MAY THE FORCE BE WITH YOU

The Platonic theory of spacetime introduces a gravitational dipole of negative|positive mass, in which the "negative mass" is interpreted as Platonic reality placed in the potential future of a global arrow of Time, thanks to which the *positive* mass is endowed with self-action: it acts on itself, and by itself. This is the fifth force. There is no "dark energy".

Ladies and Gentlemen,

It is my great pleasure to announce a major breakthrough in Physics: a new force of Nature (pp. 7-8 in *The Fifth Force*). Given the previous four forces, it will be the fifth force (*ibid.*, p. 2). It makes all forces self-acting (p. 2). All energy conditions *are* to some extent "violated" (p. 12): read p. 7.

The **fifth force** has a very wide triple presentation. It (not "He") is the "timelike vector field" as energy from geometry (Slide 1 and Slide 2), thanks to which we face the *asymmetry* of past and future. It also delivers the energy of gravity, still unexplained in General Relativity. And thirdly, the fifth force is the force of Life (Erwin Schrödinger), as it empowers all living organisms. I will elaborate on the latter point shortly, by explaining the new physics of the human brain. First, let me set the record straight.

My full name is Dimitar G. Chakalov (pronounced *tcha-KA-lov*; notice the accent on the *second* syllable). I am the founder of spacetime engineering. It is a new field of natural science, nested at the interface of life science, psychology, and physics. Read about spacetime engineering and the fifth force at my website chakalov.net, and notice at the end the purpose of my project. If you're short of time, read closely the first paragraph at the top. Now, I will briefly explain the crux of the fifth force as the force of Life. See photo 2 and recall the binding phenomenon (no privileged brain area). The brain uses energy at every local area, following the rule 'think globally act locally'. The "thinking" has unique physical origin: the matrix (p. 7 in *The Fifth Force*). The mind does not act *directly* on its brain.

Physiology of *activity* (N. Bernshtein, p. 13 in Intro.pdf): compare it with the energy and momentum of a billiard ball kicked with a stick. The ball is *not* animated, meaning it is not 'active'. In Force.jpg, the energy of the animated ball (gimbal) springs from the "negative mass": watch ball.mp4 and notice the *evolution equation* on p. 28 (last) in *The Physics of Life*.

Key point: new self-action. Not like Baron Munchausen. Illustration with a kitchen glove: the **fifth force** makes all four forces self-acting. No "mental energy", no "dark energy", no "gravitational energy", and no physical force of the arrow of Time either. We only have self-acting 'gloves' empowered by the fifth force, like the Platonic 'hand' *inside* the physical 4D 'glove'.

Read Addendum 1 (excerpt below) in *Spacetime Engineering 201*, pp. 7-9. **Time** is a complex phenomenon with *necessary* and *sufficient* components, which cannot be separated. The billiard ball (watch again ball.mp4) is set in motion by both the necessary physical component (the stick) and the **sufficient** component from the global Heraclitean Time: the fifth force. **It** (not "He") springs only from the energy of geometry (Slide 1 and Slide 2).

Thus, the ball is literally **acting on itself**, like the physical glove below.

7

Addendum 1

If you think of the **fifth force** (p. 6) as some *physical* field, you will have to call this new physical field "dark matter" and "dark energy" (Addendum 5), and speculate extensively about "black holes". Don't.

The **monad** itself has no *windows* through which something can enter or leave (Leibniz, *Monadology* 7). The **Platonic** hand has no *windows* either. We see only its 4D glove, and can deduce the existence of **Platonic** hand only from the **self-acting** faculties of its glove.

Although the fifth force is executed only *by* the glove, it cannot be derived exclusively *from* the glove; for example, one cannot derive the *asymmetry* of Time (p. 1) from matter and fields constituting the 4D 'glove'.

Let's see how we can propel the ball/glove like a gimbal. This is not some propellantless propulsion with "dark energy", but the fifth force in action.
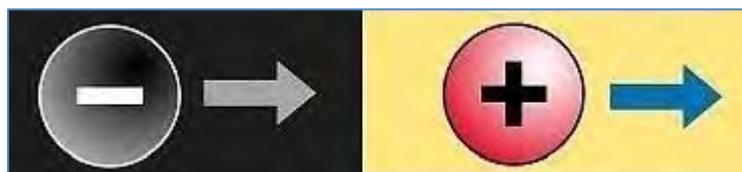


We need quantum gravity to unite the *physicalized* energy from gravity with the *physicalized* energy from the quantum vacuum. And we must get the job done before 2030, to prevent the upcoming climate catastrophe.


The Fifth Force: Proof of Concept
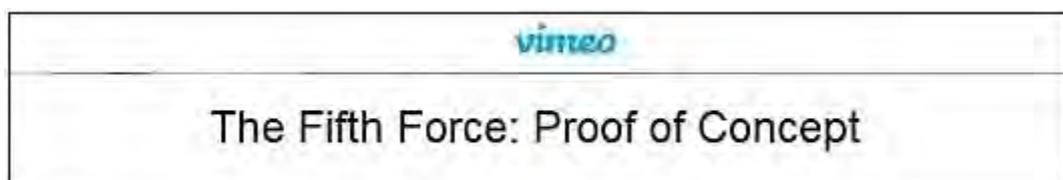
Impossible? Like "stones cannot fall from the sky" (p. 4 in *The Fifth Force*)? Let me try to explain your confusion with an analogy from Wikipedia below.

