ON THE CONSTRUCTIVE GEOMETRY OF PYTHAGORAS, NICHOLAS OF CUSA AND PLASMA PHYSICS

For my friend Charles Notley: How to bridge an axiomatic Rubicon

by Pierre Beaudry, 12/18/16

INTRODUCTION

Lyn has many times emphasized the importance of the role of least action in the creative process for the purpose of transforming the human mind's ability to understand the physical universe by means of a least inadequate method of discovery. However, he has never been so precise as in his 1992 paper **On the Subject of Metaphor** in which he wrote the following:

> "At an appropriate place in the secondary curriculum, the traditionalist teacher of secondary school geometry introduced the Pythagorean Theorem. The pupils of that class were guided to re-experience the mental act of original discovery by Pythagoras himself, thus to reconstruct a copy of that aspect of Pythagoras' creative mental processes within the mind of each of the pupils. This new existence within the pupil's own mind is itself an object of a special kind, a thought-object identified by the *metaphorical* name "Pythagorean Theorem." (Lyndon LaRouche, *On the Subject of Metaphor*, Schiller Institute, Part I of II, from Fidelio Magazine, Vol. 1. No 3, Fall 1992.)

The function of the transformation of the pupil's mind that Lyn is referring to with the metaphorical name of "Pythagorean Theorem" is not about the practical way of finding the third side of a right angle triangle; it is about the process of

discovering the "actual act of discovering itself." Such is the new thought-object to be considered here.

By doing this, Lyn identified the epistemological domain of the higher hypothesis which is required for investigating the turbulent boundary conditions under which a discovery of principle can be made legitimately inside of a human mind. That's what the rediscovery of the Pythagorean Theorem is really all about: discovering how to discover. But, how do you know if what you have discovered is useful for the future or not? How can you tell the difference between a valid discovery and a fictitious one? The only test for validating a discovery of principle is that it must increase the energy-flux-density of the human mind. If it doesn't do that, the discovery is not valid.

My purpose here, therefore, is to discard all of the invalid methods of teaching the Pythagorean Theorem in the schools, and to recover that missing creative function of transformation that was once used by Pythagoras and by Plato, but which has been kept hidden for more than two millennia. I will be recalling to your mind two forgotten aspects of this lost process of discovering with the help of Nicholas of Cusa. The first is how to **change the internal boundary conditions** of your mind in such a way that you can make new discoveries, and the second is to discover something new by means of **hypothesizing what is not there**. Since this approach of mind requires a non-linear process, whoever enters here with me must, by necessity, leave behind all deductive forms of reasonings.

1. THE PYTHAGOREAN THEOREM AS A CREATIVE PROCESS

> *"Those non-deductive solutions, solutions by methods which cannot be represented explicitly by any linear medium, such as communications media, typify the class of thought-objects to which belong the pupil's reliving of Pythagoras' discovery and of Cusa's discovery of an isoperimetric species of circular action absolutely distinct from the species of all possible linear functions."*

> Lyndon LaRouche, *On the Subject of Metaphor*

The development of this higher hypothesis is not a small task, because the science of discovery of past knowledge has been almost completely lost in the present school system. For a more complete understanding of this process, see my report: **WHAT SHOULD HAVE BEEN THE FUTURE**: Rediscovering the bold inversion function of the Pythagorean Theorem, 2/14/16.

Once you have solved the problem of doubling the square, as Plato demonstrated it in his *Meno* dialogue, you are ready to discover that the Pythagorean Theorem is derived directly from a similar process. Ask yourself: How can I geometrically construct the algebraic formula whereby $A^2 + B^2 = C^2$? In other words, given A^2 and B^2, find **C2.** It is that geometrical process that leads you to *what is not there*, which you want to use as a pedagogical model for the principle of creativity. Start with the familiar algebraic puzzle of **Figure 1**.
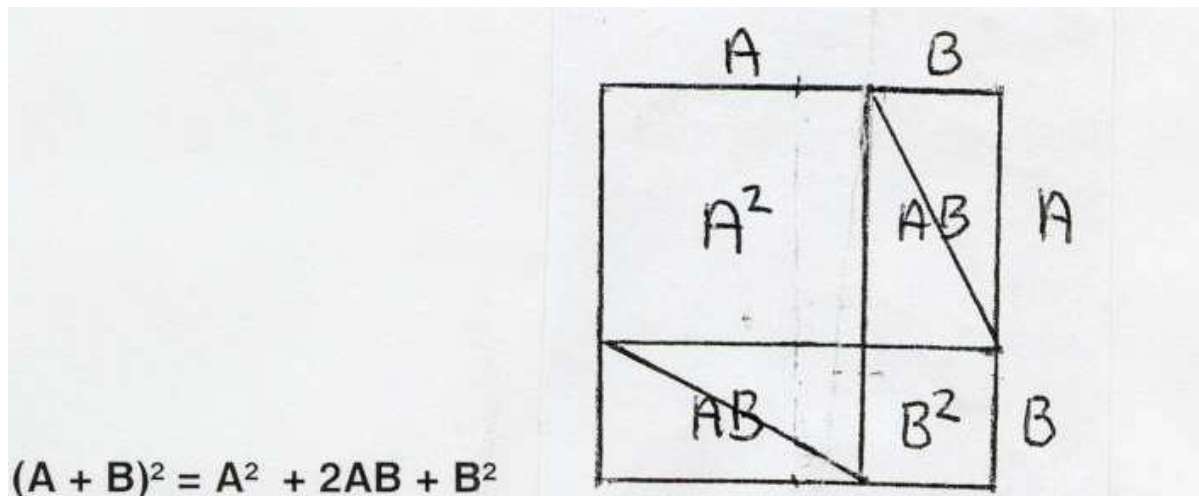

$$(A + B)^2 = A^2 + 2AB + B^2$$

Figure 1 The puzzle of finding the missing squared area, C^2.

The idea to focus on is that of transforming the internal boundary conditions of your state of mind. Consider that if the mind is required to change, it must change in the manner in which Heraclitus understood change; that is, within the unity of experience of the *logos* whereby *"everything changes, except change itself."*

This is the source origin of Lyn's notion of *increasing energy-flux-density*. It is a contradictory deductive notion because it implies that everything changes and remains the same at the same time. It can only be grasped by the intellect because it is unfathomable by reason alone. Deductive logic is not happy with this, because logic cannot accept that something and its opposite exist at the same time. So, something has to go: either *deductive logic* or the *unity of opposites*. My choice is to drop the former and keep the latter, because with the former, nothing ever changes. That's what Heraclitus reminds us when he says that like the waters of a river, everything flows, but the river stays the same.

