particular and universal phenomena of change take place harmonically, such as cosmic radiation, for example. In other words, cosmic radiation is a unified field in which the universal ordering of things changes simultaneously, throughout the universe.

However, since the simultaneous change of the universe involves different relative magnitudes of physical spacetime, such as those of the Lithosphere, the Biosphere, and the Noosphere, then, the endurance of events in the universe will not be the same, but relative to those different manifolds, because all three of those different clocks change relatively to the same simultaneity of eternity of the universe as a whole. And, since time does not vanish and disappear as if into the thin air of amnesia, one moment after the other, the magnitude of the instant of time becomes an uninteresting mathematical zero to be discarded, just as is the geometrical point of spatial magnitude.

The reader should have no problem, here, in conceiving that all things in the universe, inclusive of the three phase-spaces of Vernadsky, are subject to continuous change in the mutual relativity of the simultaneity of eternity, that is, each in their own relative spacetime frame and in their combined interactions. The difficulty appears, however, when certain physical, biological, or mental processes reach a limit. Up until then, the continuous process of change is fairly smooth and does not proceed by leaps and

bounds. As Leibniz would say, the *situs* or path of relationship of coexistence between several simultaneous things are continuous and without interruption. However, when suddenly, something happens that cannot be explained, and the continuity is interrupted, the simple continued coexistence between things becomes threatened. Why? Because, somewhere along the closed spacetime curve of change, there is a process that stopped changing. A momentary limit to endurance had been reached that was imposed by change, and because the pathway of change was blocked, the process degenerated and collapsed. The simultaneity of change and hope in the universe got dislocated and the co-existence of things came to a halt. It is under this condition that one can best appreciate the phenomenon of psychophysical parallelism in the universe as a whole.

One of the chief consequences of psychophysical parallelism is that living and cognitive processes on Earth are not freak accidents. Nothing happens by accident in the universe. Life and mind are created in the universe as a whole because there does not exist an infinite number of paths in which things must change. There is only one pathway, and it is always the simplest and most reasonable. This path of least action also carries the universal hereditary traces of life and cognition everywhere in the universe as a potential for increasing the power of the universe. In other words, the germs of living and of cognitive processes are everywhere circulating as hereditary potential spores infecting cosmic radiation across the universe. Although they only appear to exist in manifest forms when the conditions permit them to develop, as in the case of our planet, they are everywhere potentially active in the universe as a whole. That is the reason why man must conquer outer space in order to seek and discover elsewhere in the universe the best conditions under which living and cognitive processes may be sustained and prosper.

However, an axiomatic singularity emerges when change in such a least action path between things is interrupted, when this flow of spores is prevented from progressing. When the path of least action remains unused for a period of time, as it occurred in the arrest of progress in economic development in the United States from the death of Roosevelt in 1944 until 2010, the universe gets upset and causes a crisis for the entire world, because man refused to take that unique path. In fact, when a path of least action is not taken, the entire universe is in opposition to the mistaken pathways and acts accordingly. It is from that standpoint that the universe acts as a unitary organism that the ancients had called ***Hylozoic Monism***. As Leibniz put it: “If this were not the case, there would be no order and no reason for distinguishing among coexisting things, since one could pass from one given thing to another by any path whatsoever. It is this minimal path from one thing to another whose magnitude is called distance.” (Leibniz, Op. Cit, p. 671.) Lyn traced out this pathway with a laser pen during his keynote adress at the Reston conference of August 31, 1996.

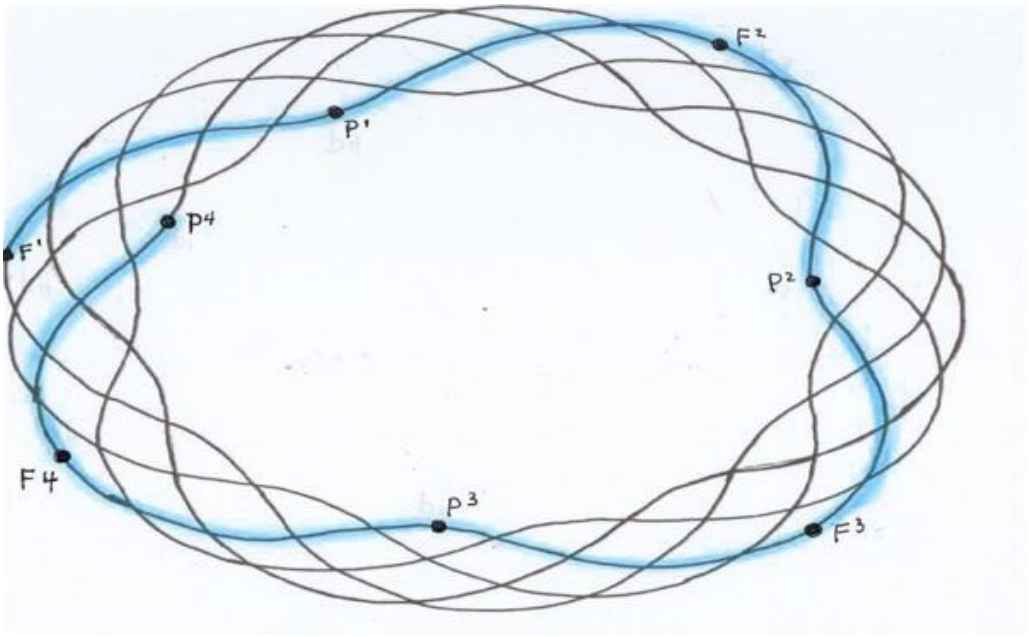

Figure 1. The finite timereversal pathway of a closed spacetime curve modified in accordance with the Einstein principle of a finite and unbounded universe. If physical spacetime in the universe is finite and unbounded, then, both space and time must have closure together, and neither can pass out of existence. The connecting points P and F of this modified elliptical function are measured by the change between Past and Future relationships of a physical spacetime process. Here, the present has no existence except to represent change in the flow between the regions of the past and future within a series of finite cycles.

However, the axiomatic epistemological condition for this model of spacetime to work is to eliminate the false notion of time represented by the instantaneous fallacy of the present, the past, or the future as points on a straight line, and permit the access to the notion of simultaneity of eternity in its stead. Each of those so-called “moments of time” are fallacies of composition which only appear to come into existence and pass out of existence as unique events never to return. They are mere illusions of sense perception, as shadows of things that never existed, except as points in the brains of mathematicians.

2- THE FALLACY OF COMPOSITION OF THE HERE AND NOW.

What is called an “instant of time” is a pure mathematical concoction. This ludicrous popular conception of the instantaneity of time must be thrown out and replaced with the truth of a universal psychophysical flow of change in the simultaneity of eternity. Then, and only then does true time become a function of psychophysical parallelism, that is, the unity of congruence between the mental and the physical

dimensionalities of a single living universe. Although the General Theory of Relativity admits of those two diametrically different forms of time within its formal system, real time in physical spacetime is represented by the flow of change. And, the best way to solve the fallacy of the "instant" is to investigate physical spacetime from the vantage point of timereversal, because the timereversal endurance of physical spacetime processes is the most appropriate notion of time with respect to the creative principle of living processes and cognitive processes in a finite and unbounded universe.

The best example of how to solve this "instant" problem is found in the *Parmenides* dialogue of Plato. And thus, since this form of timereversal applies to specific classes of higher existence in the universe, it must also apply to the universe as a whole. In other words, the time of the physical universe and the time of human consciousness is the same, and anyone who proposes a measuring clock of physical spacetime phenomena that ticks differently than the creative experience of human time, is committing a fallacy of composition. And, human creativity is the validating test here.

This Zeno-Pamamenides problem that Plato developed is not merely an academic question. The fixation on the fallacy of the "instant" has a crippling effect on the creative process as such. Both Zeno, and his teacher Parmenides, hated creativity with a passion, and their abusive use of the logical instant targetting the idea of motion was an arrow aimed at the heart of the fundamental Greek discovery of the concept of *dynamis*. Plato dealt with the case of the foolish Parminedes in his dialogue of the same name, when he demonstrated how to solve the paradox of the One and the many. The point he made was that the more people fixate on validating the "here" and "now" as the so-called seat of space and time, the more they lose their power of insight into real universal principles.

However, there is no reason to fear the damaging effects of the fallacy of composition of this positivist notion of time as instantaneous moments of the present lapsing into oblivion, because the mental damage that such a notion of time may have caused in the past, can be repaired, provided that time no longer be observed as an independent phenomenon in and of itself. What must be done is to consider the present as nothing but change between the past and the future, and once you internalize this reality with all of your powers to focuss on reality, then the so-called present of the instant will simply vanish, as if it had never existed, because it never had. The present should escape your grasp like the hat you kick when you try to pick it up from the floor!

And then, you realize that there really was never any room between the past and the future for anything to exist except change. This disappearance of the Eleatic illusion of the fixed "instant" will also make this other fallacy of composition called "absolute time," disappear. The succession of instantaneous lapsing "nows" on an infinite straight line is as much a fallacy of composition as an infinity of points is a fallacious representation for the composition of a straight line. In fact, it is the same fallacy.

Similarly, the past cannot any longer be considered the total sum of the presents that have elapsed and can no longer be changed. ***Time is the dynamic fusion process whereby the past is the fuel that one must use to light a fire under the butt of the***

present, in order to propel mankind into the future. The point is that in the physical memory of the galaxies, as in the human memory of our species, true time is represented by the enduring flow of change, and that flow is always determined from the same future, in such a manner that the past eliminates the difference between the present and the future. This dynamics of time is the central feature of timereversal causality, which does not imply the idea of physical timereversal travel in outer space, but implies a conceptual return to a past as a fuel for change, just like the remains of living processes in the Biosphere are the memory fuel of tomorrow. Similarly, cosmic radiation comes from the past to propel the present into the future. Thus, time changes all the time and in all of its aspects. Time never dies, because its residues keep returning to their proper universal residence of the future in the simultaneity of eternity.

The difference, here, from the usual way of thinking about time, is that, although it may not entirely be present to the consciousness of man, it is always presently changing, that is, it is the enduring resource for changing the present by means of universal physical principles, otherwise nothing could exist at all. In other words, physical spacetime is an enduring continuum following the geodesics of a universal finite and unbounded process, in which the past is not what no longer exists, but what is coming back and rejuvenating the present course of events, with the future in mind. Such is the significance of timereversal in the simultaneity of eternity. This open-ended process of the dynamics of time is the central anomaly of the paradox of timereversal causality in which the cause does not precede the effect, but comes after the effect. Timereversal means that the future purpose of mankind in the universe is the motor of change to be effected in the present. And, as the reader may soon discover, the future always comes alive through the actions of the past. However, if this motor of change is to be effective, today's state of uncertainty in nulcear physics and astrophysics must be resolved, and the so-called "*Uncertainty Principle*" of Werner Heisenberg must also be classified as a fallacy of composition.