The human brain and its mind (or if you prefer, the human mind and its brain) are *completely* and *totally* different things. They are "connected", but how? As an illustration of the puzzle, see the two 2D drawings below, which are made of the same stuff and are only slightly different.
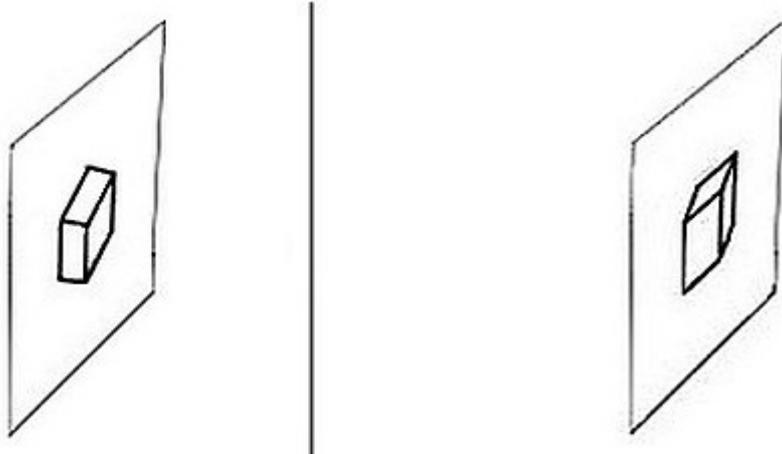
The two 2D drawings above have a common origin: the blue 3D cube below.
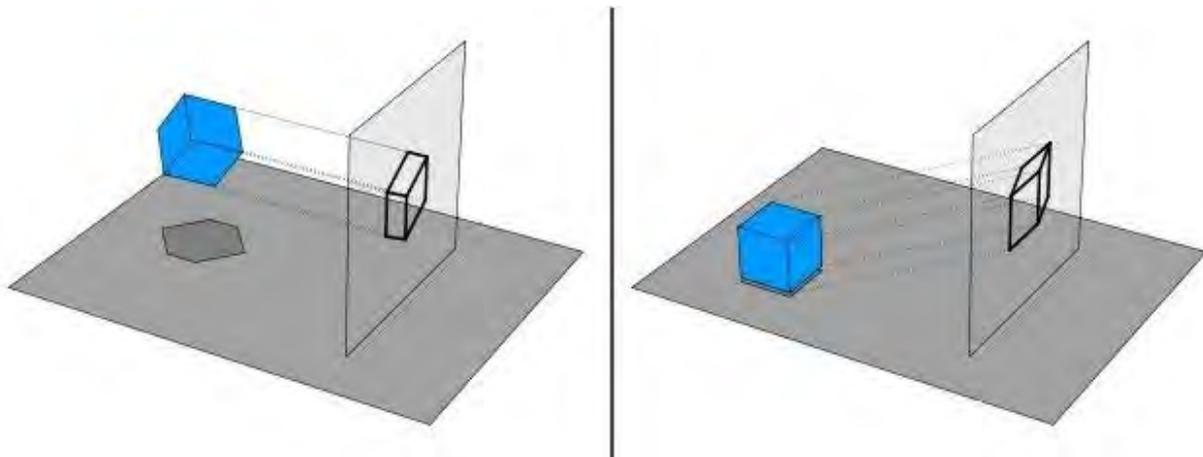
If the blue 3D cube rotates, its two (complementary) 2D projections will change accordingly. Thus, the "connection" is made by, and passes through their common 3D source. Simple and clear. Our case is much more difficult to explain, firstly because the common source of matter and psyche is *not* physical stuff: it does not live anywhere on the light cone. With light, we do *not* have access to our "blue cube". With light, we see only its physical, **4D** "projection" — the human brain — and can "see" our subjective world only with introspection (*ibid*., pp. 2-3). As Thomas H. Huxley remarked: "How it is that anything so remarkable as a state of consciousness comes about as a result of irritating nervous tissue, is just as unaccountable as the appearance of the Djinn, when Aladdin rubbed his lamp."

In the doctrine of *trialism*, the "blue cube" is Platonic "**trunk**". Clear, but not simple. Read *Notes on Spacetime Engineering* and *The Physics of Life*.

Now, in order to propel the ball (p. 2) like a gimbal, first you have to follow the Law of Reversed Effort: "To the mind that is still, the whole universe surrenders" (Lao Tzu). This is how you can access the *sufficient* condition (p. 1) viz. the fifth force. It will *unfold* toward you (Q1). No, you can't do it with "meditation". The task is to obtain particular *qualia* from the **future states** of the ball: the **matrix** (p. 7 in *The Fifth Force*). Then the ball will be "animated" and included in your body schema.

You only have to swing the **carrot** toward your preferred destination, and the donkey — not you — will carry you and the cart there. The **self-energy of the** "animated" cart/ball (p. 2)/gimbal comes from the fifth force (p. 2). The **self-energy** of, and the **self-action** by the fifth force (p. 1) are *not* like Baron Munchausen. Newton's 3rd law is *not* valid here. Read closely *RS Spacetime*.

Nature employs spacetime engineering, we only have to follow its rules. The inertial reaction forces (John A. Wheeler) are **instantaneous**: read p. 13 and p. 19 in James F. Woodward and Thomas Mahood. Thanks to the fifth force, we see — with light — only the net effect called *positive* mass.
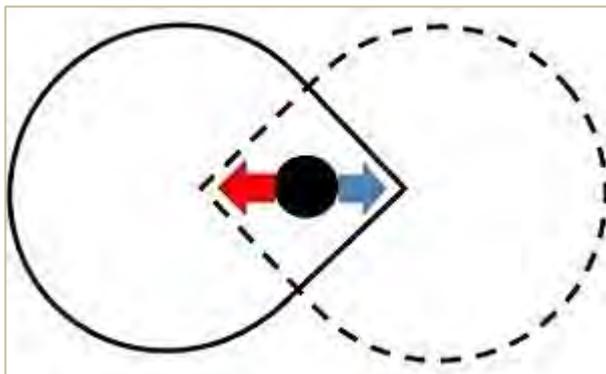
If you are in a car at rest placed on a scale, the latter will measure the **net effect** of two opposite and *conceptually distinct* (Wikipedia) components. But if the car is on a road and is accelerating, people claim that the same **net effect** will emerge **instantaneously** as 'inertia' (you will be pushed back by the **red** arrow). Why apply "brakes" to mass? Because *accelerated* bodies encounter the resistance of *attractive* gravity. Now add a "push" from *repulsive* gravity: read **NB** on p. 5 in *RS Spacetime*.

Acknowledgments

D. Chakalov
23 June 2022, 08:28 GMT

Q1: Can I learn spacetime engineering?

A1. In the doctrine of *trialism*, the Universe *and* God as Love (1 John 4:8) are indistinguishable — **not** identical. Read p. 6 in *The Fifth Force* and C2 on p. 13 in *Quantum of Spacetime*. First, you will have to learn the nuts and bolts of the theory, which is the *necessary* condition. Otherwise you will be only 'kicking spoons on the floor': read p. 8 in *Notes on Spacetime Engineering*. But to access the fifth force — the crucial *sufficient* condition explained on p. 1 — ask God (Matthew 7:7) to give you the strength to help people in need. Thus, all spacetime engineers will practice natural healing as well, always free of charge. If you do not feel the *need* to help people, like a family doctor or a nurse, you will never get help from God viz. from the Universe by the fifth force and will be helpless, like a lonely fish. You will be able only to play with parapsychology and entertain people. If all these "magicians" worked under strictly controlled conditions, there will be no "magic" and no "mystery". Can't get seriously rich from science.

Again, the *necessary* condition is very simple: all you need is at my website. But the *sufficient* condition (p. 1) is a matter of your free will choice.

Q2. I cannot understand your ideas about the inertial reaction forces (p. 4).

A2. My ideas are related to the theory of Dennis Sciama (20 August 1952): "*the motion of the universe*" refers to the *non-relational* Time (Sic!) in *RS Spacetime*. We also suggest a new *quasi-local* dynamics of gravity — think globally act locally. The "thinking" is performed by the **Platonic** quantum-gravitational world, which is being "already" re-nullified at every instant 'here and now': read p. **6** in *RS Spacetime*. The "quantization" due to the lattice of 4D spacetime is *not* observable 'online' with light. Secondly, to grasp the two opposite and conceptually distinct components (p. 4), think of a bucket you can fill with a hot and cold water: the bucket always has "positive" water (positive mass), but can have different temperature, like the three cases of *balanced* mass-energy-momentum explained on p. 12:

$$\text{4 apples: } T^{ab}{}_{;b} = 0 \qquad \text{5 apples: } T^{ab}{}_{;b} = 0 \qquad \text{2 apples: } T^{ab}{}_{;b} = 0$$

Those who reject my theory of gravity as "too speculative" will be kindly invited to explain the Earth tides with GR (MTW p. 467). The non-tensorial Christoffel symbols cannot rotate the Earth *and* pull up↑ rocks.
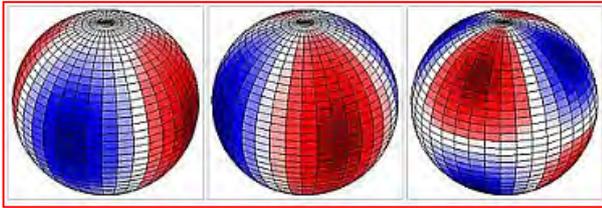
If GWs transported energy, they will be *physical* waves; if GWs *cannot* transport energy, they will be some parapsychological ghosts. This is the dilemma in GW parapsychology.