However, there is, here, a general misunderstanding where most historians think that the point Heraclitus is making is simply that everything changes. That's not true. The point is that *everything changes everything else*. What Heraclitus is saying is that the nature of the human mind is to change someone else's mind. So, the question is: ***"How do you discover the principle which causes everything else to change, and especially, someone else's mind?"*** The answer is that you look for ***what is not there,*** or the inverse of what is there, that is, you look for C^2 by changing the internal boundary conditions of **Figure 1**.

since

$$(A + B)^2 - 2AB = A^2 + B^2$$

and

$$(A + B)^2 - 2AB = C^2$$
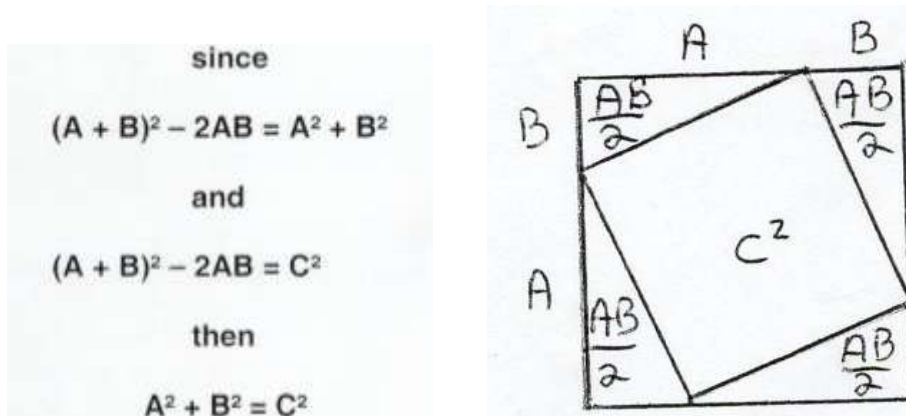
then

$$A^2 + B^2 = C^2$$

Figure 2 The discovery of *what is not there*; that is, C^2.

If you have followed this process correctly, your mind has gone through three successive states of mind: 1) Perplexity, 2) Awe, and 3) Laughter. Here is how the discovering process can be best understood:

"For twenty years, Mr. Sokoloff had been eating at the same restaurant on Second Avenue. On this night, as on every other, Mr. Sokoloff ordered chicken soup. The waiter set it down and started off. Mr. Sokoloff called, "Waiter!"

"Yeah?"

"Please taste this soup."

The waiter said, "*Hanh*? Twenty years you've been eating the chicken soup here, no? Have you ever had a bad plate?"

"Waiter," said Sokoloff firmly, "taste the soup."

"Sokoloff, what's the *matter* with you?"

"Taste the *soup!*"

"All right, all right" grimaced the waiter. "I'll taste –where's the spoon?"

"A*hah!"* cried Sokoloff. (Leo Rosten, ***The Joys of Yiddish***, Pocket Books/Washington Square Press, 1968, p. 6)

2. NICHOLAS OF CUSA'S METAPHOR OF THE TRINITY

> *"Therefore, the mind's oneness enfolds within itself all multitude, and its equality enfolds all magnitude, even as its union enfolds all composition."*

> Nicholas of Cusa, *De Coniecturis*.

In his *De Coniecturis,* Cusa created a geometrical metaphor of how the Holy Trinity is reflected in the created universe by using a self-reflective process of triply-connected circular action. Although geometry is inadequate for explaining the physical universe, metaphor is the least inadequate of all mental constructions and Cusa's pedagogical device is a powerful example of how to understand both that mental process of hypothesizing and of establishing the necessary boundary conditions for the human mind to make discoveries.

Cusa composed a diagram in which three sets of simple circular actions are enclosed within each other, expressing a well-ordered progression of 1, 3, 9, 27 self-similar rotations for a total of 40 units of action. (**Figure 3**) Cusa wrote:

"If, as the subject-matter requires, you look at the diagram with your mind's eye, then mysteries that are surely important and that are hidden to many will be made known to you.

"Every number is included in the number 10, and every progression is completed in the number 4. Now, 4 times 10 is 40. Hence, you will find, [in the diagram], 40 circles, all of them (the large ones as well as the small ones) being gathered into a single circle.
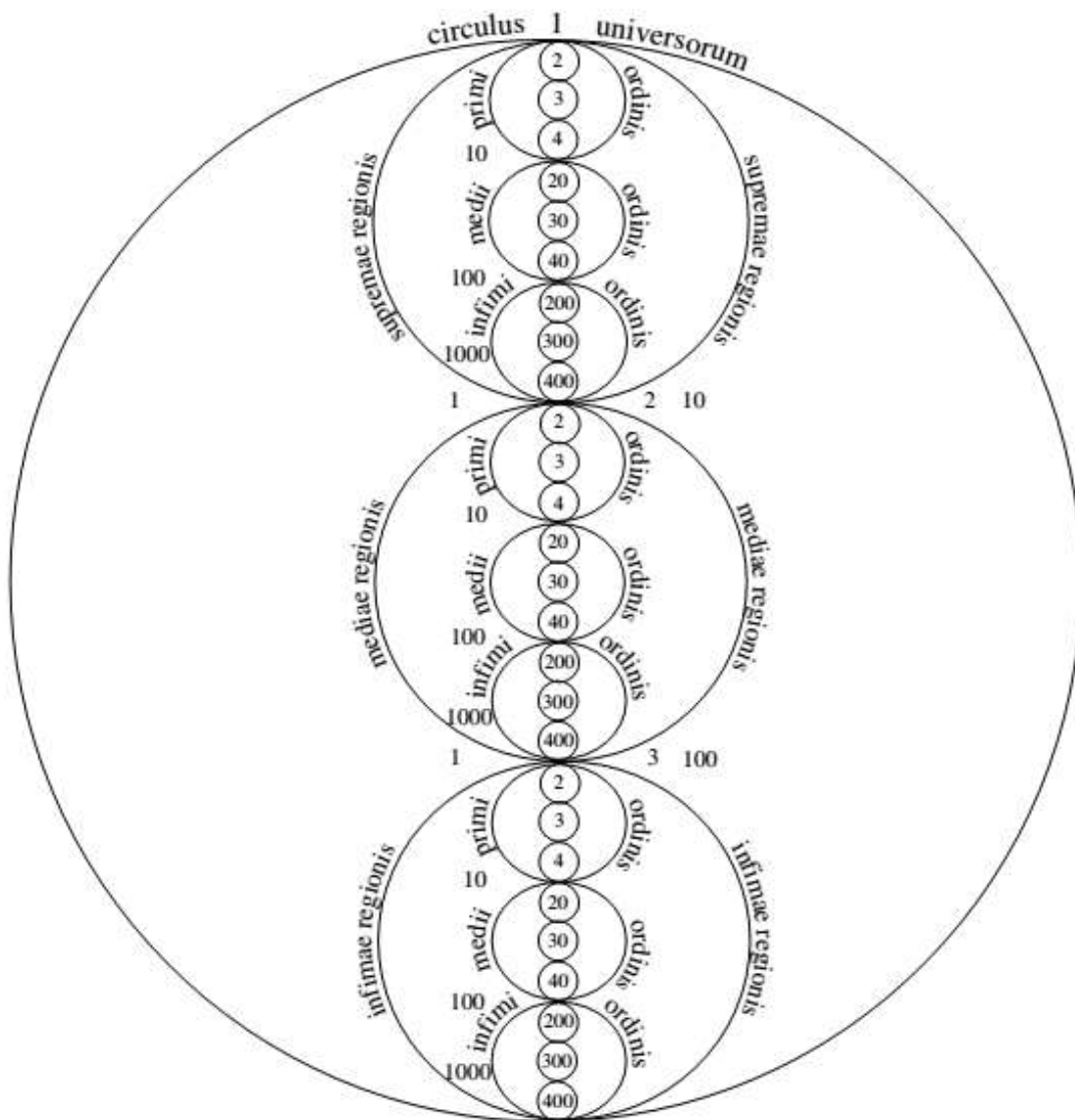

Figure 3 "Three trine distinctions" of the Trinity.