This "*Uncertainty Principle*" is not simply a revengeful ploy that Heisenberg devised, as a student, against Professor Wien of the University of Munich, who had given him an F on his exam in experimental physics during his Doctoral thesis. The "*Uncertainty Principle*" demonstrated Heisenberg's own limitations as an empricist and a positivist mathematician, by showing that he was unable to identify the true nature of the "here" and "now" as a state of change inside of the atom. The fallacy was similar to the old Eleatic sophistry of Zeno, whereby the act of measuring one aspect of a so-called "elementary particle," such as the mass of the electron, forced the other magnitudes, such as its velocity and its position, to become blurred. Why? Because it was the very idea of change that blurred his vision, not the nature of the electron. The blurr came from Heisenberg's own method of observation. The indeterminacy between the particle and the wave is caused essentially by the intrusion of the observer's sense perception, his measuring instruments, and the uncertainty of his positivist notion of a so-called "scientific observation." This is a typical shadow of the dual nature of irony that Lyn had identified with the concept of wavicle. Heisenberg was unable to conceive of the wavicle as an irony. Of course, if you are a hard-core believer in the instantaneity of the present, and you exclude change from your experimentation, you are a prime candidate for the

sort of trap that Zeno had set out for the ancient Greeks. Heinsenberg's mind was "blurred" as Schrödinger put it, because, "there is a difference, here, between a shakey or out-of-focus photograph and a snapshot of clouds and fog banks." (Erwin Schrödinger, *The Present Situation in Quatum Mechanics*, 1935.) And, Einstein replied by adding: "***I am convinced God does not play dice***!"[

It was the consideration of the instantaneous moment of observation as a "here" and "now" that was blurring the idea of change in Heisenberg's mind. As a result, the so-called "actual" or "instantaneous" state of an electron became unknowable, and his state of mind, became totally "unpredictable." The naïve conversation that Heisenberg reported he had with Einstein is exemplary of his fallacy of composition:

> "Heisenberg: "One cannot observe the electron orbits inside the atom. [...] but since it is reasonable to consider only those quantities in a theory that can be measured, it seemed natural to me to introduce them only as entities, as representatives of electron orbits, so to speak."
>
> Einstein: "But you don't seriously believe that only observable quantities should be considered in a physical theory?"
>
> "I thought this was the very idea that your Relativity Theory is based on?" Heisenberg asked in surprise.
>
> "Perhaps I used this kind of reasoning," replied Einstein, "but it is nonsense nevertheless. [...] In reality the opposite is true: only the theory decides what can be observed." (Translated from *"Der Teil und das Ganze"* by W. Heisenberg. In English, *Physics and Beyond: Encounters and Conversations*. A. J. Pomerans, trans. New York: Harper & Row, 1971.)

In this short exchange, one can easily see the difference between Heisenberg and Einstein. Einstein is challenging the human mind by postulating the priority of the theory established on universal physical principles, Heisenberg postulates the idea that he can only know what he is able to observe through sense perception. Einstein is presuming the existence of an intelligeable higher reality that exists independently of the observer's sense perception, Heisenberg is presuming that reality is ultimately unknowable, because the world appears differently to different observers. In other words, Einstein's conception of the world is based on reason while the Heisenberg conception of the universe is based on perception and public opinion.

As a result of the Heisenberg sophistry, since the first half of the twentieth century, the great majority of scientists have fallen into the trap of complete fallacies of composition known as the uncertainties of Quatum Mechanics. After the Einstein-Bohrs debates over Plank's "nature" of the photon, the general behavior of electrons was declared unpredictable, and universal principles of physics, which Einstein and Plank had advocated, were thrown out the window and replaced by statistical laws, based on a set of probabilities just like the mortality charts of insurance companies. Thus, Quantum

Mechanics became the insurance company of the new physics and Heisenberg became its undertaker.

By 1925-27, Probability had been crowned the queen of the new Heisenberg "matric equasions," and her daughter, the law of averaging, became the new Pythia whose mathematical utterings were the new statistical predictions of the new Oracle of Delphi, completely oblivious to causality in the universe. A scientist no longer needed to study the properties of physical phenomena and their causes. There was no more causality, because there was no more knowable reality. The function of reason had been excluded from science altogether. All that remained of science was the ficticious derivations of mathematical models and their statistical calculation.

The important question, however, is not the question of uncertainty, as such. The underlying assumption of the Heisenberg uncertainty principle lies in the fallacy of his conception of our sense perception of space and time. The fallacy comes from the fact that since sense perception is unable to distinguish one electron from another, in space or in time, the last resort was to consider them as groups, packets, or quanta, and their probable appearance had to be defined by statistical probability. The point is that the most detrimental fallacy of composition relative to the creative time of the human mind is to consider that "once" an event has occurred, it is considered past and impossible to change. This is the reason why time has been falsely considered as the one-dimensional direction of a straight line on which an event is either located before or after another event, and this can never be changed. That is only true for sense perception. It is not true for the mind. Therefore, the issue does not reside in the uncertainty of sense perception between wave and particle; the issue lies in the ontological paradox of Plato, between the one and the many, that is, within timereversal in the simultanbeity of eternity.

3. THE MODULAR MEMORY FUNCTION OF RAMON LLULL.

How can we answer Lyn's question: Why is timereversal the most important problem that mathematical physics has to solve, today? I can think of at least two fundamentally interrelated reasons why this is the case. The first reason is that this is the common revolving door for both science and Classical artistic composition. However, you have to enter as a poet in order to exit as a scientist. The second reason is that timereversal is the only true form of creative time in the universe.

The other obstacle to avoid, aside from the "instant" relative to spacetime, is the fallacy of reducing time to a form of space. Time is not the fourth dimension of tri-dimensional space. This linear conception of space does not allow for understanding processes of causality in physical spacetime, and reduces time to a mere category of space. As a result, this conception relates to sequences of events observed in the past which are expected to be repeated into some future time. Therefore, you don't want to append time to space like a temporal hat on the rack of spatiality. Time is the harmonic

ordering of change. Time is the dynamic of physical change, and not some mechanical, mathematical, or geometrical add-on to space; therefore, time must be pliable in motions, in inversions, in ideas, as well as in incubation periods, as Lyn keeps referring to the transmutations of a musical composition such as the "Ricercare" of Bach's *A Musical Offering*, or in the Mozart K.475 *Fantasy* memorial of it. Mozart finished his composition after Bach finished his according to a time-line, but that is not the true time of their relationship. True time is reflected in the fact that Mozart's creation was generated by timereversal in the simultaneity of eternity with the creation of Bach.

Moreover, time must not be conceived as accompanying space like your watch accompanies you in your morning walk; time must be integrated into space and it must, therefore, have the same pliability as space. So, the time of a dynamic process must be conceived as inseparable from the creation of space as in the composition of physical spacetime, which must be an open-ended cyclical process of change, as opposed to some fixed portion of surface attached to a volume of space. You want to think of time as that modality of space that expresses the dynamic flow of physical and mental endurance in the universe, like a discovery of principle in a remote past causing an axiomatic/harmonic change in a remote future. That is the notion of a true universal form of time, like a singularity occurring within the elliptical pathway of a star within a galaxy.

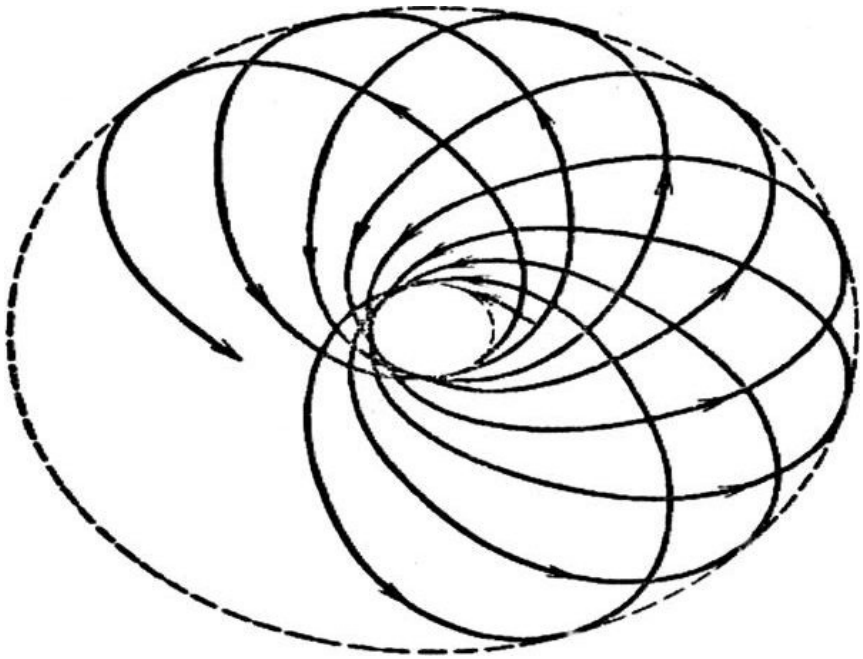

Figure 2. The elliptical pathway of a star within an ellipsoidal galaxy.

Think of each intersection of the elliptical curve (Figure 2) crossing its former path as the characteristic nodes of physical spacetime which can be conceived as refueling stations. This means that the future intersects the past at different moments in time, and the past acts on the future to change it, essentially, in two forms: one is by the willful intent of the human mind, and the other is by the natural cyclical intention of the mind of the universe. At the level of universal principles, those two types of timereversal

coincide with the same least action pathway. In both cases, real physical spacetime must always come back, as true metamorphoses, as intended in God's plan. Just as in memory, the cyclical events of physical spacetime never come back the same. This means that the past can no longer be considered as the total sum of "presents" that passed away never to reappear again. The past lives on in the memory of humanity and endures in the same way that the layers of physical spacetime forming the biospherical crust of the Earth continue to exist as the memory of the processes that had once lived there.

The question of time, therefore, comes down to a question of how to conceive of the integration of memory and creative progress by connecting memory with the imagination, with regards to personal past and future, in relationship with the past and the future of the universe as a whole. Those connections with the universe are essential; otherwise, you are wasting your time. From that vantage point, past time, for example, is not the process of reflecting memory into what has been, as in the "good old days," but, in reflecting memory into what has to become of the past, tomorrow.

Treat your memory like the old canoe of American painter, Worthington Whittredge, in *The Old Hunting Grounds*; that is, in such a manner that you relate two essential motions of time into one, the foreward leaning process toward the future and the inversion process of leaning back towards the past from that future, but, as if fused inside of each other (Figure 3). Study the features of time that are dramatized there, between the foreground and the background, and let it incubate for a while. It looks like the past, but it keeps bringing you back dramatically to the future in a lawful way, as if in a Shakespeare drama. Why? Because it is an irony. [See my report, *Worthington Whittredge and the Cooperesque Art of Civilizing Nature*, https://larouchenet.net/ Art section, February 4, 2008.]

Take yourself back to the period of nineteenth century America and identify Whittredge's The *Old Hunting Grounds* as a Shakespearian drama viewed through the pen of James Fenimore Cooper, and ask yourself: "How can an American artist depict truth and beauty in the American wilderness?" The curtain just opened and the scene of a historical memory function unfolds on the stage of your imagination. Something very tragic has happened and the relationship between the foreground and the background of *The Old Hunting Grounds* tells the story of an event that you have to reconstruct and relive in your own mind.

Figure 3. Worthington Whittredge, *The Old Hunting Grounds*, c. 1864.

The old canoe does not represent what you see with your sense perception. Like the case of the electron, it shows you what is not there. This canoe is a historical memory that shows you what was once was there, but which is now shot with holes. Why? Was it because of war, or simply because of aging? It is as if this canoe had been sitting there, for a number of years, abandoned and slowly rotting away in the water hole, reminding you that it had good days when it was maneuvering down the rapids and was being carried from portage to portage by Chingachgook. This was a sort of reciprocal arrangement between the canoe and the last of the Mohicans: "You carry me, I carry you." It was going somewhere, then, but the fact that it has been abandoned, and is no longer going anywhere, does not mean its carrying mission is over. The canoe is continuing its immortal carrying mission into the simultaneity of eternity by bringing your attention foreward to the future, by means of the sun reflecting on the birch trees of the background that Whittredge located precisely in line with those canoe holes, reflecting them, again, in the dark pool of water of the foreground. This strange double reflection is the memory function of the American soul reflecting the future into the past and into the future, as if nature had intended to create an irony. What secret does that dark water hole hide in its bosom?