You need *quantum gravity* to understand the coupling of matter to gravity. Then you can (hopefully) resolve the puzzle with the object below. Many people imagine a "black hole" lurking underneath, which is yet another case of the old Tanzanian saying: How do we know that Father Christmas has a beard? We know it, because snow falls when he shakes his beard.
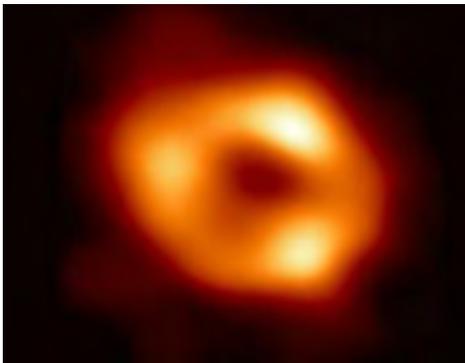
The Event Horizon Telescope project, a collaboration of more than 300 academic scientists from 13 institutions, announced recently "the first direct image of the gentle giant in the center of our galaxy." It is called Sagittarius A*. Reinhard Genzel and Andrea Ghez were awarded the 2020 Nobel Prize in Physics for … *what*? For those "black holes"?

We do not live in some "vacuum". Besides, the time-like naked singularity is inevitable in GR textbooks, only it never happened. The fuzzy photo is from a supermassive body at the center of the Milky Way (Angelo Loinger).

Again, if you disagree, try first to explain the mundane case of Earth tides above. Keep in mind that Einstein's GR does not and *cannot* explain the origin of 'energy from geometry' (Dianna Cowern, see the problem here). GR cannot *in principle* incorporate the intrinsically *non-linear* gravitational radiation. Unlike the linear EM radiation, which does *not* carry its source (e.g., electrically charged particles undergoing acceleration), the genuine *non-linear* gravitational radiation *always* transports its source. But there is no way to modify Einstein field equations to 'act on themselves' and "fly".

NB: There is no proprietary gravitational energy (p. 6): the fifth force makes matter and fields *gravitalized* and delivers the effects of gravity. We need Mathematics to unravel the new hyperimaginary numbers (p. 6 in *RS Spacetime*) and try to solve the staggering problems of number theory, point-set topology, and set theory. If you have professional experience in topology and differential geometry, send me an email. The task is tough*.

Q3. Where did all the matter of the universe come from?

A3. From the monad *without* windows (p. 4 in *The General Rule* 1 + 0 = 1).
Let me quote Krister Sundelin: "An analogy would be if you imagine that
you are broke. You have $0 on your bank account. Then you take a loan of
$100,000. You have $100,000 on your bank account, but you also have a
$100,000 debt, so your net fortune is zero. If you then buy a house for
$100,000, you have $0, a house, and a $100,000 debt. Your net fortune is
still zero, but now you can live in it."

Stated differently, your energy ("money") is *always* re-**nullified**: check out
the explanation here and the equation on p. 28 (last) in *The Physics of Life*,
pp. 25-26 in *Can Geometry Produce Work*, and the essay on gravity here.

Yes, we can "borrow" unlimited clean energy from the quantum vacuum.
Notice that "quantum field theory only cares about energy *differences*.
(…) In terms of energy density, this is about 10^{-9} joules per cubic meter.
(...) Using $E = mc^2$ to convert between energy and mass, it corresponds to a
mass density of about 10^{96} kilograms per cubic meter!" (John Baez). How
can we square the circle? Read the preceding paragraph above.

Fortunately, you did not ask the question '*when* did all the matter of the
universe come from', because this question is based on a wrong, albeit
inevitable, premise leading to the so-called **metric paradox**. Once we
introduce the metric of spacetime, after Hermann Minkowski did on 21
September 1908, we face the *temporal* origin of spacetime which should
have existed "before" the instant of creating spacetime endowed with
metric. This **metric paradox** prompted Yakov Zeldovich to suggest that
"long time ago, there was a brief period of time during which there was
still no time at all." He was, of course, joking. Details in *RS Spacetime* and
p. 3 in *The Arrow of Spacetime*. In short, see Slide 1, Slide 2, and Slide 3.

The mathematical solution of the **metric paradox** is yet to be discovered.
The conceptual solution (Slide 3) is grounded on the Unmoved Mover. It
(*not* "He") is the engine of the fifth force: the *sufficient* component of
Time (p. 1). Physicists like G.F.R. Ellis acknowledge only the *necessary*
component of Time, and are terribly bewildered by "mystery matter".

Perhaps you only need Mathematics to understand the origin of gravity and
the **Platonic** form of reality — "just in the middle between possibility and
reality" (Werner Heisenberg). Because you do need spacetime engineering:
read p. 19 in *Notes on Spacetime Engineering*. I am already old and perhaps
will not be 'in the train' to witness the irreversible climate change, but our
children and their children certainly will. Time is **running out**!

Q4. How come you aren't rich? Can you hit the jackpot?

A4. Nope. The **future** is **UN**decidable, in the sense that every event 'here and now' is fundamentally <u>under</u>determined from its history, after the Free Will Theorem. We cannot know the **future** and 'the *unknown* unknown'. Nobody can hit the jackpot. Perhaps the "jackpot" itself might eventually select your numbers that you had chosen to play the lottery, as a fact in your history. But we do not live in some pre-determined world in which every rain drop must fall *exactly* where and when Allāh "commands" it to. Thank God, the **future** is *flexible* and **open** to synchronicity. All is possible.

NOTE

As I mentioned on p. 6, the task is **tough**. There are many stories about negative mass in bi-metric theories, like S. Hossenfelder's arXiv:0807.2838. Terrible mess. Notice footnote 2 in J.S. Farnes' arXiv:1712.07962: "tachyon particles have an imaginary mass, and are not considered in this paper."

Do we have any observational evidence to discriminate between *squared* complex mass and negative mass? What if the tachyonic realm is a "mirror" unphysical world (Max Tegmark)? Frankly, we know almost nothing about the dimensionality and topology of spacetime. Back in January 1990, I made a bold statement: "the description of the bond "between" mind and matter and the description of the topology of spacetime are, in essence, one and the same problem." Earlier in 1986, I introduced the so-called *causal field* (p. 6 in *Gravitational Energy*) and explained it on 15 January 2020. Again, the *causal field* is postulated as the 'space of **Platonic** states' in which the **matrix** (pp. 5-7 in *The Fifth Force*) does its job. As an example of quantum **matrix**, read Werner Heisenberg and see Slide 12. The task is **tough**, yes.