"Hence, since the progression 1, 3, 9, 27 ads up to 40, it is not unfittingly praised. For just as 1, 2, 3, 4 is the best-ordered progression of all numbers, than which there can be exhibited no better-ordered progression (for the replication of 2 makes 4, even as does the adding of 1 to 3; therefore, 4 proceeds from these [other numbers] in a best-ordered way; and in the case of any other four numbers no such [a best-ordered progression] can be found), so too with respect to the tenfold of 4, viz., 40, there can be exhibited no better-ordered progression than the following: viz., 1, 3, 9, 27. You will be able to experience this fact by virtue of the following consideration: through these four numbers being subtracted from one another and added to one another, all numbers up to 40 are attained individually, even as from the combinations of the four numbers of the first progression all numbers up to 10 are obtained—as you can verify by yourself in both cases. Moreover, except for these [four numbers] there are exhibitable no four numbers, of an ordered progression, that when added together make a given sum and that through being added to one another or subtracted from one another yield each number contained [in that sum]." (Nicholas of Cusa *De Coniecturis*, I, 13, 64-69, translated by Jasper Hopkins.)

Cusa distinguished the process of differentiation of the universe as a process triply-connected-self-similar action in which, each action contains three orders within itself (a first, second, and third order), such that altogether, those triply-connected orders represent nine orders reflecting the universe in the microcosm and the macrocosm. Here is the complete distribution of numbers that Cusa referenced:

1	15 = (27 - 9 - 3)	29 = (27 + 3 - 1)
2 = 3 – 1	16 = (27 - 9 - 3 + 1)	30 = (27 + 3)
3	17 = (27 - 9 - 1)	31 = (27 + 3 + 1)
4 = (3 + 1)	18 = (27 - 9)	32 = (27 + 9 - 3 -1)
5 = (9 - 3 - 1)	19 = (27 - 9 + 1)	33 = (27 + 9 - 3)
6 = (9 - 3)	20 = (27 - 9 + 3 - 1)	34 = (27 + 9 - 3 + 1)
7 = (9 - 3 + 1)	21 = (27 - 9 + 3)	35 = (27 + 9 - 1)

8 = (9 - 1)	**22 = (27 - 9 + 3 + 1)**	**36 = (27 + 9)**
9	**23 = (27 - 3 - 1)**	**37 = (27 + 9 + 1)**
10 = (9 + 1)	**24 = (27 - 3)**	**38 = (27 + 9 + 3 - 1)**
11 = (9 + 3 - 1)	**25 = (27 - 3 + 1)**	**39 = (27 + 9 + 3)**
12 = (9 + 3)	**26 = (27 - 1)**	**40 = (27 + 9 + 3 + 1)**
13 = (9 + 3 + 1)	**27**	
14 = 27 - 9 - 3 - 1)	**28 = (27 + 1)**	

And

1	**6 = (4 + 2)**
2	**7 = (4 + 3)**
3	**8 = (4 + 3 + 1)**
4	**9 = (4 + 3 + 2)**
5 = (4 + 1)	**10 = (4 + 3 + 2 + 1)**

In my previous report, **NICHOLAS OF CUSA AND THE PRINCIPLE OF CREATIVITY**, I investigated the sameness of the process of triply-connectedness that Cusa had developed above in order to help my mind understand the shortcomings of the process of conjecturing or hypothesizing. However, some people had difficulties with that report because something was missing in my explanation: the function of the transporting motion.

3. THE SQUARING OF THE CIRCLE AND THE ISOPERIMETRIC THEOREM

How do you solve that anomaly? Ask yourself: How do you go beyond simple physical circular least action? You might answer: By adding a new direction of physical least action. OK. That makes sense, but how do you do that? How do you actually change the direction of a process by adding a new direction? The only way this can be done is by transforming constructively the boundary conditions at the limit of the process of simple circular action, which is, as Lyn

demonstrated, by solving the anomaly of squaring the circle in the manner that Cusa did. As Lyn showed:

"From the secondary geometry classroom: the method for estimating the area of a square approximately equal to that of a given circle is this. Simultaneously inscribe and circumscribe a pair of regular triangles, or squares. Next, by halving angles, by construction, repeatedly double the number of sides to, for the squares, some number equal to 2^n. Take the average of the areas of the two polygons; estimate the value of *Pi* , the ratio of the circle's perimeter to its diameter, by dividing the average area of the two polygons by the factor of r^2 (the square of the radius). Thus, for *n = 8*, *Pi* is estimated at approximately 3.1416321; for *n = 16*, the estimate for *Pi* is a much better approximation, 3.1415927." (Lyndon LaRouche, ***On the Subject of Metaphor***, Schiller Institute, Part I of II, from Fidelio Magazine, Vol. 1. No 3, Fall 1992.)

The question Lyn then asked was that by estimating the circle's square area to any decimal position, was Cusa ultimately able to find the congruence between the polygon and the circle; that is, between linearity and non-linearity. The answer is no; because, unless you are able to find the congruence between the circumscribing polygon and the inscribing polygon; that is, between odd and even numbers, you cannot solve the paradox. Cusa put it as follows:

"Hence, [as regards reason], every number is either even or odd; hence, there is numerical ***order***; hence, there is numerical ***progression***; hence, there is numerical ***proportion***. Hence, the proportion of the diameter [of a square] to the [square's] side is an irrational number, because that number would have to be the coincidence of an even number and an odd number. Hence, too, the diameter of a circle is disproportional to the circumference, because reason does not attain the coincidence of such different things." (Nicholas of Cusa ***De Coniecturis***, I, 76)

However, since, no coincidence can be gotten between a polygon and a circle, could there be a possibility of coincidence between concentric circles; that is, circles projected from a conical spiral action? This is how Cusa solved the

problem of congruence between linearity and non-linearity. As Lyn indicated, he jumped to a higher dimensionality. Thus, instead of subscribing and inscribing circles with polygons, he inversed the process while keeping the same original boundary conditions in mind; that is, he subscribed and inscribed polygons with circles and generated them from a conical projection. It is such an inversion which is the key to the present method.

There is a similar contradictory process involved in every axiomatic process of change. A similar singularity takes place in the third motion of the Modular Wave Torus, as I will show you a little later, which also develops inside of a plasma process of transformation.

The point to understand is that such a higher congruence is capable of resolving the paradox of the coincidence of an even number and an odd number from the vantage point of a higher geometry. In other words, if deductive reason cannot attain to the coincidence of such incommensurable proportionalities, the intellect can, nevertheless, reach congruence through the higher dimensionality of a triply-connected motion. To summarize the process in a constructive manner, here, Cusa determined the area of a triangle equal to the area of a circle by means of introducing a higher form of action, a conical-spiral action, as can be hypothesized from what follows: (**Figure 4**)
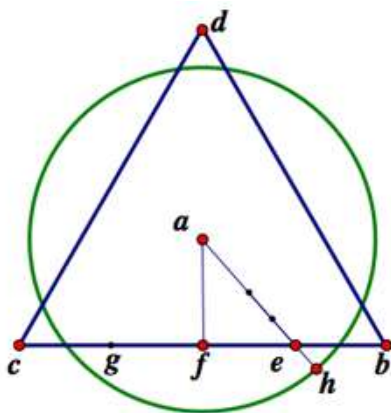