Then and there, suddenly, you recognize that the mission of Manifest Destiny, the mission of building the American nation from coast to coast, had caused an inflection of timereversal to take place in the quiet of an old water hole, by recalling the debt to be paid in rehabilitating the condition of the native people of this country; by re-membering that the essence of the Indian tradition must not rot away like a dead memory; by changing nature itself in allowing it to carry what only man is allowed to carry. That is the hidden ironic drama of lights and shadows that Whittredge intended for the spectator to discover in *The Old Hunting Grounds*: the unfinished business of John Quincy Adam's Manifest Destiny. But, let me give you another example of time incubation, closer to home.

This report is something that has been incubating for over fourteen years, ever since Lyn had written his most important intervention on the topic of timereversal, in 1996. Lyn's intervention was intended to have the effect of a time bomb in our minds, the time of its explosion having been set to go off at different moments for different people, whenever the necessity of discovery would call upon us to act willfully and decisively on this idea. During his opening statement, Lyn addressed, among other things, the notion of timereversal with reference to Gauss' notion of biquadratic residues:

> "The centerpiece of my August 31, 1996 keynote address to the Reston Labor Day Weekend Conference, was the identification of the determining role of "time-reversal" in constructing any competent mathematical representation of an economic process. The same principle of efficient timereversal, as met in Classical motivic-thorough-composition, was also demonstrated, following that keynote, in a performance of Wolfgang Mozart 's motet *Ave Verum Corpus* (K. 616). During the discussion period of that conference, I also emphasized the relevant, crucial role of Carl F. Gauss' treatment of the subject of "biquadratic residues," in constructing an adequate representation of any mathematical

function which purports to address the implications of "time-reversal." (Lyndon LaRouche, *The Essential Role of 'Time-reversal' in Mathematical Economics*, Fidelio Magazine, Winter 1996, p. 5)

Lyn illustrated this by replicating the process of a memory function with a laser pen that he directed on a large screen behind him. This crucial feature of his presentation struck me as a bolt of lightning on a cloudless day, making me realize how this intervention was probably the most important step that Lyn had ever taken with respect to mathematical physics. The gist of his intervention was to solve the paradox whereby the cause of change would be coming after the effect, from the future! But, how can you have a cause that comes after the effect? Isn't this completely crazy? Something weird and impossible was ticking away in my mind. This meant that I had to imagine the function of time in a completely different way that I had done before, and from that moment on, if I were to resolve that anomaly, I had to conceive of time as change in the simultaneity of eternity of a higher hypothesis. This also meant that such a timereversal had to be integrated, simultaneously, into the three Vernadsky domains of the Lithosphere, Biosphere, and Noosphere in congruence with Einstein's relativity. That was quite a challenge. How can you find congruence between these three different things?

This situation made me realize that, if, at the beginning of the century, Einstein had set a limit to time with respect to the speed of light, at the close of the same century, LaRouche had captured the creative function of timereversal in the simultaneity of eternity, and the two discoveries had to be complementary. Those were the two great revolutions of the twentieth century. It took me no less than fourteen years to discover that those two forms of time, relativistic spacetime and timereversal in the simultaneity of eternity, were necessarily complementary. How? ***The result of this incubation, therefore, gave rise to what I can now identify, in the spirit of Plato, the higher hypothesis of physical spacetime functioning like a biquadratic residue inside of a memory modular wave function.*** Psychophysical parallelism was the place to look for the answer. However, before submitting this higher hypothesis to the reader, there is a need to establish the historical specificity of what Lyn is saying about timereversal with respect to Riemann.

Provided that we approach Analysis Situs from the vantage point of Leibniz and complete it with the input of Riemann, it is required that we define this new form of physical geometry as a higher hypothesis of composition, in the same spirit that Plato developed in his *Republic*, *Timaeus,* and *Parmenides* dialogues. In other words, the predominant notion to emphasize in this *Analysis Situs* is change, and the predominant factor that must be changed, is the notion of "instantaneous time."

The basic features of the universe are not three independent dimensions of space plus one of time. The universe is not composed of the self-consuming infinite projection of the four directions of up and down, foreward to backward, left to right, and past to future, as if time were another infinitely extended dimension of space. This is pure Euclidean and Cartesian linear nonsense. The flow of time impregnates all dimensions of the universe in such a way that everything changes as Riemann established in his doctoral

dissertation, from an n manifold into an n + 1 manifold of psychophysical simultaneity of eternity. In other words, mankind is not simply watching time go by, from the sidelines of the Earth, as an objective lapse of time. In the real universe of physical spacetime, time is the motor of change, man is the referee, and there is no time-out.

Thus, the time in change starts with a change in time, which implies a titanic inversion, a unique sort of reciprocity function in the axiomatic understanding of change and time in a universe that is conceived as composed of a triply connected physical spacetime manifold of abiotic, biotic, and cognitive change in a finite, yet, unbounded universe. This change implies a complete overhaul of change in our notion of time, away from the "intuitive" personal notion of duration of Henri Bergson, as well as away from the fallacious linear concept of "instantaneous time" in science today. In other words, there exists no link between space and time except the crucial relationship known as the speed of light and the simultaneity of eternity. Such are the two apparent limits and boundary conditions of our psychophysical parallelism of relative physical spacetime and psychological timereversal: they are the combined dynamics that govern all motion and change in the universe as a whole.

As Lyn has shown, the illustration of this is best represented by Classical artistic composition of music, and the process of making transitions by changing to new hypotheses of a relatively higher cardinality, whose modality dominates the entire composition from beginning to end, and is reflected in every detail of the performance by the conscious performers. As Lyn put it: "The result is a shading of interpretation in the shaping of each interval of the composition, both within the individual voice, and across the polyphonic voices. The effect is of a slight deviation of the 'physical spacetime curvature' in the performance: conductor' Furtwangler's doctrine of 'performing between the notes.' " (Lyndon LaRouche, *The Essential Role of 'Time-Reversal' In Mathematical Economics*, Fidelio, Winter, 1996, p. 28.) And thus, I must insist on this point, again, that real time in the universe excludes the present and its torpid positivist and existentialist inertia. The present has no existence whatsoever, except as sacrificing its own self onto the altar of axiomatic change.

One excellent view of a memory function of universal principles comes from Ramon Llull who divided the universe into nine universal principles that had the power to penetrate everything that exists, inside of which these universal principles acted as guiding pathways of transformation toward greater perfectibility of the universe and greater happiness of humanity. These principles acted like the dimensionalities of sufficient reason, as was later developed by Leibniz. It was also from Llull that Leibniz developed his idea of *combinatoria* in congruence with his art of invention.

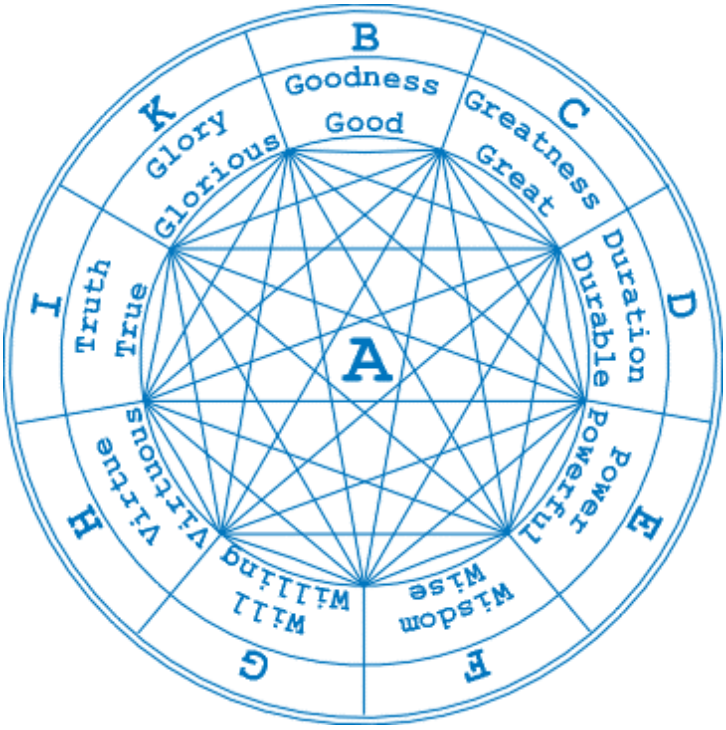

Figure 4. Figure A, the zairja of *Ars Magna* (The Great Art, 1276) by the Franciscan, Ramon Llull (1235-1315), the first great chemist in history, representing the attributes of God as nine principles of a memory function corresponding to the rotation of a higher hypothesis like a great musical composition. This is an early form of Analysis Situs of transmutation, a composition of variability that was intended to work like a Riemannian manifold in determining all of the modulations of change in the universe. Think of those three circles of harmonic principles as the gears of a manifold of variable combinations that interact by moving at different symphonic tempi, in the simultaneity of eternity.

Although it was dressed in a formal jacket, the Llull hypothesis was entirely consistent with Plato's notion of the higher hypothesis. His system worked as a formal system based on axioms, postulates, and definitions of absolute principles, but his intention was based on the dynamics of combinations and permutations, with the idea that the human mind was able to willfully change and generate new ideas. The beauty of Llull's *Analysis Situs* idea is that it reflected a passionate desire to understand human reason from the standpoint of what he identified as the highest nine qualities of God, as underlying the ordering of the universe, and most emphatically, of course, the human mind. **Goodness, Greatness, Duration, Power, Wisdom, Will, Virtue, Truth, and Glory** were each identified by a letter reflecting musical intervals **B, C, D, E, F, G, H, I, K**. Llull showed how the human intellect developed by climbing the ladder from the particular to the universal, thus, expressing the idea of anti-entropy, or perfectibility, for instance, from the vegetative, to the animalistic, to the human, to the angelical, and to the divine. Lyn explained the crucial point to be made about Llull and timereversal in the simultaneity of eternity:

> "Only in Ramon Llull's *Ars Magna* of memory, can the mind hear the development of the conclusion of the piece during the same moment the mind focused upon a portion of the composition leading in the direction of that conclusion. Only in the mind, can one hear each and all of the relevant inversions of actual intervals within voices, and also cross-voices, in the locality of the polyphony of what is being immediately recalled. Indeed, polyphony exists primarily (functionally) within the mind's process of memory." (Lyndon LaRouche, *On the Subject of Evolution: The Descent to Bush From Man*, EIR, November 15, 1996, p. 27.)

This is how you can understand that the slightest modification in the Llull manifold also changes the manifold as a whole. As the whole changes in concordance with its nine principles, so also the part changes; but as the part becomes changed, so does the whole. This process also pertains to the Catenary-Tractrix principle of Leonardo da Vinci as he applied it to light and shadow in artistic composition (See my report on *Leonardo Da Vinci's Virgin of the Rocks: A Field-Perspective experiment in Leibnizian Dynamics,* LaRoucheNET, September 1, 2018). It is in that sense that timereversal in the simultaneity of eternity acts from the future to the past, as well as from the past to the future, simultaneously.