Let me try to explain the 'space of **Platonic** states' called *causal field* or simply 'John'. It is empowered by the fifth force (see the title page) and contains no "negative mass". There is only *positive* mass, but why? Perhaps because of the *asymmetry* of time. I've been arguing since October 1998 that the *asymmetry* of time, encoded in the principle of causality, is due to the *asymmetry* of 3D space: read here. Can we unravel some blueprints of *space*-asymmetry, which make 4D spacetime time-orientable?

The first step is to show a new symmetry defined along a **3D** "axis" (watch YouTube). It starts at macroscopic scale along two opposite **3D** "directions" toward the Large and the Small: read p. 5 in *RS Spacetime* and click the drawing at left below, from Mark Armstrong, *Basic Topology*, Springer, 1997, Fig. 5.7, p. 104. The second drawing depicts sphere-torus transitions.
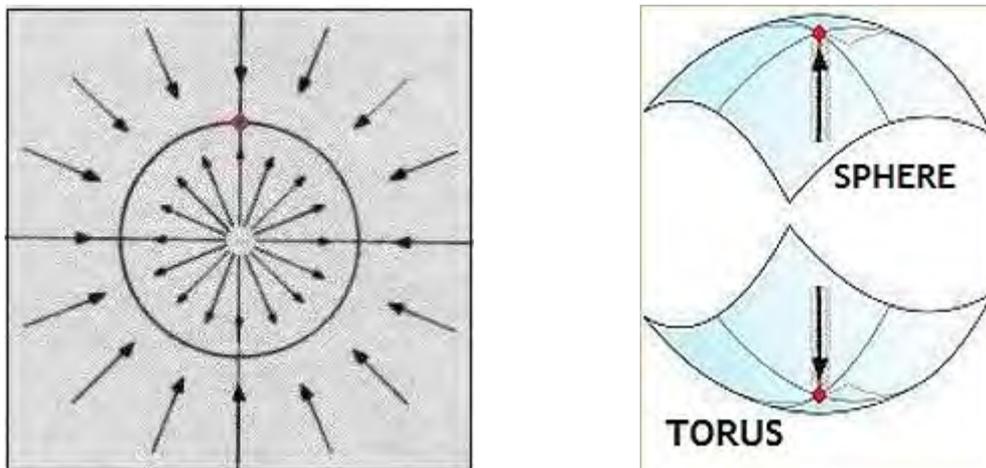
These transitions are *atemporal*, in the sense that they are not physically observable, exactly like Macavity: read p. 6 in *RS Spacetime*. With light, we can see only their consecutive end-results, one-at-a-time, in *asymptotically flat* spacetime endowed with CPT symmetry (Wikipedia). In the drawing below, the area "around" the two flat lines stands for 4+0 D *asymptotically flat* spacetime with dynamical topology (Slide 1 and Fig. 6).

Read Mark Armstrong and p. 8 in *Can Geometry Produce Work*.

Interested? I am always ready to explain in details. At the end of the day, I dare to suggest that the *causal field* can "bypass" the restrictions from 4D spacetime. Perhaps we can "see" everything there *simultaneously* and from *all directions*, including the inner 3D structure of solid objects and things obscured from 3D viewpoint; for example, all six sides of an opaque box (Wikipedia) and at *the same* instant everything inside the box, from "inside out". Of course, the human vision uses light (p. 31) and we cannot obtain visual image of the *causal field*. Only specific sensations from the "carrot". Again, if you are fluent in topology and differential geometry, read p. 6.

In 1932, Ernest Rutherford recalled that "anyone who looked for a source of power in the transformation of the atoms was talking moonshine". What if the transformations of spacetime can unleash unlimited energy? Moonshine?

Currently, the experts in theoretical physics and mathematics are not at all interested. The ball is in *their* court (p. 12), yet they simply do not care. Fine. As I wrote at my website, I don't need quantum gravity to explore the spiritual track of spacetime engineering (p. 7 in *The Fifth Force*). I'm fine.

23 June 2022, 08:28 GMT

In rebus mathematicis errores quam minimi non sunt contemnendi
Bishop George Berkeley

Can the spacetime emerge from 'something else'?

First, some prerequisites from the notions of *neighborhood* and *continuity*. To quote John M. Lee:[1] "Aside from the simplicity of the open subset criterion for continuity, the other reason for choosing open subsets as the primary objects in the definition of a topological space is that they give us a qualitative way to detect "nearness" to a point without necessarily having a quantitative measure of nearness as we would in a metric space."

But to detect "nearness" to a point and define the notion of *continuity* from any given point to the *neighboring* one, we need to zoom on their *neighborhood*. The latter has non-trivial structure, dynamics, and topology (Fig. 1 and Slide 1). To obtain a 4+0 D spacetime with dynamical topology, we will let the topology to *evolve* by "adding a hole where there was none" (D. DeCarlo and J. Gallier). Namely, we will insert a new "hole" [Q_0, Q_∞], denoted W (p. 24), at the future (P) of *all* spacetime points Q in Fig. 1.
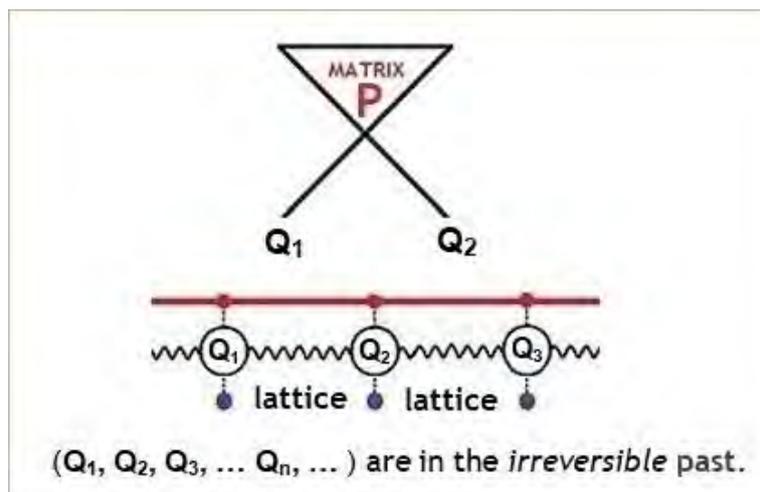

Fig. 1. See Slide 1.

The reason we propose a new model of spacetime is that the current one[2] contains unacceptable limitations, and can be pictured as 'spherical cow', at best. In my opinion, the suggestion about "open subsets as the primary objects in the definition of a topological space" and those of *neighborhood* and *continuity* (J.M. Lee) are sheer mathematical poetry. Let me explain. At the end, I will introduce sphere-torus dynamics of 4+0 D RS Spacetime.

Any error, no matter how small, is not acceptable in Mathematics, says George Berkeley. Corollary: Any idea, which may sound "intuitively clear" but leads immediately to logical contradictions, will be considered false.