Figure 4 Cusa's first attempt at determining the isoperimetric circle of a triangle was devised in 1450. In his first paper, Cusa wrote: "You divide the side *bc* into four equal parts which you mark *e, f, g*: I assert that, if one extends the line drawn from *a* to *e* by its fourth, which gives *ah*, this will be the radius of the circle whose circumference is equal to the three sides of the triangle." (***De circuli quadratura*, 1450.**)
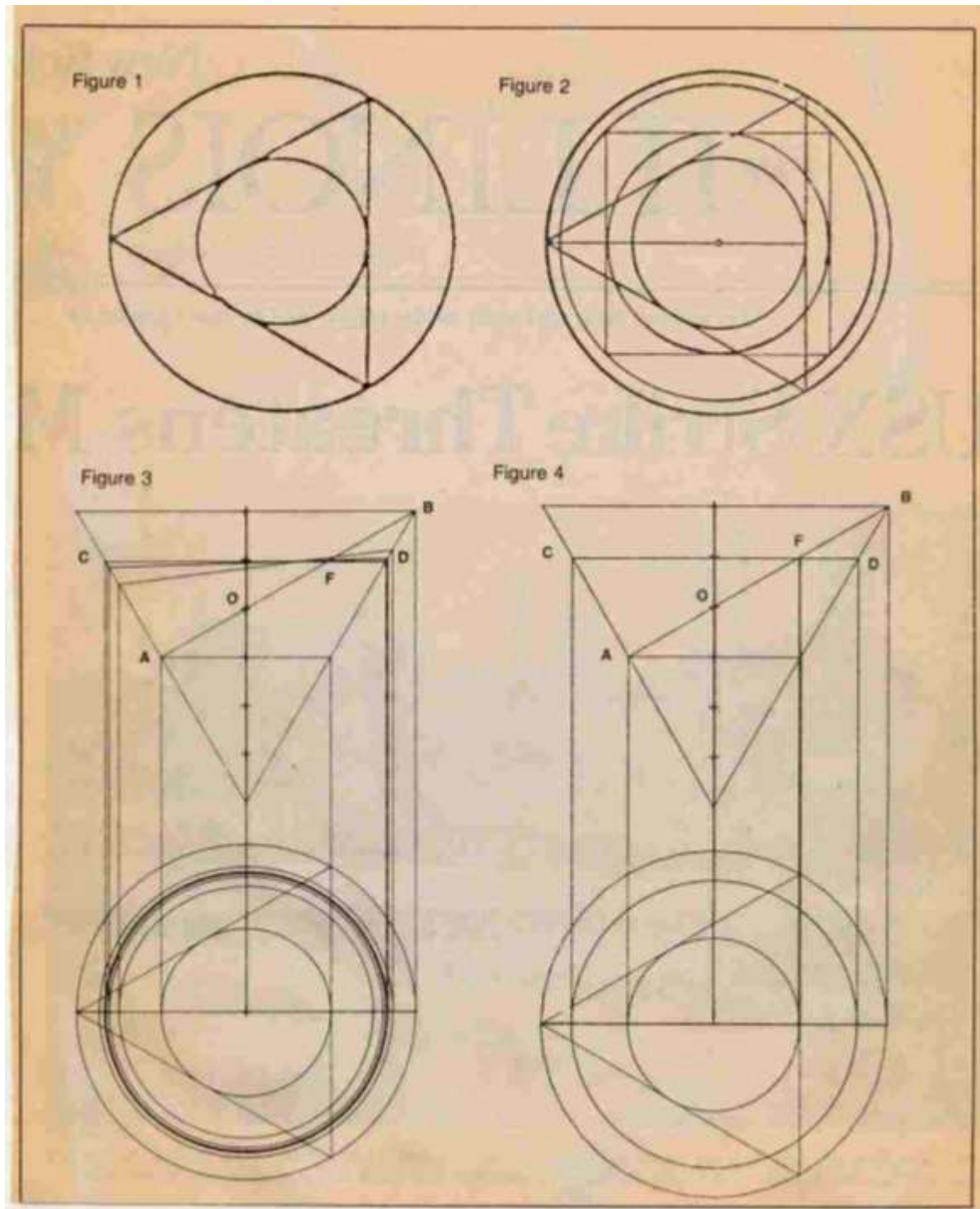
Figure 5 Cusa's solution to the Isoperimetric Theorem by inscribing and circumscribing polygons with circles into a cone.

The circular projections of little Figure 1, and little Figure 2 inside of **Figure 5** show how the inscribed and circumscribed circles of the triangle and the square converge toward each other, implying that they will coincide at some precise point, if we increase continuously the number of sides of the polygons and their inscribing and circumscribing circles. Since these two converging series of circles are projected from a cone, as shown in little Figure 3, then little Figure 4 shows that the limit circle of such a projection is the isoperimetric circle CD. As Lyn concluded, this method of higher hypothesis is the same as can be found in Plato's Parmenides:

"The application to the squaring of the circle of that method of addressing such a paradox which is exemplified by Plato's *Parmenides* dialogue, yields essential results which are the common feature of each and all of the solutions for a series of the most fundamental scientific discoveries of the period from c.1440 a.d. through c.1700 a.d. . For reasons to be considered, these features are all presented from a negative standpoint:

"1. Circular action is a distinct geometrical *species* of action in space-time, the which cannot be derived from any *species* of linear construction. No *positive* definition of circular action may be employed, if that definition specifies in any part a required *point* or piece of *straight line* (such as a radius).

"2. Circular action is defined simply (negatively) as the *least action* of closed perimetric displacement required to subtend the relatively largest area. (Thus, the Fermat-Huygens-Leibniz-Bernoulli principle of least action is already implicit, "hereditarily," in Cusa's discovery.)

"3. Circular action, because *closed*, is a form of continuous extension (continuous manifold) which contains its own metrical characteristic: counting in cycles and parts of cycles. A linear continuous manifold contains no inherent metrical quality which is not supplied to it by the external bounding imposed by a higher geometrical species of continuum.

"4. Circular action bounds externally, and thus determines all linear species of constructions." (Lyndon LaRouche, *On the Subject of Metaphor*, Schiller Institute, Part I of II, from Fidelio Magazine, Vol. 1. No 3, Fall 1992.)

4. UNIVERSAL CHIRALITY AND THE ROBERVAL PARADOX

"There always exists in nature something more than can be determined by geometry."

Leibniz letter to Huygens, June 12/22, 1694.

There are many odd things in the universe, but a very perplexing one is why you can't shake hands with yourself. And the answer is that the universe can't do it either. Why? Because matter and anti-matter reflect similar dissymmetrical chirality in the universe as a whole. Although left and right may always be together, they can never meet. How do you solve this little enigma?