However unusual and perplexing this idea of a moving memory function may appear, timereversal is not a u-turn that time makes in space. Remember, time is not a vehicle that travels through space. Time is change in the motion of space, and the form of reversibility it takes is intimately related with the higher domain of simultaneity of eternity in Classical artistic composition. Like love, or the Good, time is efficient in all places it is acting on, simultaneously, wherever it may turn out to be. This is the reason, for instance, that the changing time frame of memory in Llull's work was reflected into hope as the natural form of aspiration of the past in changing the future. Here, Lyn had also adopted a similar zairja composition of nine cells, which are, the three classes of Non-living, Living, and Cognitive taken in combinations with the three categories of Astrophysics, Microphysics, and Macrophysics. He wrote:

> "This yields a table of nine cells. Since the existence of this evidence is conditional upon the existence of human cognition, it is the driving of the cognitive process to the ever-expanded limits of inquiry into astrophysics, microphysics, living processes, and cognition itself, which underlies the nine-cell domain of science as a whole."
>
> All of the permutations of relations among the nine cells are defined in terms of strict boundaries, strict discontinuities. Consider the most exemplary such case, the transition of what is ostensibly the same living process into a non-living state, and the distinction between living processes which are typified by cognitive functions, and those which are not. What are the transitions which separates these states? Define them functionally. The difference in organization of the three states is expressed as a difference within hypothesizing the higher

hypothesis, a difference, however apparently subtle, in the effective curvature of the process.

On this account, the peculiarity of living processes, and also cognitive ones, is of the form of time-reversal: The apparent pre-determination of the next phase-state in a way which either distinguishes a living from a non-living process, or a cognitive from a non-cognitive activity within a living process. For this, the conceits of A. M. Turing and his followers will not do. Once we have identified the necessity of time-reversal for one class of processes, within the array, we have identified the necessity for the generality of the functional time-reversal.

The introduction of the notion of time-reversal obliges us to face up to the implied questions: What is the efficient future to be considered? What is the efficient scope of the relevant past?" (Lyndon LaRouche, *The Essential Role of 'Time-reversal' in Mathematical Economics*, Fidelio Magazine, Winter 1996, p. 29.)

Hope, therefore, is the guiding partner walking ahead of memory, as it must have a subject in whom it can last, and that subject is change. Anyone serious about reality will agree with Heraclites when he said: " nothing is constant but change." This is why hope, as the moral companion of memory, must hitch its wagon on change, otherwise it will not be able to sustain its confidence in the future, and will not travel very far. Memory can remember with its own power, but hope, which has its seat in memory, does not have its own power to hope. It depends essentially on the feasibility of the future that the mind contemplates with the willfulness to change the universe as a whole. However, if, as Llull implied, memory is tamed and made virtuous by hope, hope will be able to sustain itself from the nourishments of memory and both of them, together, will be able to rear and sustain their child, the future. As Llull put it:

"103. Between remembering and hoping there is a difference like the one between understanding and believing, this is because hoping is above and remembering is below, since remembering is a natural act, but hoping is a moral act.

104. Hoping and remembering are in mutual agreement; now remembering prepares for hoping (on the condition that hoping proceeds with goodness, greatness etc.) and hoping gradually raises the level of remembering so that hoping can in turn ascend with the ascent of remembering, like a coat ascends a mountain as the one wearing it ascends." (Ramon Llull, *Arts Magna* (The Great Art), Chapter 11, Hope Combined with the Principles. Otherwise known as *Ars generalis ultima* (The Ultimate General Art), published in 1305.)

4. THE MODULAR WAVE FUNCTION OF BIQUADRATIC RESIDUES.

Here, it is important to take a step back and foreward at the same time, by stressing that a bootstrap sort of principle is at work between the different temporal motions required for the process of timereversal. The elliptic function of a galactic orbiting star seemed a natural way of illustrating such a dynamic (Figure 2), provided our memory function has a built-in sort of self-fueling mechanism, such as hope, which makes the propulsion of the system move ahead continuously and harmonically, as in an inexhaustible process of change. This is how hope comes to be the fuel capsule of biquadratic residues.

Gauss was seeking to discover such harmonic functions in numbers by looking at the form of congruence and noncongruence between them in a process of Analysis situs. He viewed this congruence in the footsteps of Leibniz: " About the ***geometrica situs***, that Leibniz had foreseen, and where only a few geometers have given it a mere glance, we now virtually know nothing after a hundred and fifty years. There is a problem located at the limit of ***geometrica situs*** and ***geometrica magnitudinis***, which involves the determination of the number of intertwining [entrelacements] of two closed or infinite curves." (*Zur Geometria Situs et Zur Geometrie der Lage fur zwei Raumdimensionem*, 33b, p. 268.) This is the original source of inspiration I have used to develop the underlying *Analysis Situs* of the modular wave function of biquadratic residues, as will be demonstrated below. The Gauss theorem may be stated as follows: If there is an integer x such that $x_4 \equiv q \pmod p$ then q is a biquadratic residue (mod p), if not, q is said to be a biquadratic nonresidue (mod p). Next, follow the traces of elementary particles in the manner that Gauss recommended for numbers; that is, not as things in themselves, but as intervals of action. As he put it, on the subject of the transformation of surfaces, such a process is designed to work when "***what is counted is not substances (objects thinkable in themselves) but relations between any two objects***." (William Edwald, *From Kant to Hilbert: a Source Book in the Foundation of Mathematics*, Vol. 1, Oxford University Press, 1996, p. 312.) This is how you solve the Heisenberg uncertainties.

This said, you must leave behind your source book of mathematics, because the idea that I am developing, here, is not a mathematical concept, and it will not be found in those books. The aim, here, is to establish a cognitive congruence between number intervals, principles of discovery, and human historical situations, in a manner such that a concordance, or agreement, among A, B, and C is based on the fact that A is able to solve the difference between B and C. This congruence also reflects the creative process of problem solving in political, social, and international affairs, as for instance, Mazarin demonstrated during the course of his negotiations for achieving the Peace of Westphalia, in 1648. Mazarin proposed to solve the crisis between France and Spain in their relationships with the Netherlands, by having the Ambassador of the Netherlands discover ways of eliminating the differences between France and Spain. That was the type of diplomatic congruence that led to the Peace of Westphalia.

Therefore, consider that biquadratic residues act like historical singularities of principle that propel humanity in a perpetual motion of foreward progress, as does each new discovery of principle inside of the individual human mind. To discover how this works, let the Analysis Situs do the counting for you, while you let your finger do the rotating. I remind the reader that Leibniz considered such *Analysis Situs* games as a most important means of developing creativity or what he termed "the art of invention":

> ***'Following the games that depend only on numbers, we have the games which further involve the situation, such as backgammon, checkers, and above all chess. The game called Solitaire also pleased me enough. However, I am considering it in a reverse manner, that is to say, instead of undoing a composition of pieces, according to the rule of this game, which calls for jumping into an empty place, and taking away the piece on which we jump, I thought it would be more beautiful if we reestablished what had been undone, by filling in a hole on which we jump; and by that means, we could propose to form such and such a given figure, if it were doable, as it surely could be done, since it was possible for it to be undone. But, some will say: 'what is the purpose!' I would respond, to perfect the art of invention; because we should have methods for solving everything that reason can put before us.'*** " (Gottfried Leibniz, ***Letter VIII to M. de Montfort*****,** in Leibniz, ***Opera Philosophica***, quoted by Louis Poinsot in ***Reflexions sur les principes fondamentaux de la théorie des nombres*****,** Paris, Bachelier, Imprimeur-libraire, 1845, p. 45-46.)

With this Leibniz method of *Analysis Situs* in mind, construct the following theorem of biquadratic residues as a torus manifold:

> ***If you have P poloidal wave intervals arranged as a torus, and you join them into a continuous motion from h to h, h being a biquadratic residue of P, you will necessarily pass through all of the P intervals before returning to your starting point, and you will have covered the toroidal circumference of the torus*** $\frac{P-1}{2}$ ***times.***

The purpose of this game is to stimulate the reader's powers of creativity, and the problem to be solved is the Ontological Paradox raised by the irony that Lyn identified with the idea of the "wavicle": ***Given that 4 is a biquadratic residue of module 17, find, by wave rotation alone, all of the biquadratic residues, quadratic residues, and primitive roots of 17. Fill in all of the empty spaces with the appropriate numbered intervals of action by following the ordering sequences of their discovery, and relate them to the corresponding discoveries of universal physical principles, as identified below.***

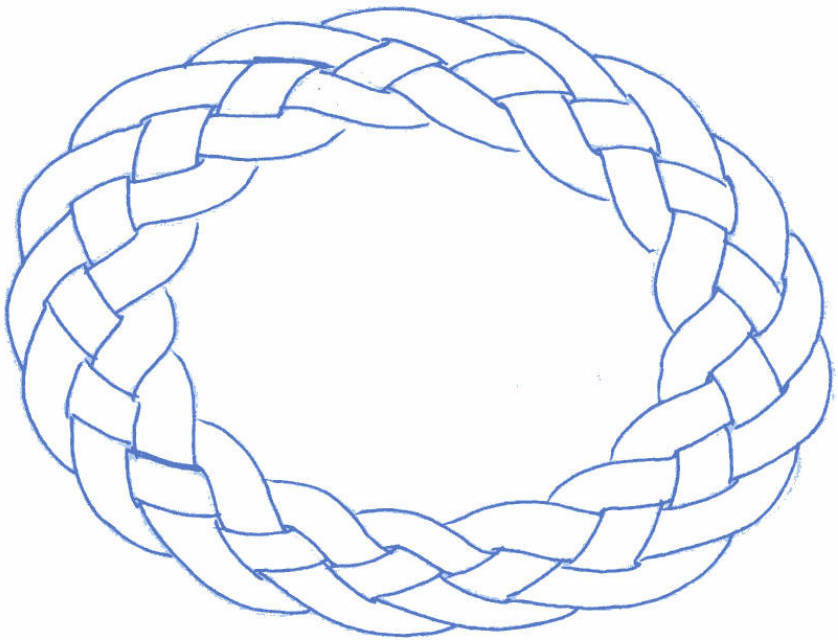

Figure 5. This is an Analysis Situs game composed in the spirit of Leibniz's Letter VIII to M. de Montfort for the purpose of playing the game of a Gaussian biquadratic residue. The poloidal wave of 4 intervals of action is a biquadratic residue of the toroidal module of 17 waves.

This modular wave function represents a series of 17 poloidal waves of 4 intervals of action each. Start, and proceed clockwise or counterclockwise, with the first poloidal wave rotation anywhere in the module, but, preferably, on the outside or inside rim of the torus. Since each discovery of principle always depends on the existence of a previous principle of discovery, each residue that you discover must have a necessary predecessor, and must be followed by a necessary successor wave number, each representing a distinct singularity through which the entire module progresses foreward. [For further details, see my report, *Fusion Power is not Democratic*, on LaRoucheNET, February 16, 2010, or send an email to pierrebeaudry@larouchepub.com]

This specific biquadratic manifold is internally divided into four different intertwined cyclical manifolds that are not visible, but that can be discovered by rotating the required number of poloidal and toroidal wave cycles. All 4 manifolds are developed through the permutations of 4 different sets of discoveries of principle each, and each set of 4 discoveries is composed of 4 residues. What does that say? The point to be made is that this single closed curve represents, metaphorically, the finite spacetime curve of a higher hypothesis of theorem lattices composed of discoveries of principle which have all emerged at a relatively different specific historical moment of time during the progress of mankind's last five thousand years of development, in congruence with the harmonic musical ordering pertaining to the tuning of the human voice at C-256. Therefore, the different sub-manifolds of quadratic residues and of primitive roots reflect the pathways of progress of valid ideas that are necessary for the progress of humanity. The reason why numbers behave in the same fashion as ideas do in a memory function is because it

stands to reason that there is only one path of least action in the universe as a whole, and that path must be the simplest and most effective. Thus the required use of *Analysis Situs*.