For example, consider a blue circle with red diameter, like the one below.

Fig. 2

It may sound "intuitively clear" to speculate about some open interval (Wolfram) that includes *only* the blue points. Not the **two** red end points. It will be as if you have a chain of ten apples numbered from 1 to 10, and you imagine an "open" interval of eight apples [2, 9]. Besides, the set of apples is denumerable, and there are no apples *between* (Sic!) the ten apples. But in our case, we face a segment from the real number line, which is a set of infinitely many (Kurt Gödel) non-denumerable *geometric* points. How are these *geometric* points arranged into a *perfect* continuum? There can be no object "between" any "neighboring" points, which is *not* a point as well. You cannot "drill" the real number line and hit *anything* that is *not* a point. (I can, but with the so-called **hyperimaginary** numbers: read p. 6 in *RS Spacetime*.) The alleged "open subset criterion for continuity" (J.M. Lee) is sheer poetry. It may sound "intuitively clear" only to Russian "experts". Further, we can picture a set of consecutive balls (Fig. 3) with *different* states, to explain the notion of 'time as *change*', as read with a clock.
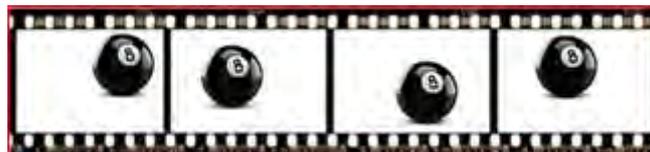
Fig. 3. See Fig. D on p. 3 in *The Arrow of Spacetime*.

In our case, the entire *background*, including the vertical black strips in the movie reel in Fig. 3, correspond to the crucial *ambient Euclidean space* [1] in which manifolds live. This is their backbone (p. 3). We will model it with the new **Zenon Manifold** [7] endowed with sphere-torus dynamics (Fig. 6).

NB: It is *mathematically* impossible to "remove" the *ambient* infinite-dimensional Euclidean space.[1] You can't paint a picture without a canvas.

If the reader still believes in spherical cows[1][2] and hopes to find solutions to the numerous problems mentioned above, I suggest to start by applying the preposterous (ε, δ)-"definition" of limit to Thomson's lamp. Bottom line is that you *may not* zoom on a single geometric point or even imagine individual *viz.* countable points. Unless of course you are Chuck Norris.

Sure enough, we can explain the fact that one can find an *exact* number as the limit of a function, thereby alleviating the fears of George Berkeley about the 'ghosts of departed quantities'. That will be easy: see Fig. 5 in *Quantum of Spacetime*. What follows below isn't. The task is non-trivial.[3] Today's theory about relating points and neighborhoods[1][2] can't help.[4][5]

As mentioned earlier, we insert a new "hole" [Q_0, Q_∞] denoted **W** (p. 24) at the **future** (**P**) of *every* physical spacetime point Q in Fig. 1 and Slide 1. Not just two "holes", as depicted in Fig. 4 from D. DeCarlo and J. Gallier.

Fig. 4. Read also Wolfgang Däumler.

To explain the initial idea, see the 2D surface of the "expanding balloon", which stands for our good old 4D spacetime as 'shadows in Plato's cave'.
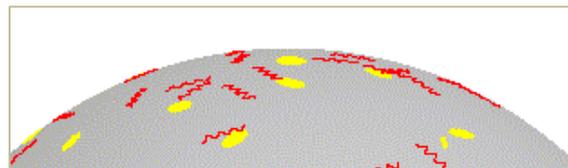

Fig. 5

We cannot show 3-sphere or 3-torus, which live in the (asymptotically flat) "surface" in Fig. 5, and will have to use in their 2D analogies. Also, notice that the crucial "hole" **W** [Q_0, Q_∞] is depicted with **red lines** [6] in Fig. 6.
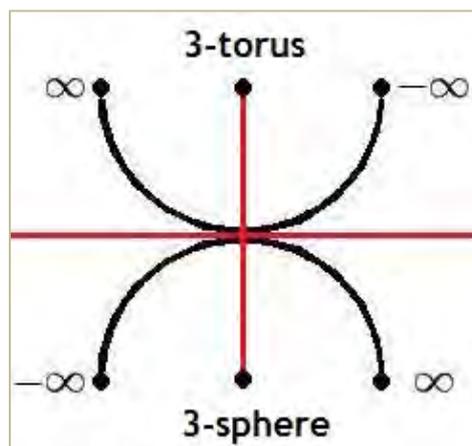

Fig. 6. Adapted from Eric Schechter.

Now the explanation of sphere-torus dynamics (Fig. 6) is straightforward, but will nevertheless require considerable mental gymnastics. Let me try.

To paraphrase the title, can the null cone *emerge* from 'something else', and the physical world becomes 'retarded light' with positive mass only?
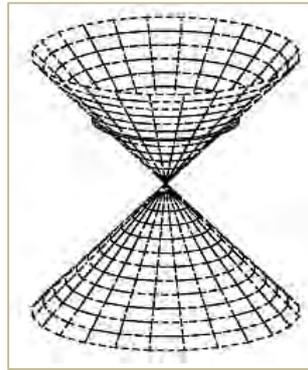

Fig. 7

Think of the null cone (Fig. 7) as some EPR-like web located "inside" every spacetime point 'here and now' (David Colasante). Our task is to map the sphere-torus transitions (Fig. 6) to the *atemporal* emergence (Macavity) of *physicalized* 4D "jackets" Q from $P_w \rightarrow P_i \rightarrow Q$ transitions (Slide 1) below.
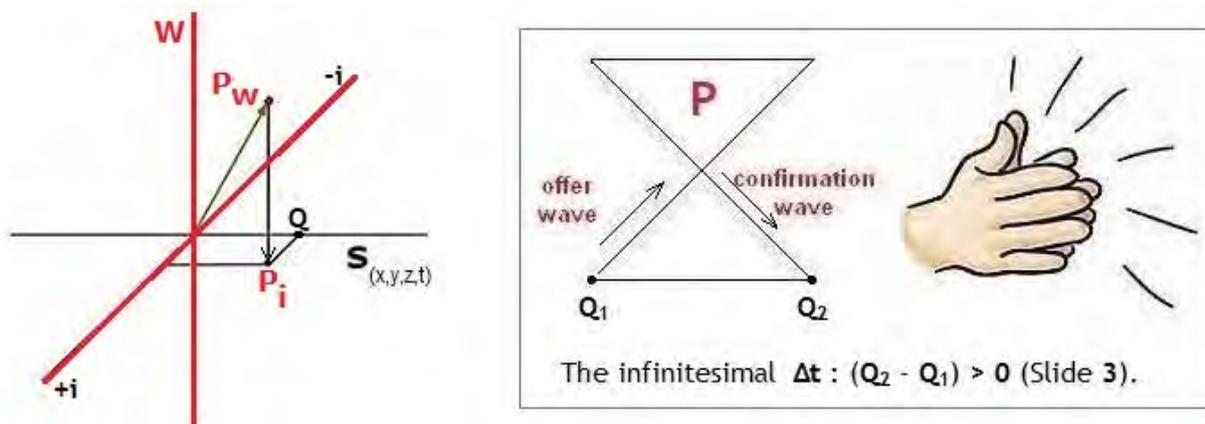
Fig. 8. Read also Kevin Brown.