The way I started looking at this problem of chirality is with Roberval and his construction of the cycloid. The idea to focus on, here, is not to determine which direction the circle is moving, but to solve the paradox of the cycloid in the manner that Roberval had solved it, by construction.
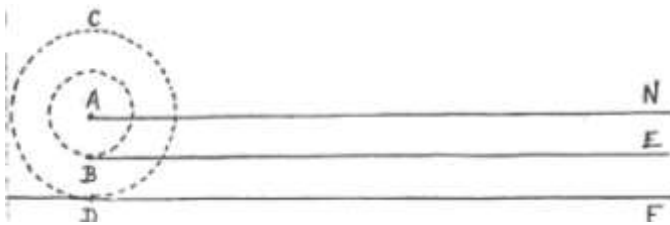

Figure 6 The paradox of the *Rota Aristotelis*: **"Why is it that when two concentric circles are rotated together, they travel the same distance, while they travel different distances when rotated separately?"**
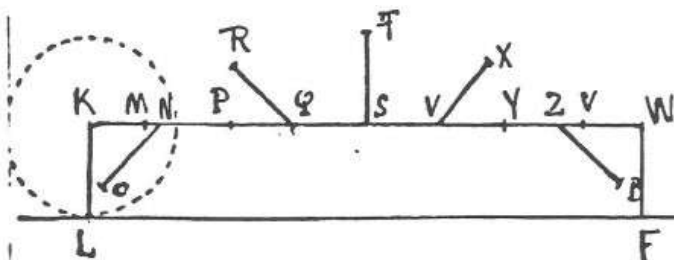

Figure 7 Roberval's solution of the cycloid paradox with a double motion: transporting and rotating at the same time. While point L rotates to point F, Point K is transported to point W.

This transporting process changes the understanding of what a circle represents. A circle is not simply a round thing; it is the result of an action that closes on itself, and when that action rotates, it carries that action with itself into a second motion to generate transcendental curves called cycloids. Cycloids also attain complete closure by such a composed motion, when they come to the end of their double motion. As Lyn showed, it is such an isoperimetric least action closure which determines the boundary conditions of a doubly-connected form of simple self-similar circular least action. Such is the axiomatic limit of least circular action in the Cusa model of (**Figure 3**) "The Trine Distinctions" of the Trinity.

How then, is the hypothesis of changing that limit such that a higher form of least action can be moored to the same mental boundary-conditions? In other words, how do you change the past? This is what I will now investigate by attempting to show how boundary conditions of mind remain unchanged externally while everything can be changed internally. The only necessary precondition is for this process of change to go beyond DOUBLY-CONNECTED SELF-SIMILAR CIRCULAR ACTION as shown above. How do you do that?
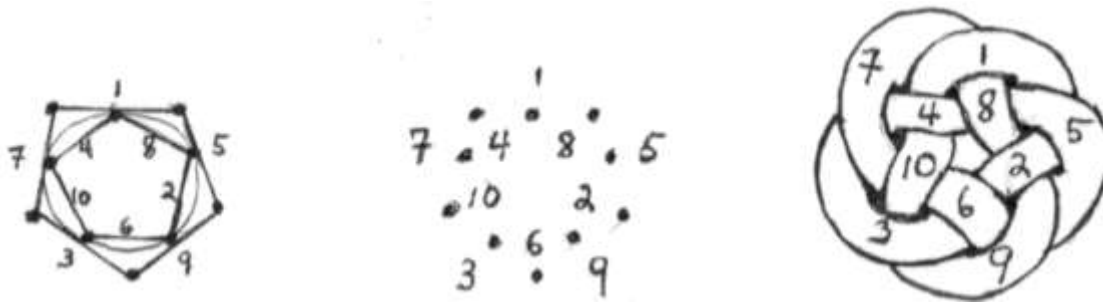

Figure 8 How to axiomatically change from simple circular action of the circle to the triply-connected poloidal-toroidal action of the torus. Since the poloidal action is 3 and the toroidal action is 5; then, the P:T ratio is 3:5

How can you resolve that anomaly and bring those two series of odd and even numbers together? How can both series belong to the same numbering process? How do you go beyond the limitation of a circle and jump between an inscribed and circumscribed polygon? Think of this bold action as similar to Cusa's isoperimetric circle problem. How can you bust the fallacy of squaring the circle? How can you bridge the discontinuity between the inscribed and

circumscribed polygons with a higher form of action that isn't there, but which will enable you to go in and out of the circle at will?

My diagram of choice (**Figure 8**) is a Torus of modular wave which functions on the basis of three different self-similar actions: 1) TRANSPORTING ACTION, 2) POLOIDAL ACTION, AND 3) TOROIDAL ACTION. Take the following heuristic pentagonal transformation as a means of solving the three mind problem of the Peace of Westphalia, and don't look at numbers as quantities but as modular stepping stones in a pathway of resolution of conflicts. How do you go beyond the discontinuity among even numbers inside and odd ones outside of the circle? The anomaly is solved by going through a continuous process of moving clockwise through the Torus following the ordering as in **Figure 9,** and generate a total of 1+ 5+ 7+ 8+ 4+ 2, = 27 poloidal waves back to 1. The reader can learn how to go through the process by reading my report: **THE SOLFEGE TORUS**.

I chose that heuristic device because solfège speaks to the soul; and therefore, it is capable of resolving axiomatic differences between Sol and Fa in a manner that no other dissonance can. Since it is this conflicting area, between Sol and Fa with respect to Do, which is the home of the creative musical soul, I assumed that the geometry of a SOLFEGE TORUS must be the least inappropriate geometrical construction to demonstrate the process of triply-connected braiding action that the creative mind has to go through to access a higher domain.
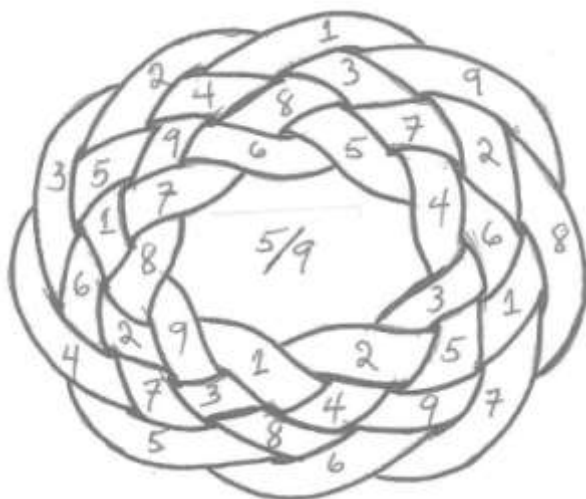

Figure 9 THE SOLFEGE TORUS
Three clockwise triply-connected-self-similar torus actions starting at 1 and returning back to 1:

1) **Transporting motion**: 4 cycles of 9 successive units of distance.
2) **Rotating motion**: 9 poloidal waves of 5 units of distance.
3) **Orbiting motion**: 16 toroidal cycles of 27 poloidal waves of 5 units of distance.

Figure 10 THE SOLFEGE TORUS. Add your own Every Good Boy Does Fine and FACE in the appropriate intervals of action. Think of this as a thought-object representing quantum tunneling of axiomatic changes. This is a mental plasma stellarator that fuses old ideas to generate new ideas.

In the opposite counterclockwise direction, however, the **transporting motion** remains the same but the **rotating** and **orbiting motions** are completely different. That inverse poloidal rotating motion is characterized by three numbers which are missing in the clockwise motion. Those numbers are 3, 6, and 9. In solfège terms, they correspond to Si, Sol, and Re, which are the three notes played at a military funeral service. I cannot explain this anomaly at this point in time; but, maybe you can.