The next question is: "Why is this path found by biquadratic residues and not by primitive roots?" This leads to another question: "Why is it that the doors of three sub-manifolds cannot be unlocked without first using the key of the biquadratic residue?" This further provokes the question: "Why does the Peace of Westphalia work, while no other form of peace worked?" There are two reasons. One is that biquadratic residues embody the necessary timereversal characteristic of reciprocity, which is essential for the progress of all true creative ideas. The other is that biquadratic residues that Gauss discovered are small angular openings that reflect the presence of a higher hypothesis, as if it were peeking through the curtains from behind the scene: *Augusta per angusta*, that is to say, to great discoveries through small angles. In this manner, biquadratic residues represent the singularities that help bridge the gap between the theorem-lattices of hypotheses and the Platonic domain of the fourth unhypothesized hypothesis. For instance, it is the latter that can serve as a higher hypothesis for the three lower phase-spaces typified by the Noosphere, Biosphere, and Lithosphere.

The following is a list that identifies seventeen of some of the most important discoveries of universal physical principles and their authors, in the chronological order in which they have appeared during the span of the last five thousands years of European history. However, the true way they should be ordered in an immaterial modular memory function is the order in which such dynamic discoveries were made and relived by a sovereign individual human mind:

1- IMHOTEP: The Astronomy Principle of the Great Pyramid of Egypt.
2- THALES: The Thales Theorem and the Principle of Proportionality.
3- PYTHAGORAS: Pythagorean Theorem.
4- ARCHYTAS: The Doubling of the Cube.
5- PLATO: The Ontological Paradox of the One and the many.
6- HIPPARCHUS: Discovery of the Astrolabe.
7- CUSA: Learned Ignorance and the Isoperimetric Principle
8- LEONARDO: The Principle of Irony in Classical Artistic Composition.
9- KEPLER: The Principle of Harmonic Ordering in Gravitation.
10- BACH: The Principle of Lydian Well-Tempering.
11- MAZARIN: The Principle of the Peace of Westphalia.
12- LEIBNIZ-BERNOULLI: The Catenary Principle of Least Action.
13- GAUSS: The Principle of Quadratic and Biquadratic Reciprocity.
14- RIEMANN: The Principle of the Multiply Connected Manifold.
15- VERNADSKY: The Noosphere, Biosphere, and Lithosphere.
16- EINSTEIN: Relativity of Finite and Unbounded Physical Spacetime.
17- LAROUCHE: The Principle of Anti-Entropic Energy Flux-Densities.

Each one of these 17 discoveries of principle represents the singularity of a shockwave-like historical event expressing an axiom busting Platonic idea that has defined the historical path of mankind's economic progress to this day. Although each in

its own right has proven to be a beneficial contribution to the progress of a particular national culture of Western Civilization during the last five thousand years, it is the reciprocal interactions and permutations of all of those principles, taken as a whole, that have proven to be necessary for the whole of mankind, and must continue to be so in the future. They are not the only principles in existence, and more could be added. However, I chose those seventeen principles in order to best illustrate how the heuristic device of the Gaussian seventeen-gon works as a memory function from the vantage point of generating 4 times 4 sets of 4 residues, that is, $4^3 = 64$. It is interesting to note that such residual effects also correspond to the genetic code of 64 codons for the encoding of amino acids in DNA, both of which pertain to C-256.

Moreover, such a series of discovery of principles should become accessible to all of the peoples of the world, because this series has demonstrated its ability to increase the anti-entropic power of the human mind for the continued progress of mankind. No other set of discoveries has actually demonstrated such a cognitive force of applied validation at any moment in human history. Since these scientific and artistic discoveries of principle have successfully demonstrated their planetary effectiveness, especially during the last thousand years of human history to date, they have earned the right to represent the most important means for the development of the whole of mankind for the indefinite future. That is the reason why these 17 principles must replace the failed and dying British positivist system of fallacies of composition, presently dominating the world, and primarily in the two domains of economics and physics.

Considered in their dynamic sequence, as opposed to the chronological sequence presented above, these discoveries of principle represent the key to the increase in relative population-density of mankind for the future expansion of humanity into the solar system and beyond. The most important principle to be used in coordinating all of the others adequately is the Ontological Paradox of Plato. Lyn has stressed the relevant point to be made on this principle:

> "Reference the stated general case of a series of theorem-lattices, considered in a sequence corresponding to increases in potential relative population-density of a culture. We are presented, thus, with a lattice of theorem-lattices, each separated from the other by one or more absolute, logical-axiomatic discontinuities (e.g., mathematical singularities). Question: What is the ordering relationship among the members of such a lattice of theorem-lattices? Consider this as potentially an ontological paradox of the form treated by Plato's *Parmenides*.
>
> Some discoveries may occur, in reality, either prior to or after certain other discoveries; however, they must always occur after some discoveries, or prior to some others. This is true for discoveries in the Classical art-forms and related matters, as for natural science. In other words, each valid axiomatic-revolutionary discovery in human knowledge, is identifiable as a term of the lattice of theorem-lattices, exists only by means of a necessary predecessor, and is itself a necessary predecessor of some other terms. This is the historical reality of the cumulative

valid progress in knowledge, to date, of the human species as a whole. This is, for reasons broadly identified above, the function which locates the cause for successive increases in mankind's potential relative population-density. Question: What is the ordering principle which might subsume all possible terms of this lattice of theorem-lattices?" (Lyndon LaRouche, *Non-Newton Mathematics for Economists*, *FIDELIO Magazine*, winter 1995, p 14 of 30.)

That last question establishes the basis for discussing the principle of reciprocity, and the answer to it lies in the process of mutual transformations of a memory function by means of such universal physical principles. That is the simplest expression of how to generate and solve Plato's Ontological Paradox of the One and the many. However, the ordering of such a sequence of change between each and all of them must be generated from a higher hypothesis whose measure of change is not generated from or by any of the particular principles among the stated lattices, but which can only be expressed by way of the higher unhypothesizing principle of Mind. Such an unhypothesized hypothesis may be represented as a higher form of the One and the many that Plato had identified as the universal Good. Such is the basis for true telepathic communication.

5- THE UNIVERSAL PHYSICAL PRINCIPLE OF RECIPROCITY.

Plato's idea of the Common Good is what makes it possible to have the idea of reciprocity reflected and extended into economics, politics, physics, biophysics, mathematics, diplomacy, epistemology, and more. The principle of the advantage of the other of the Peace of Westphalia that Cardinal Mazarin implemented in Europe in 1648 is the best example of application of the principle of reciprocity as a principle of mutual development between nations. The principle was based on a reciprocity that was expressed in a paradoxical war situation whereby France had to lose in order to be victorious. The French paradox was: « ***On the one hand, the French cannot win the war against the Habsburg Empire unless the German Electors join the French forces. On the other hand, France cannot win over Germany to her side, unless she sacrifices her own interest for the benefit and the advantage of all of the Germans states and principalities***.» Thus, France had to eliminate the differences between Germany and the Habsburg Empire. That was the paradox that Mazarin had to solve. The benefits offered to the German principalities would, in turn, secure the borders of France along the Rhine River for all time to come. It is only from that standpoint that the principle of reciprocity can be implemented by someone who has no intention of gaining advantage and ascendancy over the other.

Perhaps that is why the so-called "Canadian-United States Reciprocity Treaty" of 1854 never held water. During that year, the British negotiated a treaty, on behalf of the Canadians, in order to have the United States eliminate a 21 % tariff on grain and timber, for the purpose of facilitating imports from Canada. The Americans agreed in exchange for special fishing rights off the coast of Newfoundland. However, this Reciprocity Treaty never worked, because it created an internal contradiction within the free-trade

policy that the British oligarchy never wanted to resolve. Indeed, how could reciprocity work in a system of free trade when that system is essentially based on taking advantage of the other? Isn't that what the anomaly of stock markets is all about, also today?

The principle of reciprocity is also a recognized principle in several scientific domains such as electromagnetism, for instance, where voltages and currents can be interchanged inside of oscillating and modulating systems of electrical fields. It is also interesting to discover that a similar community of principle has always been reflected everywhere within the different forms of asymmetrical exchanges through a weak force in the growing patterns of mitosis of living processes. In mathematics, Gauss applied the principle of reciprocity, which he referred to as "the fundamental theorem" in *Disquisitiones Mathematicae*. In his mathematical diary entry for April 8, 1796, Gauss identified the theorem of quadratic reciprocity, as the "golden theorem" (*theorema aureum*) that he had discovered, one early morning, when he was still in bed. With his discovery in mind, Gauss had also found the solution to the construction of the 17-gon. (Felix Klein, *Development of Mathematics in the Nineteenth Century*, Math Sci. Press, Massachusetts, 1979, p. 30.) Although solutions to these problems have been settled, it is essential to rediscover them, again, with one's own means, and in one's own least action (s)pacetime path of discovery.

The reason I have characterized biquadratic residues by timereversal in the simultaneity of eternity is because the spacetime curvature of the higher hypothesis of the Common Good affects every different element of the time sequences of all the sub-manifolds simultaneously, and because it subsumes all aspects of their past from the future modalities under consideration by means of the principle of reciprocity. This is not simply a new way of rearranging old things in human history; this is a way of changing the way we normally think about things, by establishing the most appropriate geodesic curvature of creativity to the physical spacetime of our planet, and by taking the American Constitution as the standard for it.

The model of reciprocity referenced here is derived from an anti-Euclidean concept of a modified elliptic function, which eradicates, once and for all, all dependency of the mind vis-à-vis the British-Cartesian limitless and continuous notion of extension of space and time based on attraction at a distance between hard balls, and on the perpetual passing illusion of how to make a quick profit from the pairwise shocks of the "heres" and "nows" in a competing globalist world market system. This is why we must establish this reciprocity from outside of mathematics and outside of the fictitious capital of current British-controlled physics and stock markets alike.

The measure of change that is being considered, here, is not a measure of exchange and is not an observable phenomenon of sense perception as such, but a cognitive adjustment that the mind must make in relationship with such perceptions, and through the jump of an axiomatic singularity. For example, take the case of mitosis. This modular function is not applicable to the descriptive evaluation of a field of cosmic radiation as measured mathematically in physical spacetime, but, rather, as a measure of change among a mind, the reading instruments of cosmic radiation, and the totality of

changes in living processes and their residues as reflected in a new Periodic Table of elements. From that triple vantage point, this model is not a mathematical model for mitosis or cosmic radiation, for that matter, but strictly a thought experiment in epistemological causality, as expressed by cognitive reciprocity. Take the case of going from the polygon/circle manifold to the higher torus manifold, as illustrated in Figure 6, for example.