We want to recover the infinitesimal transition Δt & fundamental spin, projected on spacetime points 'here and now'. No "spacetime curvature".

I will use the *ambient* infinite-dimensional Euclidean space in which all manifolds live (read above), and will ask the reader to imagine that the curved line in Fig. 5 (it has to be "curved", otherwise we cannot take derivatives) is a section from his wristwatch, at the top of which we see point **12** in Fig. 9.1 below.

Imagine also that you are inflating *indefinitely* the wristwatch.
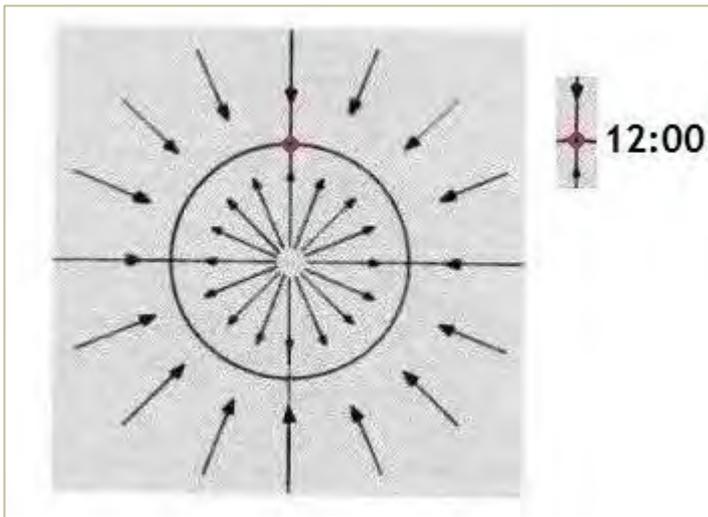
Fig. 9.1
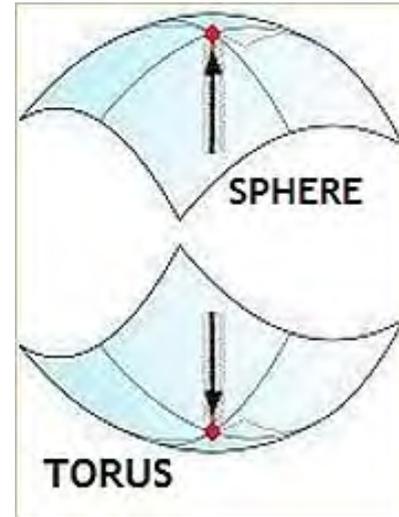

Fig. 9.2

Inevitably, at some instant the "closed" diameter of your wristwatch will reach the actual/absolute infinity and will become part of the *ambient* infinite-dimensional Euclidean space. Just a flat line (Fig. 6). The diameter will **break** at points **9** and **3**, and the **center**[6] will **fuse** with the flat line at point **12**. But you are a brave guy and keep going, until you trespass the **breaking** point and find out that you are now in a torus (Fig. 9.2). It is like inverting a 4D right rubber glove 'inside-out' into a 4D left rubber glove.

But what if the physical, 4D spacetime is topological **superposition** of your sphere-and-torus states? Then you will find out that you actually live in CPT invariant world. Just keep in mind that the sphere-torus transitions occur *simultaneously* at *all* point from the diameter of your wristwatch (Fig. 9.1).

The common objection to my model of spacetime is that it is speculative. But let's face it: the spacetime has its own properties and faculties, which *cannot be derived from the physical stuff that lives in it*. For example, the perpetual *calibration* of rods and clocks in "meters of light-travel time" (E.F. Taylor and J.A. Wheeler). We take for granted that the spacetime does not exist *independently* from its physical source, but, on the other hand, the spacetime has its own properties and faculties, which we assume are rooted on 'something else',[3] namely, on the *atemporal* Platonic realm.

Another objection is that the model does not offer math. True, but the fault is not mine: there is no mathematical presentation of the *action* of spacetime on its source, as 'energy from geometry' (Hans Ohanian). Watch Dianna Cowern and see the unsolved problem here. It is widely known since the inception of GR in 1915, but has been quietly swept under the carpet.

Perhaps the core idea in Fig. 8 is indeed very difficult. Let me try to shed some light on it. Think of the *atemporal* offer wave & confirmation wave (*ibid.*) as "inhaling & exhaling" of the Universe. To quote David Schiller, before Zen, mountains are mountains and trees are trees; during Zen, mountains are no longer mountains and trees are not trees; after Zen, mountains are once again mountains and trees once again trees (Fig. 10).

Q_1: [mountains and trees]   **Zen** Q_2: [mountains and trees]
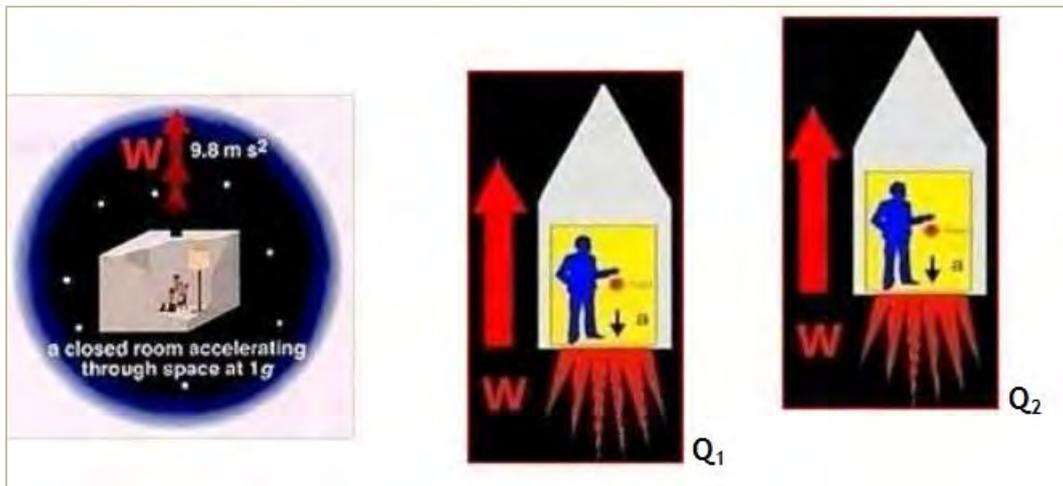
Fig. 10. The Zenon manifold [7] is <u>not</u> infinitely differentiable (C^∞).

The infinitesimal ($Q_2 - Q_1 > 0$) is "explicitly nonzero and yet smaller in absolute value than *any* real quantity" (Wolfram). It is governed by the Zenon Connection[7] "during" (Fig. 11) the *atemporal* sphere ⇔ torus **loop**.


Fig. 11. See p. 1 in *RS Spacetime*.