5. GERMAN FUSION STELLARATOR CREATES BREAKTHROUGH IN THE GEOMETRICAL EPISTEMOLOGY OF FUSION PLASMA

> *"IPP is concerned with investigating the principles underlying a power plant, which – like the sun – will produce energy from the fusion of light atomic nuclei."*

> **https://www.ipp.mpg.de/2285/en**

According to **Nature Communications,** November 30, 2016, the German team of plasma physicists from the Fusion Stellarator Reactor at the Max Planck Institute of Plasma Physics (IPP) in Greifswald, Germany, has achieved a new breakthrough with the **Wendelstein 7- X (W7-X) Stellarator.** The achievement was reported in an article by Thomas Sunn Pedersen and associates, **Confirmation of the topology of the Wendelstein 7-X magnetic field to better than 1:100,000.**

The reason why I am reporting this breakthrough is because the physicists of the Max Planck Institute of Plasma Physics have been following a method of constructive geometry similar to what I have used above. They have broken through a mental axiomatic barrier to better understand the behavior of the plasma and they have succeeded. In other words, instead of attempting to force the plasma into an academic corset of their choice, the team has constructed a geometrical design to channel, control, and determine the physical behavior of the plasma within very precise boundary conditions.

As a result, the shape of their discovery may not win a beauty contest (See **Figure 11**), but these researchers were able to tailor the constructive geometry of their coil magnets to the nested magnetic surfaces in congruence with the behavior of the plasma confinement within a deviation of less than one part in a hundred thousand. This is quite a remarkable achievement.
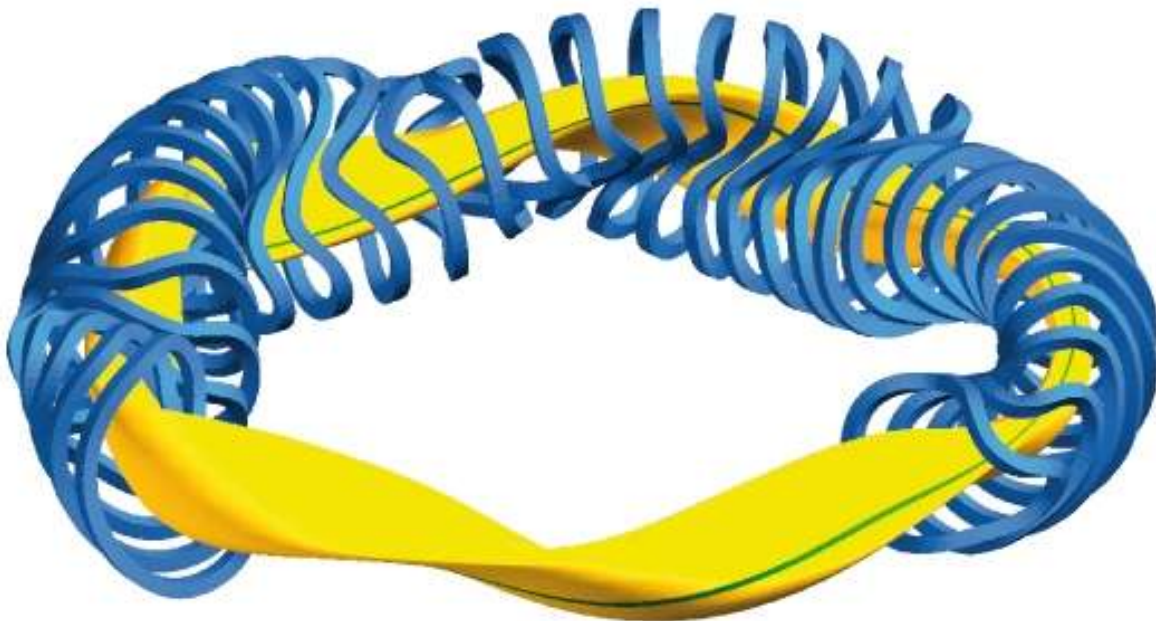

Figure 11 The fivefold symmetry of the **Wendelstein 7-X -- from concept to reality** from the Max-Planck Institute for Plasma Physics. This illustration of the stellarator design shows 35 superconducting magnetic coils (blue) surrounding a fivefold twisted plasma Torus (yellow). A magnetic field line is highlighted in green on the yellow plasma surface.
https://www.youtube.com/watch?v=An2Go1ldw-M.

Because of this successful geometrical stellarator design, physicists estimate that the W7-X could sustain a hot plasma at about 150 million degrees Celsius for at least 30 minutes at a time, which would be much higher than its closest competitor, the French Tokamak "Tore Supra," which is currently the world record holder with six minutes and 30 seconds. If the W7-X were to succeed in fully demonstrating the validity of their epistemological method, humanity could be in a fusion based economy within a few years.
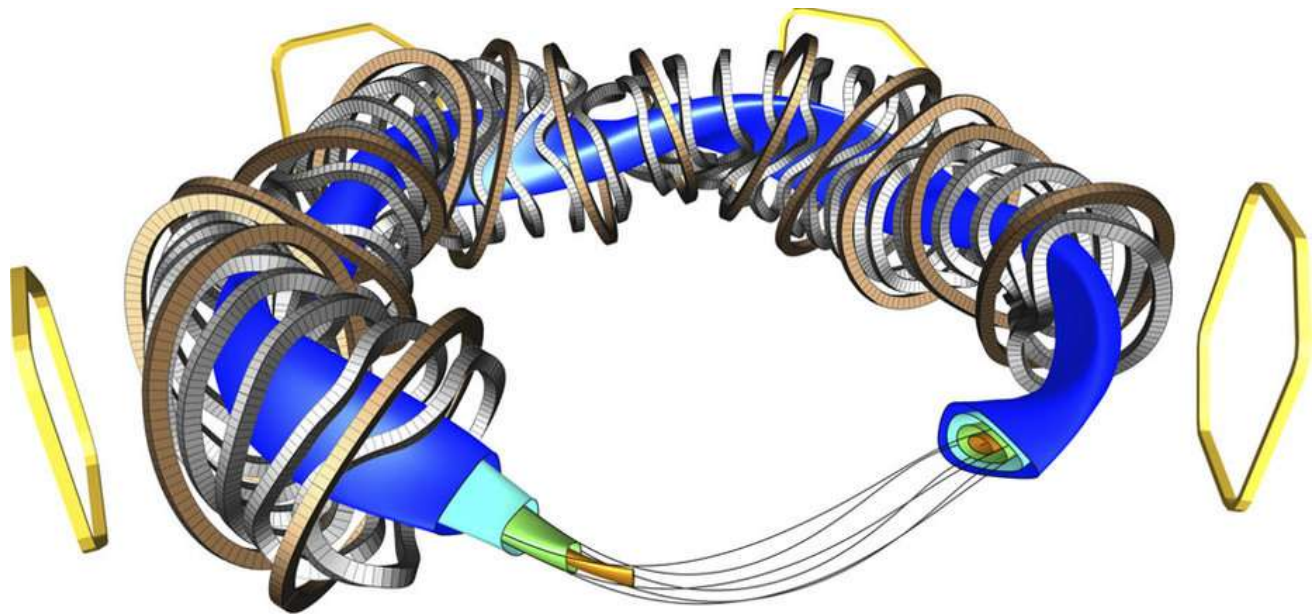
Figure 12 "Some representative nested magnetic surfaces are shown in different colours in this computer-aided design (CAD) rendering, together with a magnetic field line that lies on the green surface. The coil sets that create the magnetic surfaces are also shown, planar coils in brown, non-planar coils in grey. Some coils are left out of the rendering, allowing for a view of the nested surfaces (left) and a Poincaré section of the shown surfaces (right). Four out of the five external trim coils are shown in yellow. The fifth coil, which is not shown, would appear at the front of the rendering." (**http://www.businessinsider.com.au/germany-is-turning-on-its-monster-stellarator-2015-10**)