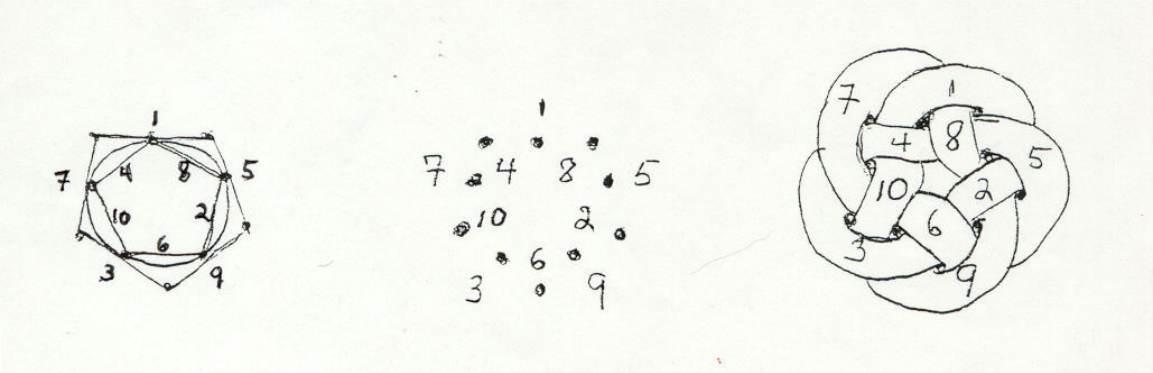

Figure 6. The change of cardinality between the circle and the torus. The values of the integers in the torus are inconsistent with the value of the integers of the polygons inside and outside of the circle. They are the same, but their axiomatic significance is completely different.

On the one hand, the odd and even numbers of the two pentagons 1,5,9,3,7 and 2,6,10,4, 8 are separated by an axiomatic wall represented by the circle. It is as if the unit circle had been divided into two separate entities, like the elements of the Mendeleyev periodic table and their isotopes. But, this perception is a fallacy of composition. It is the opposite that must occur. On the other hand, in the torus, the numbers are distributed in a continuous dynamic flow from 1 to 10 without any apparent discontinuity. The reason for this is that the process has gone through the axiomatic barrier of simple circular action by adding a new dimensionality to simple circular action, like life would add a new dimensionality over the abiotic domain. Therefore, the torus functions as a doubly connected circular form of action, one poloidal and the other toroidal. It is those two motions in one that must govern the Periodic Table of Elements. Now, examine the difference in the same numbers between the two manifolds. Even though they are in similar positions, they have completely different functions. The difference is that their distribution in the torus is in the form whereby all of the couples 7 and 3, 4 and 6, 8 and 2, and 1 and 9 are all of the reciprocals of 2 x 5 = 10. That is the type of characteristic dissymmetry of axiomatic change that is required for our investigation of the Periodic Table, as well as in living and cognitive processes.

As Figure 6 shows, any event inside the curvature of the higher manifold is inconsistent with every apparently similar event in the former lower manifold. From that standpoint, the two manifolds are completely inconsistent with each other, as zoic is to azoic. They belong to two completely different worlds, and the former cannot generate

the latter manifold. The result of the meeting of two such manifolds corresponds to what can be termed a clash of axioms, similar to the clash between the Titan Prometheus and the Olympian Zeus. In fact, right now, you can hear in your own mind the axiomatic rumble underlying such a titanic clash, when you proceed to pierce through the limits of the polygon/circle singularity, and force a breakthrough to the higher dimensionality of the torus. Such is the process of constructing the non-linear pathway from a simple circular form of time to a cyclical spacetime curvature, the passing from an n-fold extended magnitude to an n + 1 magnitude. A formal mathematician cannot conceive of such a jump, because it appears as an illegitimate "leap" of faith across an impassable gap.

However, once you have crossed that impassible gap, your mind will be free and you will be able to browse through the entirely new manifold of your modular memory function and resonate, foreward and backward, as if you were playing between the notes of a great symphonic composition. This resonance will make other confederates resonate with you as well. You will be able to recognize all of the different voices and discover how each small part of the composition is affected by the whole. You can understand such a resonance by comparing the communication between two tuning forks of the same caliber and size, or how a school of fish, or a flock of birds, coordinates their movements simultaneously within themselves. Given a certain proximity between two musical forks, the fork that you strike will make the other one resonate as well, spontaneously, without striking it. This is how ideas are communicated from one mind to another; but, until you make that leap, you will remain clueless as to what principle is involved here. This is also how Plato's ontological paradox of the One and the many gets resolved. In the case of the One and the many, the individual part is given a specific coloration, location, and identity because of the motion of the whole. However, the frequency of its action must be tuned to the ratios of the whole, that is, 2,4,8,16, etc., of the C-256 series.

The secret lies in how to construct the One without the Many. Although the part may have a certain resonance of luminescence with respect to the whole, the part has no effect on the whole, unless it is a mind. It is the functional role of a true discontinuity in its relationship to the whole that determines the individual part's contrapuntal role in the symphony of universal events. Here is, briefly, how Lyn identified the dynamics of this process in his paper on timereversal:

> "The Image of Gauss' development of, and Riemann's apprehension of higher implications of biquadratic residues, is forced to our attention, thus. […] The more profound aspect of matter forces our attention to the functional implication of true discontinuities. The crux of the matter is efficiently introduced by the following proposition. […] How are singularities, such as metaphors afforded discreteness within the mind? The answer from any literate person should be: by the juxtaposition which we term irony: a "double meaning," the which cannot be resolved deductively." (Lyndon LaRouche, *The Essential Role of Time-reversal,* p. 29)

As in the case of reciprocals, the ironies that must be identified in the manifold of a higher hypothesis have to be subjected to two conditions. One, they must all be subjected to Leibniz's playful idea of *Analysis Situs*, as improved by Riemann, and, thus, reflect shadows of singularities of shockwave motions generated by the transformation from an n-manifold to an n + 1 manifold. The fact that this idea of change could also be applied to living processes is not difficult to grasp once you understand the idea that interplanetary space is not empty, but is filled with intertwining discontinuous flows of singularities that represent the transforming factors of all living and cognitive processes on the Earth.

Secondly, what those ironies express is how the characteristic generative flows of cosmic radiation and electromagnetic effects are integral parts of bioluminescence in living processes. They are the very fuel-substance of living processes, the shaping principles of their anti-entropic change. Therefore, life on earth depends essentially on the actions of the universe as a whole for precise and regulated modular harmonic movements of cosmic radiation.

Following in the footsteps of Vernadsky, Russian scientist Alexander Gurwitsch, and German biophysicist Fritz Popp, have both demonstrated that complex living beings fulfill their cell-developments through special types of weak ultra-violet light and electromagnetic signals that are the cosmic fuels of the Biosphere. They demonstrated that all molecular communications inside and outside of living bodies transmit their messages through such wave dynamics of luminescence and electromagnetism, and that all living beings are generated and regulated through such weak forces; so much so, that the slightest change in the effects of cosmic radiation reaching the Earth could mean life or death for the whole planet.

In the cognitive relation to that perception of cosmic radiation, it is also essential to note the crucial Gauss theorem of biquadratic reciprocity. As Gauss demonstrated by that theorem, all residues of a biquadratic are also the biquadratics of those residues. In fact, in my choice of example, each biquadratic residue has itself as a residue of the fourth power, as if it were the cause of itself. It is as if it had within itself a self-generating principle. The only other realities I know that have themselves as residues of themselves are living processes and the cognitive processes of the human mind. This sort of reciprocity is, therefore, very special by the simple fact that it functions by dissymmetrical reciprocity.

Gauss began to discover this theorem of reciprocity in *Disquisitiones Arithmeticae*, where he developed a beautiful inversion in the tradition that Leibniz had initiated with his method of discovery from the inversion of tangents. Gauss noted that it is one thing to find the residue or nonresidue of a modulus, "but the inverse question, ***given a number, to assign all numbers of which it is a residue or a nonresidue,*** is much more difficult." (Carl Gauss, *Disquisitiones Arithmeticae*, New Haven, Yale University Press, 1966, Section IV, No. 107, p.72.) This is how Gauss established how the One was able to determine the Many.

This approach was taken in the spirit of Leibniz who said about the catenary principle: It is one thing to find the tangent of a circle when you are given that circle. It is a much more difficult task to discover the curve if you are only given the property of the tangent. This process of reversibility is also reflected in each individual case of biquadratic reciprocity, where the relationship is such that when a given integer is a biquadratic residue of a modulus, that modulus can also be a biquadratic residue of that integer. In other words, the part has a reciprocal congruence with the whole as a part of the past has with the whole of the future. To further illustrate the point that the process of biquadratic residues is generated from a principle of reciprocity, note in Figure 7 the vertical mirror chirality of numbers showing up everywhere between the cracks of module 17. The biquadratic and quadratic residues show symmetry, but the quadratic residues and primitive roots reveal an asymmetrical ordering within the total series of 16 reciprocities.

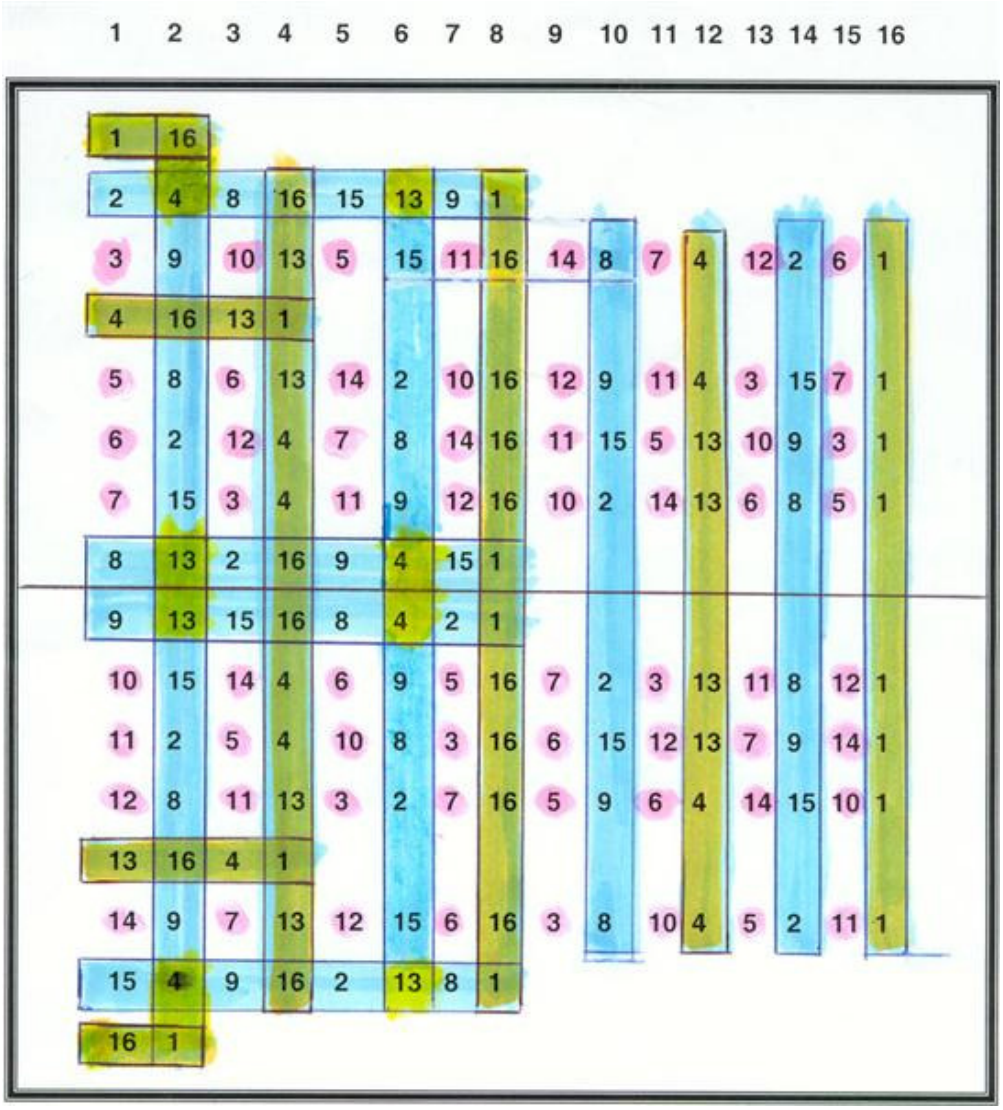

Figure 7. The mirror image and reciprocity of the 16 biquadratic residues (green), quadratic residues (blue), and primitive roots (purple) of 17 are in the order of their modular wave discovery.