This is the dynamical topology of 4+0 D spacetime in a nutshell. Read again *RS Spacetime* and notice the so-called *causal field* explained in the *Note* on pp. 8-9 in *The Fifth Force*. Again, the *causal field* is the arena at which the Platonic **matrix** performs its job: read Werner Heisenberg and see Slide 12.

NB: Everything said above (p. 1) is aimed at explaining the **common** *arena* of the **matrix** and its mental complement (qualia) called cognitive vacuum. Surely the Lorentzian metric "admits" the *asymmetry* of Time, but only because of the **self-acting** fifth force (p. 2). It's not like Baron Munchausen. Read Friedwardt Winterberg[8] and the doctrine of *trialism* at p. 3.

No physical stuff *alone* can reach "the edge of space-time" (S.W. Hawking and G.F.R. Ellis) and ultimately stop there. We must reveal the Platonic cutoff **W** (p. 24) and invent the *hypercomplex* analysis (Slide 2). The virtual Planck particles[8] have no 'windows' (Q3), just like Leibniz's monads.

We need physical theology[9] and Mathematics. *Soli Deo gloria* (John 1:1).

Not surprisingly, my manuscript was rejected by the talebans at arXiv.org. No problem. I can take it. Does a fish need a bicycle?

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Latest update: 31 August 2022, 23:32 GMT

References and Notes

1. John M. Lee, *Introduction to Topological Manifolds*, 2010, pp. 19-20.

2. Robert M. Wald, *General Relativity*, 1984, pp. 423-427.

3. C.J.Isham and J. Butterfield, On the Emergence of Time in Quantum Gravity. arXiv:gr-qc/9901024, 8 January 1999.

> Space and time are such crucial categories for thinking about, and describing, the empirical world, that it is bound to be ferociously difficult to understand their emerging, or even some aspects of them emerging, from 'something else'.

4. E. H. Kronheimer, Time-ordering and topology, *General Relativity and Gravitation* **1**(3), 261-268 (1971).

5. R. Geroch, E. Kronheimer, and R. Penrose, Ideal points in space-time, *Proc. Roy. Soc. Lond.* A327, 545-567 (1972).

6. I. Jané, The Role of the Absolute Infinite in Cantor's Conception of Set, *Erkenntnis* **42**(3), 375-402 (1995).

7. D. Chakalov (25 April 2021), *Quantum of Spacetime: Zenon Connection*, pp. 3-4, p. 25. Available at this http URL. The *Zenon Connection* is the infinitesimal shift $Q_1 \rightarrow Q_2$ (Fig. 10), executed by the Fifth Force (p. 2).

8. Friedwardt Winterberg, The clouds of physics and Einstein's last query. arXiv:0805.3184, 20 May 2008.

9. Albert Einstein (29 April 1924): "I find the idea quite intolerable that an electron exposed to radiation should choose of its own free will, not only its moment to jump off, but also its direction. In that case, I would rather be a cobbler, or even an employee in a gaming house, than a physicist." (Einstein to Hedwig Born. In *The Born-Einstein Letters*. Correspondence between Albert Einstein and Max and Hedwig Born from 1916-1955, with commentaries by Max Born. Macmillan, New York, 1971, p. 82.)

The idea of 'quantum jump' was suggested by Niels Bohr in 1913. The idea is ugly, to say the least. The founding father of Quantum Mechanics (QM) called it '*verdammte Quantenspringerei*' (Erwin Schrödinger). Einstein was totally against the '*spukhafte Fernwirkung*' ("spooky action at a distance") as well. The math (suggested by Max Born in a footnote) makes no sense. But it works, in line with the 'shut up and calculate' interpretation of QM. Can we do better?

The puzzle — why an ugly idea works for practical purposes? — is rooted on the "non-unitary evolution" (Wikipedia) of a quantum-mechanical system "during" its measurement at the length scale of tables and chairs. But what is "non-unitary evolution"? As an illustration, think of converting apples to oranges — instantaneously and irreversibly. That makes no sense either. But what if the "apples" were *not* genuine apples? Perhaps in the quantum world *out there* (not at the length scale of tables and chairs), the "apples" are **Platonic**, not-yet-physical *oranges* (called '**John**'): Dead matter makes quantum jumps; the living and quantum-gravitational matter is smarter.

Once we resolve the problem with '*Die verdammte Quantenspringerei*' as an **artefact** from the *inanimate* measuring devices at the length scale of tables and chairs, we will have a new path toward quantum gravity. The first off task is the *energy* from gravity: it is *gravitalized* energy, as gravity does not and cannot have proprietary energy. Hint from QM: recall that, thanks to the Planck constant, electrons can never collide with the nucleus.

Can we suggest a new "quantization" of spacetime to eliminate the so-called "event horizon" (p. 6)? How is the *quantum of spacetime* [7] related to the *balance* (p. 12) of positive|negative mass? More on Christmas 2022.

As Arthur Conan Doyle remarked, when you have eliminated the impossible, whatever remains, however improbable, must be the truth (p. **2** and p. **9**). Namely, the *Zenon Connection* [7] — the infinitesimal shift $Q_1 \rightarrow Q_2 > 0$ in Fig. 10, executed by the Fifth Force (p. **2**) — must be the truth. In the first place, the *atemporal* **sphere $\Leftrightarrow$ torus loop** (Fig. 6) must be the truth. Read pp. **9-10** in *The Fifth Force: Proof of Concept* (text.pdf) and p. **6** in *Physics of Life: The Fifth Force* (history.pdf).

Let me suggest another illustration of the Fifth Force (p. **2**) to explain the Killing *vector* field (p. 10 in *Relative Scale (RS) Spacetime*). Suppose you hold a hot toast and spread butter on it. The butter will penetrate into the toast and will *change* its properties. But in our case, we (**i**) cannot see the butter *before* we spread it on the hot toast, nor (**ii**) separate the hot toast (the physical 4D 'glove') from its butter (the **Platonic** 'hand', p. **2**). People only introduce — by hand — a new 'butter field' (a.k.a. Killing vector field) and a bunch of 'butter conditions' (a.k.a. energy conditions) to speculate that the *total* (Sic**!**) energy of the buttered toast should be "positive". In our theory of 4+**0** dimensional spacetime [7], we introduce *positive* energy with a new **re-interpretation** of so-called "negative mass" (p. **5**). This is how the Fifth Force (p. **2**) executes the infinitesimal $Q_1 \rightarrow Q_2 > 0$ in Fig. 10. Then comes the new *causal field* (p. **8**): see Table 1 on p. 27 in BCCP.pdf.

For comparison, Lars Andersson, the leader of the research group *Geometry and Gravitation* at Max Planck Institute for Gravitational Physics, declared "all manifolds are assumed to be Hausdorff, second countable and C^∞, and all fields are *assumed* to be C^∞, unless otherwise stated" (p. 3 in The global existence problem in general relativity, gr-qc/9911032v4), and cautiously added (*ibid.*, p. 40): "It appears likely that some aspect of the picture sketched above will be relevant for the final analysis of the large data, global behavior of vacuum spacetimes". This individual never replied to my email messages in the past 20+ years. In ADM hypothesis, the infinitesimal shift in 4D spacetime is made *only* by matter and fields with positive energy density. Nothing else. What is your choice? Like Baron Munchausen maybe? Only the Unmoved Mover can do it, but we don't know the math (p. **15**).