In comparison with the Tokamak, what the Stellarator W7-X concept represents is a revolutionary physical geometry which accounts for ***what is not***

there; that is, the creation of nested toroidal magnetic surfaces being produced from external magnetic coils. Thus, the plasma is entirely man-made or composed by computer design. (See **Figure 11** and **12**) As Pedersen reported:

> "Each magnetic field line meanders around on its magnetic surface; it never leaves it. In general, if one follows a field line from one point on a magnetic surface, one never comes back to the same exact location. Instead, one covers the surface, coming infinitely close to any point of the surface. The stellarator is different from the other toroidal magnetic surface concepts in that both the toroidal and the poloidal field components—which together create the magnetic surface topology—are created from currents in external coils. In the tokamak and the reversed-field pinch, a strong toroidal current driven within the plasma is needed to generate the poloidal magnetic-field component. The stellarator's lack of a strong current parallel to the magnetic field greatly reduces macroscopic plasma instabilities, and it eliminates the need for steady-state current drive. This makes it a more stable configuration, capable of steady-state operation. These are important advantages for a power plant."(Thomas Sunn Pedersen and associates, ***Confirmation of the topology of the Wendelstein 7-X magnetic field to better than 1:100,000.***)

Although it is the magnetic surfaces of the plasma which guide and guarantee good confinement for the particles, it is the artistic composition of the external magnetic coils which transports the entire process. In other word, what you are looking at is a scientific revolution controlled by an instrument capable of tuning and transporting the plasma into unperturbed poloidal rotations and toroidal orbits around the torus. It is the degree of mastery in the resonance of this electromagnetic instrumentality which produces the higher resolutions of dissonances in the plasma system like the mastery of a Stradivarius transporting a creative composition to its higher perfected resolution.

Dissonances, however, appear in the configuration of the plasma as "island chains" or clusters similar to a collection of islands forming an archipelago. Such chains appear with resonant values similar to the three-mind-problem we have seen above, but they are produced due to a faulty placement of a superconducting coil.

How, then, do you solve the fallacy of squaring that circle? Pedersen reported: "These deformations, due to the electromagnetic forces between the magnets, cause a roughly 1% decrease in ι, thus shifting the location of $\iota=5/6$ a few centimeters outward from where they would be without coil deformation." **Figure 13** shows what the singularity of an "island chain" dissonance looks like as a result of a slightly faulty coil position.
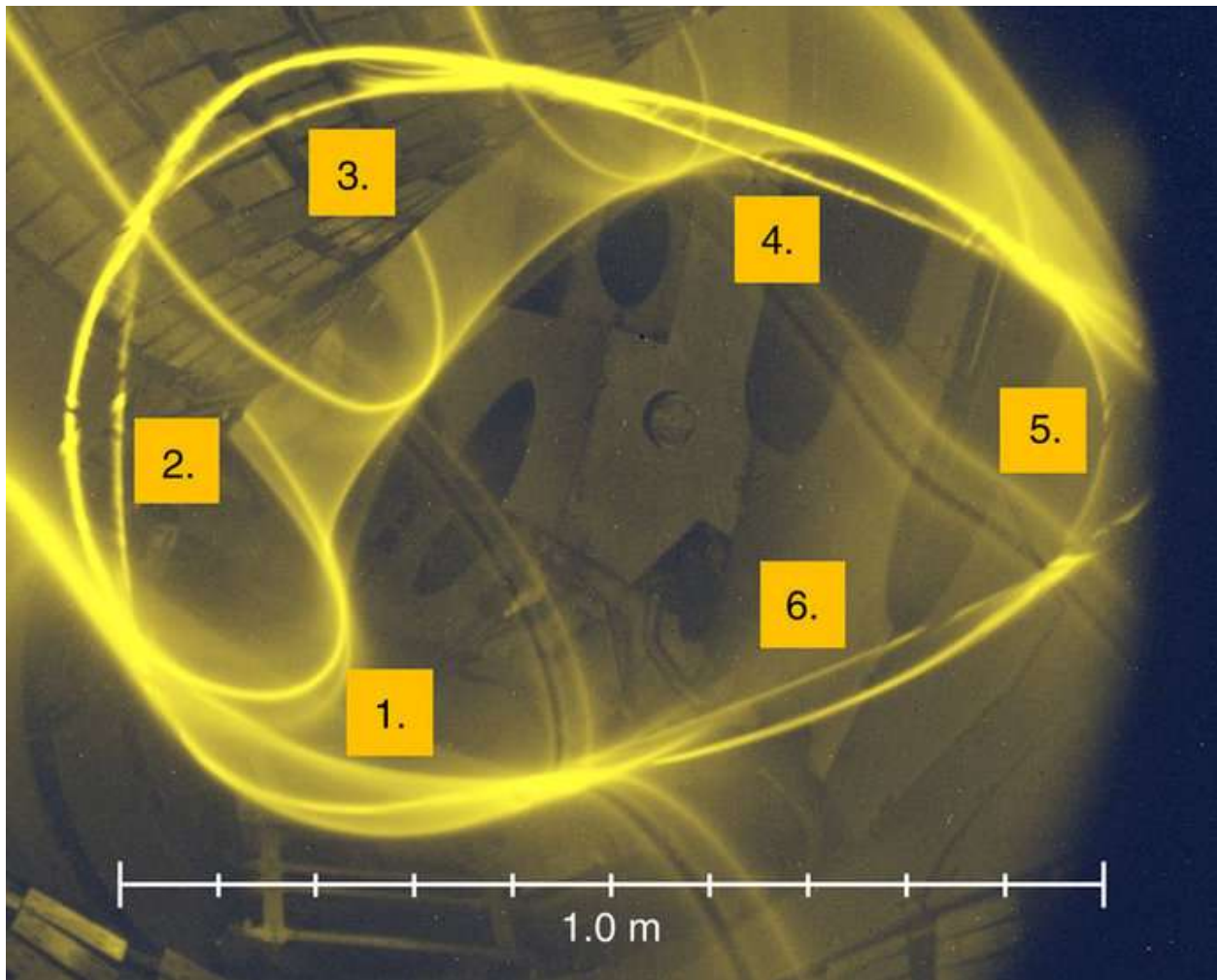