Finally, let's take a look at the Gauss modular function and apply it to the domain of cosmic radiation in congruence with the idea of reconstructing the Periodic Table of Mendeleyev. Consider that there exist more than 3,000 known isotope singularities which should be ordered in accordance with the following Gauss modular function for complex numbers (Figure 8).

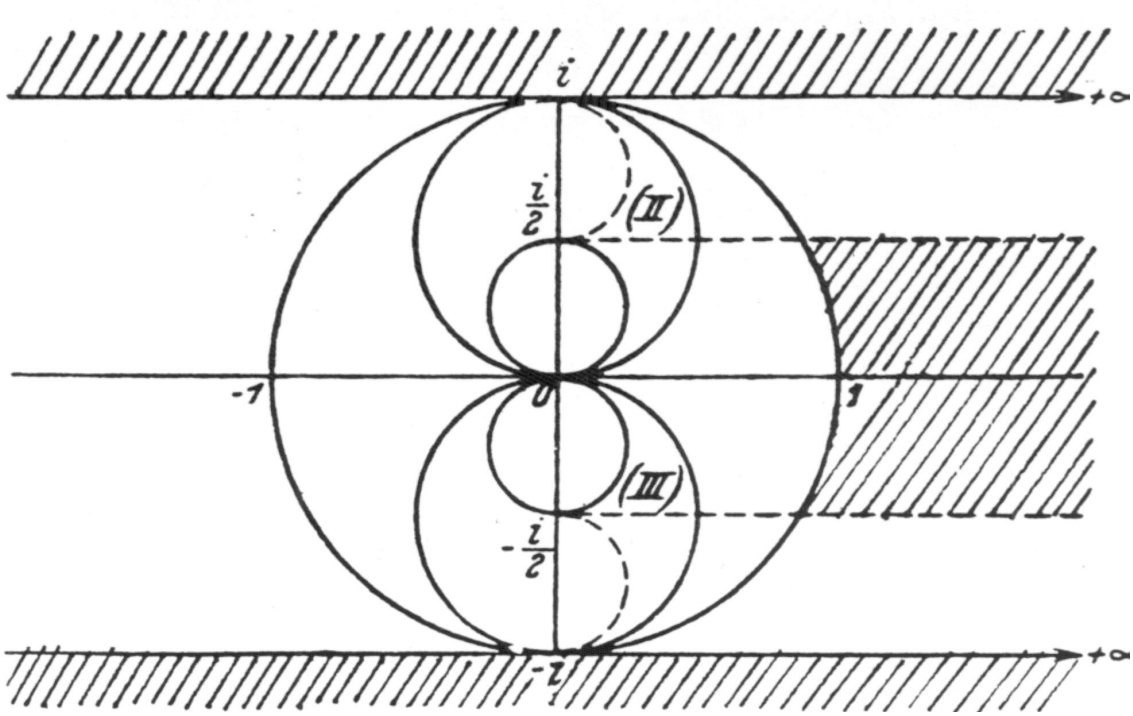

Figure 8. Carl Gauss modular function for whole complex numbers.

Now, develop a hypothesis for a new periodical table of elements and their isotopes based on applying the principle of reciprocity of biquadratic residues to this Gauss modular function. Two things are required. One is to consider that the process of passing from a polygonal/circle manifold to the higher poloidal/toroidal manifold is the geometrical equivalent of the process of passing from ordinary whole numbers to the higher dimensionality of Gaussian complex numbers. Two, the two motions of the torus allows you to apply both the so-called "real" part and the so-called "imaginary" part of the Gauss complex numbers, respectively, to the chemical and nuclear components of the elements and their respective isotopes. The most important aspect, however, is to treat these relationships in a manner such that they correspond to the congruence of the method that Mazarin used to achieve the Peace of Westphalia. In other words, this is not a mathematical hypothesis. Of course, the process will take you through a Riemannian mathematical singularity, which is a difficult axiomatic jump to make, but it is Mazarin who has constructed the best dynamic path of least action for this sort of cognitive process.

6. REVERSIBILITY AND CHIRALITY IN LIVING PROCESSES.

Both Einstein and Vernadsky considered that the single irreversible direction of a polar vector of time expressed entropy, and both suggested that something should be done to change that reductionist view of the universe. However, as far as I can ascertain, neither Einstein nor Vernadsky proposed any specific hypothesis to replace the false assumptions of the entropic unidirectional space and time. Undoubtedly, they were both thinking of an anti-entropic form of timereversal, as Lyn expressed it, in the form of creative time, but without developing a conceptual model. Nevertheless, both Vernadsky and Einstein pointed toward the idea of understanding the question of "reversibility" as being a characteristic of spacetime that is everywhere increasing the anti-entropic density of the universe which is not being wasted outside of the universe as if into an external wasteland. This meant that some form of closed spacetime curve was required to contain the universe within itself.

Vernadsky took his investigation of living and cognitive processes in the direction that Pasteur had already began to trace-out before him. Vernadsky's idea was centered on the existence of life as generated from a higher anti-entropic principle, as Pasteur identified living processes with the characteristic of asymmetrical chirality (enantiomorphism) of crystals. Moreover, the transmutation of solar energy into chemical and molecular energy are two cases of how biogeochemical cycles in living processes reflect inversions of anti-entropic processes with reference to azoic matter. As Vernadsky noted, the biogeochemical history of living matter of the Biosphere is increasing the energy of the universe as a whole by means of its reversible processes. As he noted:

> " Living matter increases the active energy of the terrestrial crust in two different manners. It increases it by its *reversible processes*, in releasing free oxygen in exchange with the other chemical elements of the environment. It also generates a great amount of kinetic energy and of active energy in general thanks to solar radiation." (My emphasis. W. Vernadsky, *La Biochimie*, Paris, Félix Alcan, 1924, p. 339.)

The point to be made on the chirality character of living processes is very important because it touches on the essential feature of physical spacetime that expresses *reversibility* of spacetime in both the Biosphere and the Noosphere. However, chirality is not merely the casting of a shadow of sense perception that expresses clockwise and counterclockwise motions in visual space, or right-handedness and left-handedness. Be aware that the appearance of chirality casts a deeper shadow beyond sense perception, which is the most important shadow to consider, because it expresses reversible motions of growth, that is, anti-entropic motion of spacetime as a process of inversion that is exhibited by reciprocity, for instance. Regarding principles, it is the reversible reciprocity factor expressed by the One toward the Many that is the most important idea to reflect on, not the visual right or left mirroring shadow orientation. The idea is to reflect on the deeper significance of the reciprocal inversion of two asymmetrical realities.

Figure 9. Reversibility in escargots.

Cognitive inversion processes such as the timereversal function of a creative process express the most notable aspect of chirality. Outside of Lyn, very little has been said about this inversion of time**,** that is, about the forms of action that the future can have on the past or, conversely, that the past can have on the future. With respect to time, one can conceive of two forms of temporal chirality within a closed system, one is full cyclical motion, and the other is reversibility of a generative dynamic process. Universal creative motion of physical spacetime expresses both of these features, simultaneously, at any moment during the course of an enduring anti-entropic process of change. Thus, it is important to investigate how time comes back by cyclical closure and how it comes back by reversal of direction in a two-way form of axiomatic discontinuity. In other words, the question is: how can the future change the past and how can the past change the future.

It is also important to note, here, that these are two distinct but interconnected aspects of the same process of timereversal chirality that have been emphasized by Frederick Schiller from the present to the past, and by Lyn from the future onto the present. Considering that we are dealing with the same inverse directionality in both cases, the first was articulated for the purpose of establishing a foundation to universal history, and the latter, for the purpose of long-term projects of future human economic development. When viewed from the vantage point of creativity, they are both complementary phases of the same process of timereversal, and both of them can be evaluated at any time during closed cycles of time allocated to the process in progress, because both processes are poloidal and toroidal, simultaneously.

The aspect of time reversal identified by Schiller in his first lesson on Universal History emphasized the fact that it is wrong to look at universal history by starting from the past. Universal history is the history of the changing course of current history. The function of universal history is to focus on changing the present, because this is the precondition for releasing causality from the future. It is the changing present that is the subject of universal history, and it is universal history that leads the willing Promethean man to change his present society for the better, while it drags along the unwilling and the poor fragmented souls trailing behind, as Rabelais put it. The only true significance of the past is, therefore, for the purpose of understanding how the present world situation

should be modified, and given new improved boundary conditions for realizing the intention of mankind. As Schiller wrote:

> "Out of the entire sum of historical events, the universal historian selects those which have had an essential, irrefutable, and easily ascertainable influence upon the contemporary form of the world, and on the conditions of the generations now living. It is the relationship of an historical fact to the present constitution of the world, therefore, which must be seen in order to assemble material for world history. World history thus proceeds from a principle, which is exactly contrary to the becoming of the world. The real succession of events descends from the origin of objects down to their most recent ordering; the universal historian ascends from the most recent world situation, upwards towards the origin of things." (Friedrich Schiller, *Poet of Freedom, Volume II*, Schiller Institute, 1988, Washington DC, 1988, p. 267.)

Therefore, universal history is not determined by a personal selection of past events for the satisfaction of the present, but is selected to change the present for a future yet to come. There are precise events, good or bad, that have shaped the world as it came to be, and which have to be rediscovered if one is to understand where humanity is going. It is in that sense that history is determined by the willful actions of man with regards to the future. In other words, there are very specific historical principles that have played a role in establishing the current constitution of the world, and those principles must be truthfully reevaluated in every nation of the world, for better or for worse.

As Schiller also noted, in addition to creating an "enkindling light in your mind, and a charitable enthusiasm in your heart," universal history will also make you relive the great moments of axiomatic changes of human history in a manner such that the individual passes consciously from his individuality of physical spacetime, from his own historical specificity, into the universality and immortality of the species; but, only for the explicit purpose of improving coming generations. That is the most important form of cognitive timereversal notion attached to the idea of immortality, because it is only from this vantage point of the human will that the second aspect of timereversal, causality from the future**,** can be understood. Lyn has been investigating this second aspect of time reversal during his entire life. This is how he formulated the design in 1996, when he expressed his original principle of hypothesis in dealing with the "future as change" for the science of physical economy. Lyn defined the "intention" of timereversal in physics as follows:

> "In order to make clear the apparent paradox, I asked the audience to acknowledge the perplexity, the which this notion of "time-reversal" would pose to the ordinary professional mathematician. I state here, as then: *How might one represent, mathematically, a function in which an event in the future might serve as the apparent cause for an event in the present?* This was, in fact, being considered by the famous Soviet physicist Sakharov, as a formal problem in mathematical physics, during the later years of his life. The issue of the functional role of "time-reversal," is the most important of the fundamental issues

> confronting mathematical physics today. It is also a key, axiomatic issue in the field of natural law, and, in a related way, important for cleansing theology of certain cultish, intrinsically pagan superstitions, which have no proper place in the teaching of Christianity, Judaism, and Islam. Here, all those issues are implicit; but, it is the decisive role of "time-reversal" in any competent economics teaching, which is the topic explicitly addressed in the following pages. […]
>
> A dog reaches for a bone; a dog hunts for prey not yet seen, heard, or smelled. How does human reaction to the idea of the future, differ from what an observer might attribute to the "intentions" controlling the dog's action? In short, the difference is, that, except when a man is behaving with the simple-mindedness of a *macho,* materialist, or empiricist, the object of the relevant expression of human intent, is not the apprehension of a sensory object, but, rather, a desired *change* in the *axiomatic* characteristics of some referenced pattern of human behavior. That point may be stated otherwise: *What is desired is not a mere event, nor a mere change in opinion, but, rather, either a change in hypothesis, or theorem.*
>
> The change which distinguishes characteristically human ideas of the future, from the bestial intent which might be expressed by a beast, or in a man's moment of beastliness, is always of the *ontological* quality designated by the connotations of the term *Platonic idea,* rather than mere contemplation of a real, or merely desired object of sense-perception." (Lyndon H. LaRouche, Jr., *The Essential Role of 'Time-reversal' in Mathematical Economics,* Fidelio, Vol. 5 No 4. Winter 1996.)