In 1772, the French Academy of Science issued an official declaration rejecting meteorites: there are no rocks in the sky, so stones cannot fall from it. Period. The academicians were rejecting the claims of meteorites until 1803, when a huge shower of meteorites rained down in France, and it was already impossible to deny such "anomalous" facts. Now is 2022. I will have to go public and try to trigger a new paradigm shift. But it will be a terribly protracted process, and we face an *enormous* climate catastrophe. **Time is running out!**

The Zenon Manifold [7]

This note is intended to mathematicians (Fig. 3) interested in Physics: read pp. **9-10** in *The Fifth Force: Proof of Concept* and p. **6** in *Physics of Life: The Fifth Force*. Again, only the Unmoved Mover can fit the bill. But how? The task is non-trivial (Fig. 10), because the arrow of causality must *not* be empowered by any physical field nor by some almighty creature like Allāh. Enter the Fifth Force (p. 2). The challenge is strictly mathematical (p. 11): every point has intrinsic structure (Fig. 4), dynamics and topology (Fig. 6).

In 4+**0** D spacetime (p. 10), the "intuitively clear" idea that the distance from a point *to itself* were "zero" is amended with a new notion of '**zero**': the Universe as **ONE** at **sub-photon** level **W** "inside" null intervals (Fig. 6).

W: point zero/infinity
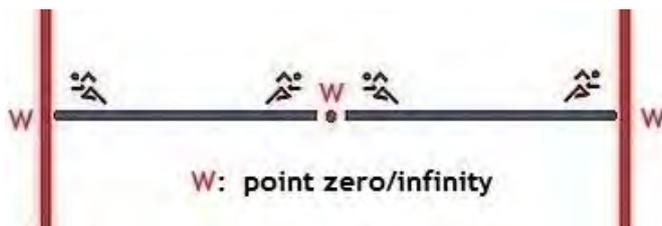
The Universe is like an unbroken ring with no circumference, for the circumference **W** is **nowhere** and the center **W** is everywhere.

How do we *split* the geometric point that "has no part" (Euclid)? Check out *the general rule* (1 + **0** = 1, rule.pdf) and the *atom of geometry* below: the elementary step **P** → **Q** (Fig. 8) replaces the 'quantum of time' (chronon).

FUTURE

Interface 'now'
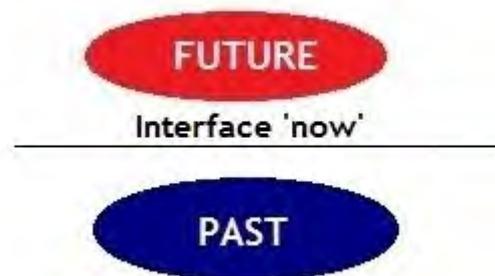
PAST

P (potential future) → **Q** (past)

Physicists believe their manifolds are Hausdorff, second countable, and C^∞, and all fields are also *assumed* to be C^∞. **JAIN**. To watch my video lecture *Spacetime Engineering 101*, follow the instructions in the first paragraph in *Modified Gravity*. The arrow of Time along **W** (*ibid.*, pp. 11-12) can only be recovered together with the 3D space. It's a bundle.

Here we enter the most difficult part of the theory: the "breathing" of the Universe by its 'two modes', which illustrates what happens "during" Zen.

Read pp. 8-9 above, pp. 12-15 above, and pp. 11-12 in *Modified Gravity*.

Four regions of asymptotically flat 4D spacetime
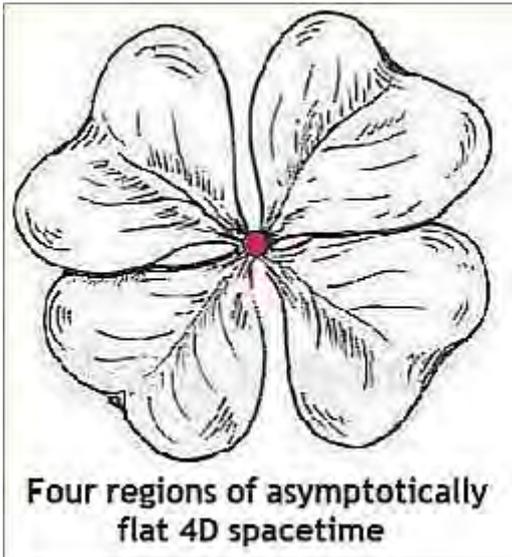
The "open" lily "during" Zen yields four regions of asymptotically flat 4D spacetime with *inverted* (3+1D ⇌ 1+3D) spacetime dimensions. The axis W of the arrow of Time is collapsed into the red dot below.
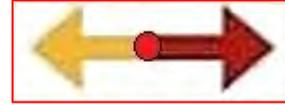
Can we recover the arrow of Time W together with 4+0 D spacetime (pp. 12-15 above)? At the instant 'here and now', the four leaves of the lily are "closed" along the arrow of Time.

Notice that the "breathing" of the Universe "during" Zen, by inhaling (open lily above) and exhaling (closed lily pointing to the arrow of Time W), takes place at null surfaces stacked along the radius of the expanding balloon (depicted below) made by consecutive physicalized events 'here and now'.
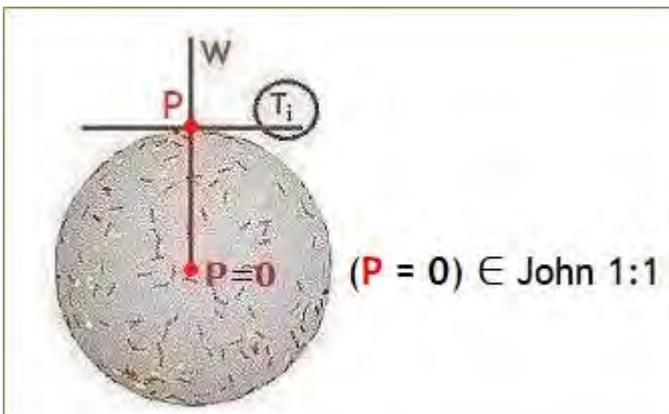
The red dot P along W belongs to the event *here and now* (P → Q) from the arrow of Time: read p. 3 in curvature.pdf. The picture at left shows only the case of global positive curvature (Ω >1), but the *asymptotically* flat 4D spacetime is created by *atemporal* sphere ⇔ torus loops depicted in p. 9 above. See also p. 8 in *Modified Gravity*.

At the end of the day, we should reach Quantum Gravity: read p. 9 (last) in *Spacetime Engineering 101*. The current model of gravity is for the birds.

Clearly, a lot of work is needed to recover the physical 3D space with the four asymptotic "runners" pictured above, together with the arrow of Time. The task boils down to replace the 'ideal points' — "some of these ideal points can be interpreted as singular points of *M*, others as points at infinity"[5] — with the Platonic (W) points above. Feel free to contact me by email, I can say much more. The challenge is tough, but recall Henry Ford: whether you believe you can do a thing or believe you can't, you are right.

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