Figure 13 The caption says: "The 5/6 island chain is visible in a poloidal-radial Poincaré plot created by an electron gun and a sweep rod, as a set of six 'bubbles', reflecting the $m=6$ poloidal mode number. A thin background gas in the chamber creates a visualization of the field lines that create the x-points of the island chain."
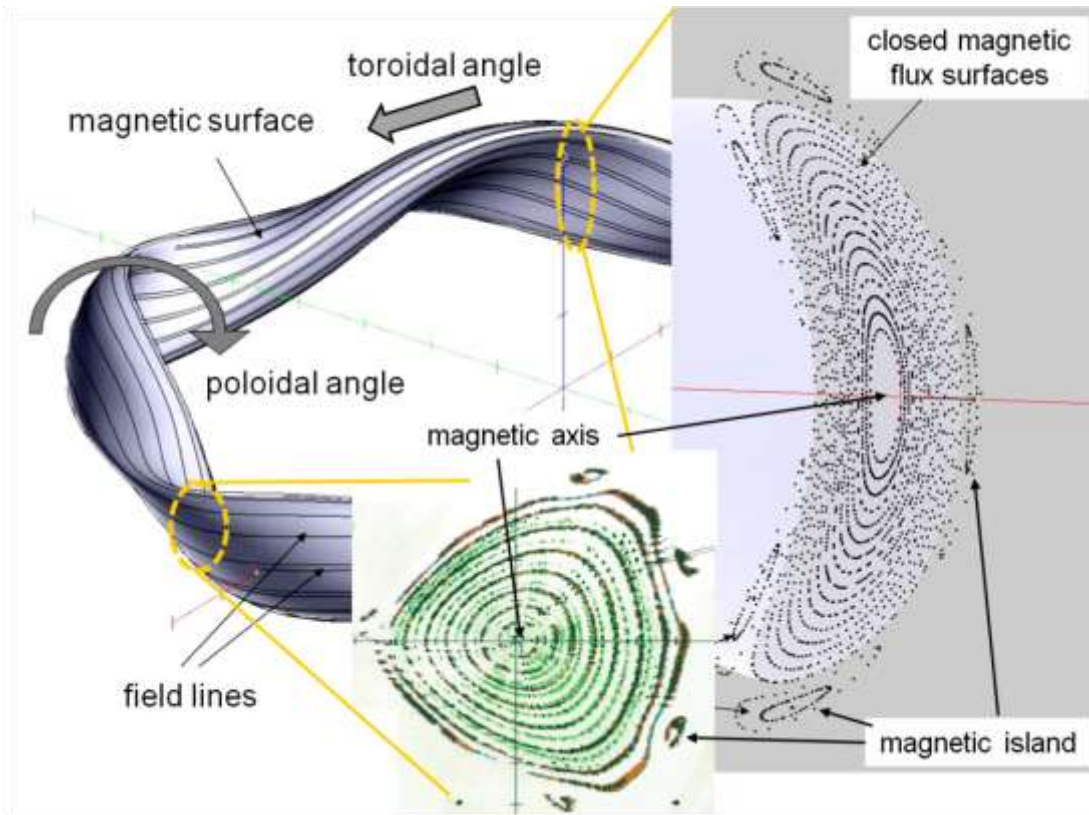
Figure 14 Location of singularities (magnetic islands) in the stellarator plasma.

The revolution, here, lies in the fact that the German team of the stellarator was able to *change the boundary conditions* of how to think beyond simple circular action and replace their way of thinking with the higher geometry of the Torus. Moreover, they were also able to discover *what is not there* by inversing and replacing discreteness and linearity with the non-linear geometrical flow of the plasma. Although this new axiom busting moment in knowledge is not yet fully understood and recognized, the epistemological plasma Rubicon has been bridged.

At, length, the team of researchers involved is very discrete about its revolutionary significance and they are cautious about predicting commercial fusion energy any time soon. As Pederson concluded: "To reach the other goals of the device, and provide an answer to the question 'is the stellarator the right concept for fusion energy?', years of plasma physics research is needed. That task has just started." (Thomas Sunn Pedersen and associates, *Confirmation of the*

topology of the Wendelstein 7-X magnetic field to better than 1:100,000. *Nat. Commun.* **7,** 13493 doi: 10.1038/ncomms13493 (2016).

Thus, the performative physical geometry of the Wendelstein 7-X works as a proof in the pudding that their Pythagorean Theorem method is the right method to adopt for doubling the energy-flux-density of the plasma, simply because the minds of their researchers were able to replicate *what they say and do* with a similar Pythagorean method of *changing the boundary conditions* of the problem and by looking for *what is not there*; that is to say, for the inversion of what is there.

I remind the reader that this method of axiom busting was first introduced to the organization in Lucketts Virginia, under the name of **LANTERNLAND**, when I taught a class of constructive geometry class on Rabelais and the construction of Platonic solids to a group of ICLC members' children during the summer of 2001. Here is part of the tune that I sang for them, at the end of that summer:
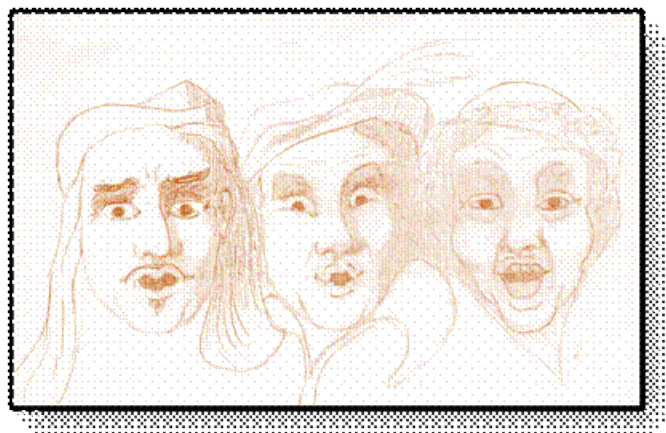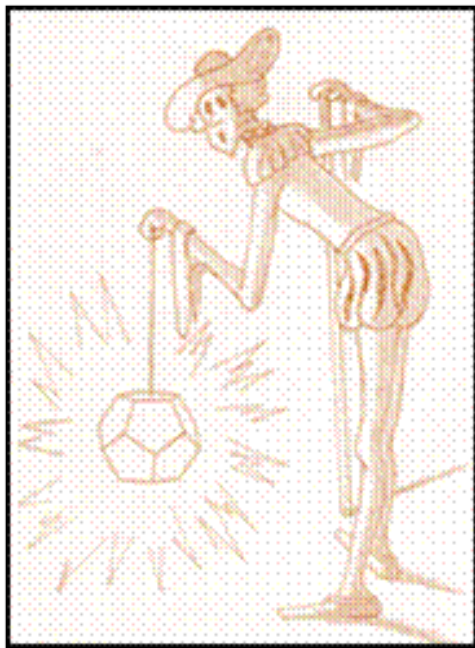

Figure 15 Dehors Debonneheure, aka Epistemon, and the three faces of discovery: Perplexity, Awe, and Laughter.

BLOW YOUR WHISTEL BLOW
A LANTERNLAND SONG

On the way to Pla-to's Ca-vern, Blow your whistle Blow.

We all made lots of discoveries in the field of Ar-chi-me-des

Ho Ho Ho! Blow your whi-stle blow.

-1-
On the way to PLATO'S CAVERN,
  Blow your whistle blow.
On the way to PPLATO'S CAVERN,
  Blow your whistle blow.
We all made lots of discoveries
In the field of ACHIMEDES
Ho Ho Ho! Blow your whistle blow.

- 2-
We've discovered BEES and HONEY,
  Blow your whistle blow.
We've discovered BEES and HONEY,
  Blow your whistle blow.
They have neighbors oh so many
  Cause they build hexagonally
Ho Ho Ho! Blow your whistle blow.

-3-
We've discovered our FROG HENRY,
  Blow your whistle blow.
We've discovered our FROG HENRY,
  Blow your whistle blow.
He had fallen in the pipe way
But DARIO raised him safely
Ho Ho Ho! Blow your whistle blow.

-4-
We've discovered EPISTEMON,
  Blow your whistle blow.
We've discovered EPISTEMON,
  Blow your whistle blow.
He's the greatest MIDNIGHT OILER
With a wonderful demeanor
Ho Ho Ho! Blow your whistle blow.

FIN