These measures of change are very useful to reflect on, but the difficulty is much greater when you invite someone to investigate the ontological nature of future-oriented timereversal as something that pertains to the domain of epistemological change in his or her axiomatic character. That inversion becomes much more difficult to live through, and in some cases proves to be impossible, because sometimes people feel they are being turned inside out. It should become obvious to every one that such a singularity cannot be expressed in the domain of mathematics, because it would turn mathematicians into human beings, if it did. As Lyn has often indicated, mathematics is inadequate for the task, be it with transfinite theory or theory of numbers, or any other theory. However, it is now time to push this question of timereversal further and open up the question with respect to living processes.

The next step to take is to always be of the disposition of discovering, that is, to put your mind in the forward bending direction of the future, as opposed to the backward leaning direction of repeating some already established past knowledge. And, the next step after that is to forge ahead as if you had already burned your bridges behind you, especially those built with the ropes of mediocrity and public opinion. The time has come to erect new bridges ahead and upward that you secure based on the higher plane of expectation with the pure credit of the catenary principle.

So, lastly, let's test living processes with the idea of timereversal chirality, for example, and see what comes alive. What does a reversible form of physical spacetime reflect like and sound like in the Biosphere? As it was the case for the human mind, how you express it will depend on whether you conceive of the universe as a dynamic whole that is not determined by the sum of its parts. How does an anti-entropic form of spacetime manifest itself in that sort of universe? Is there some enantiomorphic form to it, as if appearing asymmetrically like in a mirror image? This is the chirality that Pasteur had discovered in wine fermentation of tartaric acids during his studies, after Jean Baptiste Biot had discovered rotational polarization.

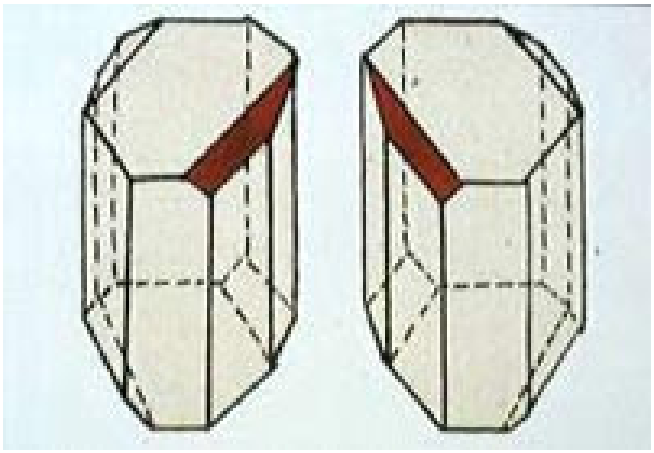

Figure 10. Reversible mirror image of isomorphous crystals.

What Pasteur had discovered and reported in his Doctoral dissertation of 1848, including the isomorphous crystals that Gabriel Delafosse had confirmed for him during the same year (Figure 10), was that certain molecules expressed a unique character of chirality that reflected a growth process by inversion, that is, by reversibility, as if by turning themselves inside out. Again, don't get bogged down in the limited right and left-handed formalities. Ask yourself: Does that living characteristic also extend to processes of time-reversibility in the universe as a whole, and specifically, to creative processes of thorough musical composition? One thing is certain, which is that reversibility is not an adventitious physical process. It represents the definite footprint of the process of creativity by the simple fact that it has the characteristic of being mutable; that is, self-reflective in the form of reflection of the One and the many that Lyn identified as having the character of timereversal. However, sometimes, there is a conceptual difficulty in understanding this sort of inversion.

When you see an image of right and left-handedness, as in Figures 9 and 10, do not think of left and right automatically, because you will miss the essential point. The reason why biology students have not gotten very far in understanding the principle of living processes has been their attachment to this easy trick of remembering dissymmetry. It is a mechanical trap. Don't get caught in it. It would be better if you were to turn a right hand glove inside-out instead, so that you could think of dissymmetry as an

inside-out dynamic of reversibility. By using the idea of turning something inside-out, you are closer to the Noospheric and Biospheric anti-entropic creative processes of reversibility that dominate the universe as a whole.

Take the case of mitosis and go through the process of doubling a cell. The change demonstrates the relevant inside-out inversion process of reciprocity. The way mitosis works is like the discovery of the catenary/tractrix. The cell develops itself as if by inversion of tangents. So, don't just describe things, construct them. For example, the best way to discover the principle of the catenary/tractrix is by constructing it. But, you might object by saying: "How can you construct it if you don't know what the principle is?" That's the whole point. You must construct it by using the principle of its construction at the same time; that is, in a manner such that ***the principle of discovery is also the discovery of the principle.*** Then you have closure. That is the most important form of chirality of timereversal causality that you want to conceive of in the simultaneity of eternity. It is that process of creativity by reciprocity which was the most important discovery that Gauss ever made.

CONCLUSION

Since timereversal applies to creative thinking as well as to creative living processes, as an anti-entropic modality of simultaneity of eternity, it must necessarily apply as well to the rest of the universe, because, when a superior axiomatic singularity has been validated in some part of the universe, it is also valid for the rest of the universe as a whole; the reason being that when a universal physical principle appears in some small crack in the wall of the universe, it means that even though you don't see it, it is simultaneously acting everywhere, as if it were staring at you from the outside, looking in and telling you: Hey! Pay attention, something important is happening here! When that happens, recall to your mind the famous *Flammarion Woodcut* depicting Archytas piercing through the limit of the universe (Figure 11). That is how the causal process of the human mind works as an integral and functional part of the principle of anti-entropy. From that standpoint, therefore, the reader may legitimately ask in ending: "But, why are biquadratic residues so important?" The reason they are so important is not because they are numbers, but because they reflect the highest form of epistemological congruence of the human mind, as Mazarin discovered.

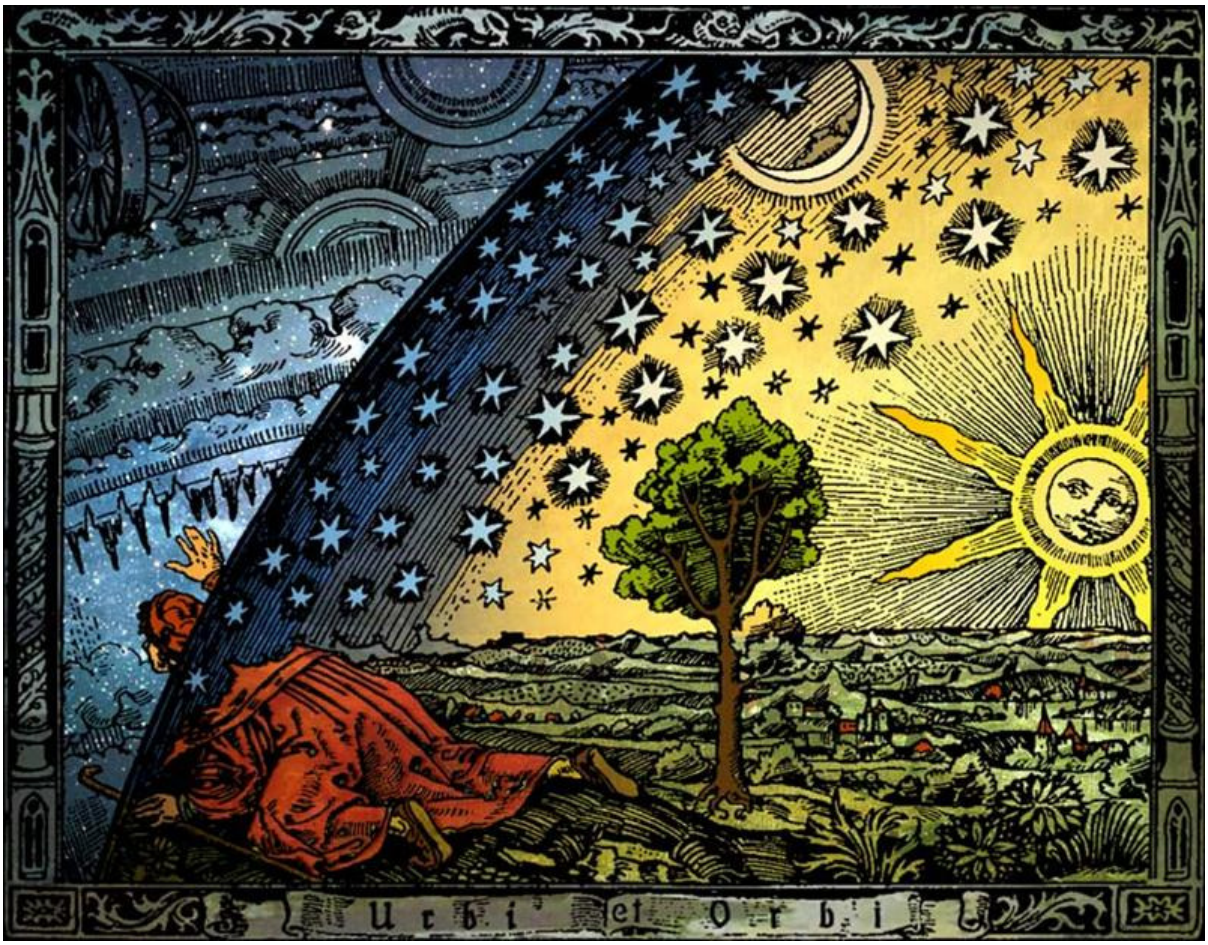

Figure 11. *The Flammarion Woodcut*, Archytas discovering that the boundary singularity of the universe is "Here and everywhere!"(*Urbi et Orbi*)

Biquadratic residues represent the maximum form of epistemological creative activity there is to be found on this side of the physical universe. It was with this idea in mind that Lyn emphasized in 1996: "The issue of the functional role of "time-reversal," is the most important of the fundamental issues confronting mathematical physics today." And, people who have understood that, like Gauss and Riemann, have put the rest of us on alert about this unique singularity of the memory function. But, that is not all. Ultimately, biquadratic residues represent the fuel pellets that are required for devising the appropriate modular memory function to take you to Mars and back. This is why we are required to imagine such a universal weave of things, as if the effect were the cause of itself. Indeed, the only way you get to know anything truthfully, without having to learn it from a sourcebook, is in designing the path by means of which you came to know it, yourself. As the Swedish astronomer friend of Einstein, Gustaf Stromberg, once put it: "The only thing I can imagine that is behind Matter, or that is more fundamental than Matter, is Mind. Mind is probably the button of everything." (Gustaf Stromberg, *Soul of the Universe*.)

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